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CONTENTS

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THE
INDIAN JOURNAL OF SURGERY

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RECONSTRUCTIVE SURGERY OF BLOOD VESSELS*

BY

R. NIGAM, New Delhi.

It is a distressing fact that a certain proportion of comparatively young men attend hospital for symptoms of vascular insufficiency in the lower limbs, and a fair number of these cases require amputation. Vasodilator drugs and sympathetic denervation give relief in the early stages of the disease, but amputation is only postponed, not prevented. When the cause of ischaemia in a limb, is disease leading to thrombosis of the major axial vessels, a reasonable method of treatment would be, to either, disobliterate the diseased blood vessel, or to bypass the obstructed segment, and thereby improve the overall circulation of the limb. This procedure would, however, be applicable only to those cases, where the disease is segmental in distribution and not of a diffuse nature. A considerable amount of literature has accumulated on the subject of reconstructive surgery in obliterative vascular disease; and notable contributions are those of Crawford and DeBakey[6], Linton[12], Lynch[10], Lynn[14], and Rob[19]. The object of this work was primarily to study and report on the scope of reconstructive surgery in the treatment of obliterative vascular lesions of the extremities, and, in particular, of those of the lower limbs. A few cases of allied vascular lesions such as arterial embolism, and aneurysms, have also been studied.

Clinical Material

The cases were studied for evidence and degree of vascular insufficiency, and their suitability or otherwise for reconstructive procedures (Jones and Steiner[10]). Physical examinations were made for coldness, paraesthesia, discolouration, presence of ischaemic ulcers and gangrene, colour changes of the fingers or toes, presence or absence of associated phlebitis, pulsation of vessels, signs of inflammation and stupor. A history was taken with reference to specific disease, diabetes, use of drugs, family history and personal history of cardiovascular disease. Laboratory investigations on corresponding lines were carried out. Pertinent investigations included colour changes of the toes with posture in suitable cases, claudication distance, skin temperature readings using a thermocouple, and response after application of warmth or after spinal anaesthesia. Arteriography of the peripheral arteries, as well as of the aorta, was an important method of investigation, and was the basis of selecting cases for

*Paper read at the Annual Conference at Jaipur in December 1959.

reconstructive surgery, and also on deciding the type of operative procedure to be employed in a particular case (Julian[11], Jones and Steiner[10]). Visualisation of the peripheral arteries was undertaken by the percutaneous injection of 50% diodone. In quite a few cases, a block existed in the larger proximal vessels *viz*: the aorta or the aortic bifurcation and the common iliac arteries. In order to study the entire vascular tree of a limb, aortographic examinations were done in the majority of cases. For the abdominal aorta, the percutaneous translumbar route was adopted, and approximately 60 aorotographic examinations were undertaken during the course of this work. The technique employed has been reported elsewhere (Nigam et al[17]). Retrograde catheterisation of the abdominal aorta was considered to be an unsafe procedure in patients with an already poor circulation in the lower limbs. Retrograde catheterisation of the thoracic aorta, through the brachial or carotid arteries, was carried out in cases of aneurysms of the thoracic aorta and its branches.

From tables No. I and II it will be observed that the majority of cases were between 20 and 30 years of age and would be ordinarily classed as cases of Buerger's disease or thromboangeiitis obliterans. The older ones would belong to the group of arteriosclerosis. There is quite a lot of confusion in the clinical diagnosis of the so called Buerger's disease. The histological features of arteritis and phlebitis with surrounding fibrous reaction, is an established feature of this disease. Winewater and Buerger's clinical description of this disease requires some modification (Collins and Wilenskey)[4]. The racial predilection to the Jews, and the invariable association with smoking have been disputed. To begin with, it is a segmental inflammatory obliterative disease of the arteries and veins, being almost entirely confined to the medium sized vessels such as the lower femorals and popliteals occurring in young men, involving the extremities and rarely the viscera also, producing ischaemia of the tissues and frequently leading to gangrene. The large vessels *viz*: the aorta, common or external iliac arteries are never affected by this disease. From a clinical study of the cases, besides age and sex, there are no clear cut facts to distinguish Buerger's disease from obliterative arteriosclerosis. Perhaps the sub group 'Juvenile arteritis' in a classification of obliterative vascular lesions of the lower limbs as put forward by Boyd[1], includes the clinical features of Buerger's disease. Obliterative vascular lesions in the lower limbs are segmental to begin with, and only in the later stages does thrombosis involve the entire peripheral vessel, beyond the site of

Table No. I

Cases of obliterative vascular lesions of the lower limbs, observed in Surgical Unit No. I Medical College, Hospital, Nagpur, during a period from 1948 to 1959,

Age in years.		No. of cases.
Under 20	...	1
21 to 25	...	22
26 to 30	...	18
31 to 35	...	10
36 to 40	...	9
41 to 45	...	2
46 to 50	...	1
51 to 55	...	3
56 to 60	...	1
Males	...	66
Females	...	1

Table No. II

Types of Vascular lesions

Cases studied	...	45
Obliterative vascular lesions	...	32
lower limbs	...	30
upper limbs	...	2
Aneurysms	...	9
Arterial embolism	...	4

block. Reconstructive surgery in these cases, where the block is segmental, has a definite place, though the number of such cases is comparatively few (Rob[20], Mylie and McGuinnes[15], Crawford and DeBakey[6]). Table No. III and Fig. Nos. 1 to 8 show the site of block observed in some of the cases under review.

Table No. III

Site of obstruction in vessels

1. Abdominal Aorta	...	1
2. Common Iliac	...	7
3. External Iliac	...	1
4. Common Femoral	...	4
5. Superficial Femoral	...	3
6. Popliteal	...	13
7. Posterior Tibial	...	1
8. Brachial	...	2

Selection of cases

With the introduction of newer methods of treatment, employing direct surgery on the blood vessels, it has made it possible to review the entire approach to the management of obliterative vascular disease. The

Fig. 1
Translumbar aortogram. Block of abdominal aorta.

Fig. 2
Block of left common Iliac artery.

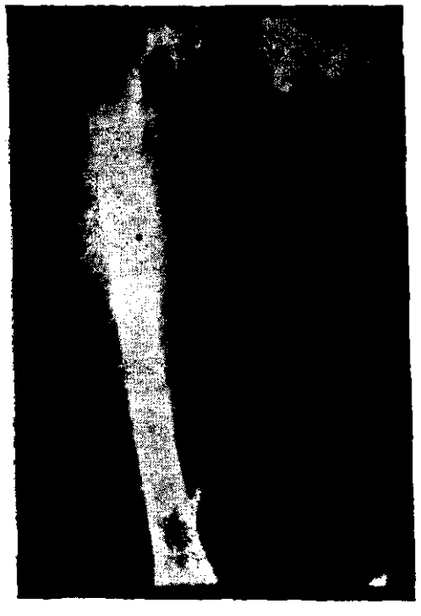


Fig. 3
Block of the Common Femoral artery. Note the distal end of vessel has filled clearly.

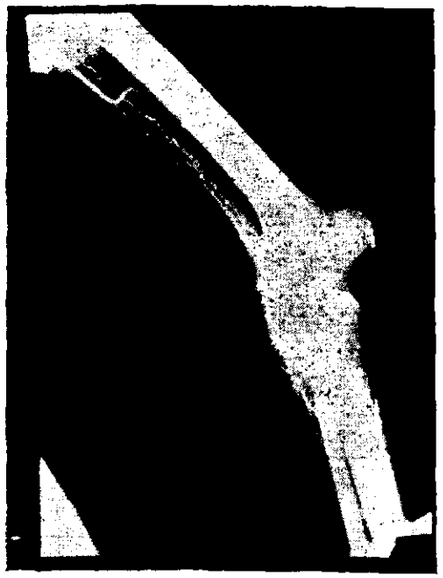


Fig. 4
Block of Superficial Femoral artery.

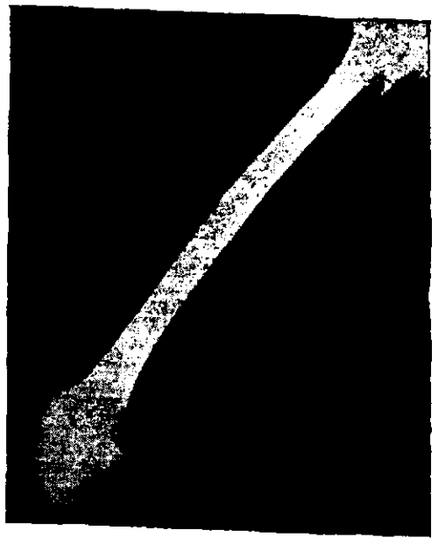


Fig. 5
Block at Femoro-Popliteal junction

Fig. 6
Block of Popliteal artery.

Fig. 7
Block in Brachial artery.

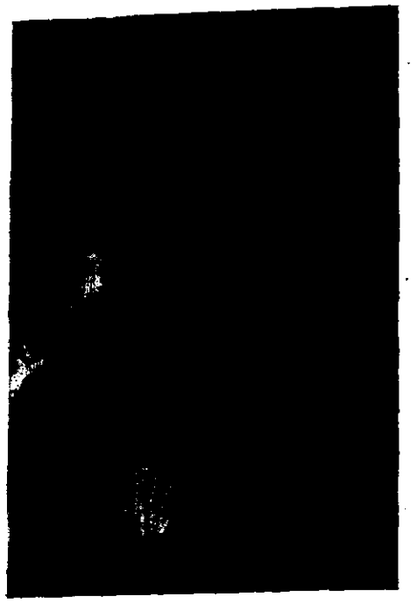


Fig. 8
Segmental block right common iliac artery.

treatment thus far available consisted of improving the circulation by vasodilator drugs, sympathectomy, and where this failed, amputation as a last measure. Lumbar sympathectomy is a valuable procedure in obliterative vascular disease involving vessels below the popliteal artery, and in those cases where the lesion is of a diffuse nature. Sympathectomy, essentially, improves the circulation of the skin and hardly, if at all, affects the circulation in the muscles. By improving the circulation of the skin, healing of ischaemic ulcers is expedited, and gangrenous areas separate quicker. A more restricted amputation is often sufficient. Sympathectomy does not relieve intermittent claudication in cases with segmental block in the aorta or in the common iliac arteries.

Reconstructive surgery is an additional procedure in the treatment of cases with segmental arterial block of the larger blood vessels. Thrombo-endarteriectomy of the affected segments (Cannon and Barker[5], Muller[16], Pratt[18]), or a bypass of the segment by a vascular graft has a definite place[4] (Crawford[6], Glenn[8], McAllister[15], Rains[19], Shaw[22]). The criteria for selection of cases have been defined by Linton[12] and are given in Table No. IV.

Table No. IV

Critetria for reconstructive surgery

1. Obstruction in proximally placed arteries, sufficiently high up in the vascular tree.
2. Availability of a suitable graft.
3. Adequate distal flow.
4. Good arteriograms.
5. Judicious use of anti-coagulants.
6. Rigid asepsis.
7. Avoidance of a dead space.
8. Avoidance of trauma to intima.

Out of 67 cases only 32 cases were considered suitable for a detailed arteriographic study, and some of these were explored with a provisional diagnosis of a segmental block. Only 20 cases were finally found to be fit for a reconstructive procedure. The remaining 12 cases, showed at operation that there was a diffuse obliterative disease, or that the distal vessels, beyond the block, were too small for accomplishing an anastamosis. Reconstructive procedures were not undertaken in such cases.

Treatment

Two types of reconstructive operation were undertaken :—

1. Thromboendarteriectomy.
2. Bypass using a veingraft or a synthetic prosthesis.

Out of twenty cases selected, ten cases each were submitted to each of the two

procedures. At the commencement of the work, more cases were subjected to thromboendarteriectomy than to the bypass operation. This was primarily due to lack of sufficient experience in handling vessel grafts and also due to a lack of perfection in the technique of vascular anastamosis. Autogenous vein grafts were employed in some cases (Jahnke and Seeley[8]), using the long saphenous vein, and this procedure was used in a segmental block of the femoral and popliteal arteries. Synthetic tubular prosthesis, crimped, of the Edward Tapp type, were used to bypass the iliac and femoral arteries. Homologous arterial grafts were not used in this work. However, in the laboratory, homologous arterial grafts, including synthetic tubular prostheses, were extensively employed in the dog, to gain experience in the technique of vascular anastamosis. The details of the experimental work will be the subject of another communication.

I. Thromboendarteriectomy

The cases submitted for a thromboendarteriectomy were as follows :—

Site of block	*No. of cases*
Common Iliac Artery ...	3
Common Femoral Artery ...	5
Femoropopliteal ...	2

The exposure of the blood vessels was by the usual classical incision. An extraperitoneal route was utilised for the common iliac artery. The femoral artery and the femoropopliteal junction were best exposed by a medial and posteromedial route (Brinkley and Wylie[2]). This route was found to be superior to a posterior approach, and gave adequate access to the femoral artery in the Hunter's Canal, as well as to the popliteal artery posteriorly. Both lower limbs of the patient were draped independently resting on a sterile sheet. The patient's position on the operation table could be conveniently changed from the supine to the prone position, giving adequate access in the exposure of the blood vessels. Intra-tracheal gas and oxygen anaesthesia was preferred to spinal anaesthesia, since the blood pressure could be adequately maintained by fluid replacement. A fall in blood pressure is detrimental to a successful anastamosis, there being greater chances to a thrombus developing at the suture line.

Hypothermia was used in a few cases of aortic aneurysm but this was not used as a routine procedure. The entire segment of the thrombosed vessel was exposed and was followed up and down to the part where the vessel felt normal. Arteriotomy was made by a vertical incision and the clot, including the intima and a part of the media, was shelled out and excised. A cleavage plane was developed by blunt dissection. In some cases a wire stripper was employed through two separate arteriotomy incisions. The intima of the cut proximal and distal segments was anchored to the media by a few interrupted 5 "O" arterial silk sutures. The arteriotomy incision was closed by a continuous arterial stitch. After the haemostatic clamps were released, a slight ooze occurred from the suture line which was staunched by gauze pressure. The surrounding soft tissues were approximated by interrupted sutures and the limb was draped in a light dressing. Antibiotics were administered to all cases. Heparin 10 mgm. in 100 cc. saline was administered regionally (Freeman and Gilfillan[3]). General heparinisation was not employed and was considered to be unsafe, owing to the frequent formation of a haematoma followed by infection.

II. Bypass Procedure

This was undertaken in the following cases :—

(*a*) Bypass with veingraft	6 cases.
Common Femoral	2 ,,
Femoropopliteal	4 ,,
(*b*) Bypass with synthetic graft	4 ,,

Site of block common and external iliac arteries.

The cases selected for this procedure had symptoms of vascular insufficiency and the block was segmental and located in the large proximally placed arteries. Cases with obvious gangrene, and particularly those with superadded infection, were excluded. Arteriographic visualisation of the exact site of block and the assessment of an adequate distal flow were the criteria for selecting the cases. In some instances the distal limit of the block could not be made out, since no filling was observed in the arteries beyond the block. These cases were explored and the reconstructive procedure was limited to those cases where the distal limit of the block could be determined. An operative retrograde arteriogram was employed in a few cases, on the operation table, but was too cumbersome to be utilised as a routine procedure.

The saphenous vein from the groin to the lower third of the thigh was carefully dissected out. The tributaries were carefully tied with 5 'O' arterial silk. The lumen of the vein was flushed with a dilute solution of heparin. The graft was reversed and the proximal end was sutured, end to side, to the artery below the site of block. The distal end of the graft was then passed through a tunnel made by blunt dissection in the subcutaneous tissues, and sutured, end to side, to the artery above the block. Haemostatic clamps, which had been applied prior to the vessel anastamosis, were released, and a distinct filling of the graft with pulsations, was observed. The wound was carefully closed and a light dressing applied. In both thromboendarteriectomy and bypass operation, a concurrent lumbar sympathetic denervation was performed in all cases. In four cases with segmental block of the common and external iliac arteries, a bypass with an Edward Tapp, crimped, synthetic tubular prosthesis was employed.

Results

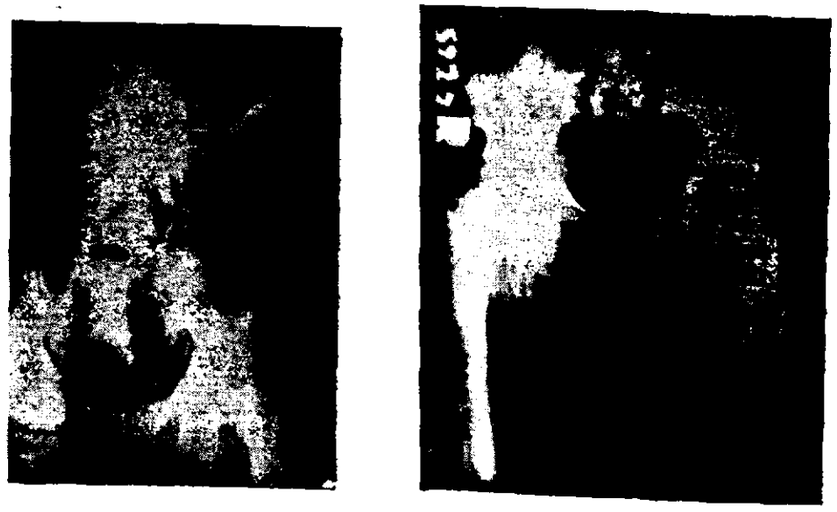
Symptomatic improvement, with warmth and relief from ischaemic pain, was observed in all cases. Actual re-establishment of a definite pulse below the level of block, was found only in a few cases. The results of three cases are shown in Figs. 9 & 10, 11 & 12, 13 & 14. The response in the remaining cases was symptomatic, but arteriographic visualisation, or the presence of a distinct pedal pulse was lacking. The success was therefore not quite as dramatic as is reported in the literature.

Treatment of aneurysms

Ten cases of aneurysms were investigated. The details are shown in Table No. V.

Table No. V

Site of aneurysm.	No.	Treatment.
1. Thoracic aorta ...	4	Two cases treated with polythene cellophane cover, and two cases with intracavitary wiring (Fig. Nos. 15 & 16).
2. Abdominal aorta ...	1	No surgical treatment employed.
3. Popliteal ...	2	One case treated by proximal ligation. One case treated by excision (Fig. No. 17).
4. Innominate ...	1	No treatment (Fig. No. 18).
5. Carotid ...	1	Treated by excision. No graft could be inserted to replace the internal carotid artery as the distal end of the artery was very short. Patient developed hemiplegia which later cleared up (Fig. No. 19).



Figs. 9 & 10

Pre-operative and Post-operative aortograms of a case with obliteration of left common iliac artery. Disobliteration was done with a successful result.

Figs. 11 & 12

Pre-operative and Post-operative arteriograms of a case with segmental block of the right common femoral artery treated by disobliteration of the artery.

Figs. 13 & 14

Pre-operative and Post-operative arteriograms of a case of segmental block of the popliteal artery, treated by dis-obliteration.

The relative incidence of aneurysms to obliterative vascular diseases is small in the present series of cases. Most of the cases observed were too far advanced for reconstructive surgery. None of the cases was submitted to resection and replacement by a graft.

Arterial embolism

There were four cases of arterial embolism in patients suffering from auricular fibrillation, which were referred as emergencies from the medical services of the hospital (Table VI). Two cases had an embolism at the bifurcation of the common iliac artery, and one at the bifurcation of the common femoral artery. The symptoms were those of a sudden ischaemic pain with coldness and cyanosis of the limbs. The site of block was localised clinically and this was explored. The clot was removed after arteriotomy and the lumen of the vessel was flushed out with heparinised saline. Circulation was re-established at the time of the operation. These patients were treated with digitalis and were also heparinised. In all four cases residual gangrene developed and amputation was required. The level of the amputation was however much lower than what had originally been contemplated. Possibly the delay in the institution of surgical treatment, was responsible for the development of residual gangrene.

Table No. VI

Arterial Embolism	Total 4 cases
Common Iliac	... 1
Common Femoral	... 2
Axillary	... 1

Fig. 15

Aneurysm of the Thoracic Aorta. (Ascending).

Fig. 16

Aneurysm of the Thoracic Aorta. Retrograde transcarotid Aortogram.

Fig. 17

Aneurysm of Popliteal artery. Arteriogram.

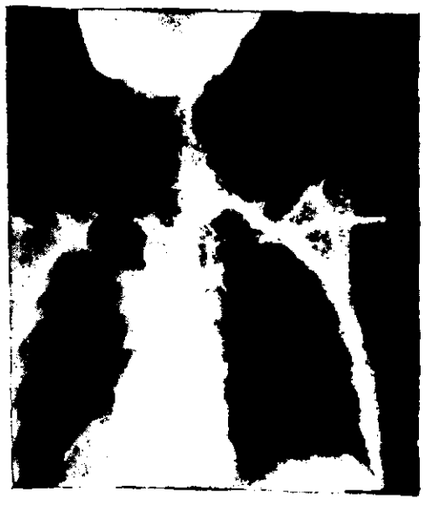


Fig. 18

Aneurysm of Innominate artery. Retrograde arteriogram.

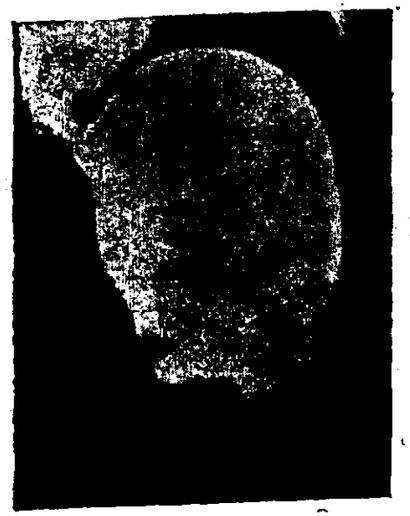


Fig. 19

Aneurysm of the Common Carotid artery. Arteriogram.

Discussion

An extremity can remain viable despite a drastic reduction of its blood flow. A blood flow less than 10% of normal can sustain a lower limb. Thus a wide range exists between the blood flow of a limb, in which some detectable features of vascular insufficiency exist, and another limb with impending gangrene. The usual methods of treatment by vasodilator drugs, and sympathetic denervation have their place, but the only procedure that will correct the overall reduction of the blood flow, is direct surgery on the axial artery, either to restore the lumen, or to bypass the obliterated segment by a vessel graft. This procedure, however, can only be applicable to a limited number of cases with localised block, situated in the larger blood vessels. Early and adequate evaluation of cases of intermittent claudication by arteriography, or preferably, by aortography, will enable an early detection of cases, where reconstructive surgery may be helpful. Reconstructive surgery however, does not replace the therapeutic importance of vasodilator drugs, nor that of sympathetic denervation. It is an additional procedure, and perhaps a very valuable one, in certain cases. No definite differentiation had been made, in this study, between the various types of obliterative vascular diseases. The selection for surgery was largely dependent on arteriographic findings. Perhaps, cases of obliterative arterial disease of inflammatory origin, with periarteritis and periphlebitis, and with diffuse peripheral thrombosis of the vessels, would not be amenable to this form of treatment.

Conclusion

1. Sixty-seven cases of obliterative vascular disease were studied, out of which 32 cases were subjected to detailed arteriographic examination, for determining their suitability or otherwise for undergoing direct surgery. Twenty cases were ultimately selected for either thromboendarteriectomy or a bypass procedure. Sympathetic denervation was done in all the cases in addition to direct surgery.

2. The symptomatic relief in such cases was good. Successful arteriographic restoration of good circulation was achieved in four cases.

3. Nine cases of aneurysms were studied. Some of the cases were treated by either intracavitary wiring, or by polythene cellophane cover, or by excision.

4. Three cases of arterial embolism were operated on.

5. Experimental work in the laboratory was undertaken on dogs, to gain practical experience in vascular anastamosis, using homologous arterial grafts, as well as synthetic tubular prosthesis.

Acknowledgements

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CONGENITAL BLADDER NECK OBSTRUCTION*

BY

S. P. SRIVASTAVA and N. D. TAHILANI, Agra.

Lower urinary obstruction is an uncommon but important urological problem in children and adults. Marion defined diseases of the bladder neck as dysuric disturbances similar to those due to hypertrophy of the prostate but caused by alterations of the bladder neck without any visible lesions in it and not attributed to nervous disorders. Albarran called them 'Prostatiques Sans Prostate.'

The condition seems to have been first described by Langenbach who in 1802 described the presence of urethral valves as the cause of obstruction. This has been much discussed by Young who in 1912 published a large series of cases and showed that valves were not uncommon, but because it is difficult to define them, their presence as a common cause of lower urinary obstruction is not widely accepted.

Guthrie (1833) described another important but uncommon cause of lower urinary obstruction found in adults that is, a bar at the vesical neck which could obstruct the flow of urine from the bladder. He considered it to be due to inflammation at the vesical neck which produced loss of elasticity and contracture of the internal sphincter. Mercier and Civall (1858) also described the same conditions occurring in young men. French writers considered this clinical condition to be due to lack of bladder tone and muscular atrophy. Chetwood, Fuller and Keys suggested that the commonest cause was *stricture of the prostatic urethra*. Young (1913) reported a large series of this condition and labelled it (Badenoch 1949) 'Median bar obstruction' or 'Fibrous prostate in adults'. Marion (1927) was the first to attribute it to a congenital factor *viz.*, hypertrophy of the internal sphincter at the vesical neck and which he called 'Maladie du col'. He later (1933) considered that it could be caused by any of the following three pathological types of lesions :—

1. *First type.*—Congenital—due to hypertrophy of the musculature of the internal sphincter not unlike pyloric stenosis. The symptoms in this type may occur late-till middle age.

2. *Second type.*—The musculature of the internal sphincter is infiltrated with fibrous tissue leading to gross fibrosis of the vesical neck. This type comprised the largest number of cases in this group, the commonest age being between 40 and 50 years.

3. *Third type.*—Localised hypertrophy of the prostatic glandular tissue in the region of the vesical neck in addition to the fibrosis present.

The condition has since then been called Marion's disease. Depending upon the onset, Marion has described two clinical types of diseases :—

1. *Congenital.*—Where symptoms appear in early age but are slow in progress. The patient may however ignore these symptoms in the early part and may turn up for

*Paper read at the Annual Conference of the A.S.I. at Jaipur in December 1959.

consultation as late as 50 years. It is fairly common to get these cases presenting symptoms between 18 and 30 years.

2. *Acquired.*—Where symptoms of prostatism appear at more or less advanced age but usually develop rapidly. Antecedent chronic urethritis and stricture may be factors in the causation and symptoms persists even after its treatment. Urethral sepsis is a complication rather than an antecedent and integral part of the syndrome.

William (1954) has recently sub-divided cases of the congenital type into three groups :—

(*i*) Male children under 3 years with chronic retention and ureteric dilatation.

(*ii*) Cases in whom diverticulae dominate the picture.

(*iii*) Children of both sexes with chronic retention and large hypotonic bladder. This he considered to be not due to bladder neck contracture, but to passive dilatation and he calls it as ' mega-ureter—megacystis syndrome.'

Badenoch (1949) reported his series of 26 cases, all males, and attributed its origin to the congenital factor - hypertrophy of the muscle of the bladder neck notwithstanding the fact that it occurred in middle age. In the patients who reach adult life the obstruction is slight at birth but is slowly progressive. At first the diverticulum and dilated ureter takes up the back pressure but eventually total retention, acute or with overflow, results. Many cases have been considered to be due to fibrous prostate and are cured by prostatectomy but Badenoch thinks that in these prostatotomy and wedge resection would have had beneficial results. The fibrous prostate may be the normal gland in old age without hyperplasia. In his series it was almost invariably associated with diverticulum of the bladder (which he found in 3 cases) or very rarely with bilateral hydro-ureters. The congenital origin has recently been accepted by Burns et al (1957) and by Melick and MNaoyke (1957). To this Young (1958) has added a group which he labels as 'dyskinesis of the detruser and sphincteric mechanism of the bladder' and in which dysuria is the presenting symptom. Nanson described bladder diverticulae in 29 out of 84 cases and hydronephrosis in four cases only. Nanson says it is a sound axiom that the presence of diverticulum spells bladder neck stenosis until proved otherwise.

Bugbe and Welfstein (1923) reported hypertrophy of the verumontanum as another very rare factor which could cause lower urinary obstruction in infants and young children.

Other extremely rare conditions that can produce this syndrome as reported are diverticulum of the seminal vesicles and congenital stricture of the urethra.

Pathology

Marion described three different findings from the fragments taken out of the bladder neck as described above in the three types though he did not attach much importance to it as they did not allow full study of the bladder neck.

Bodian did biopsy of five fatal cases and found that besides bladder hypertrophy and dilatation, the posterior urethra was not dilated but its wall was hypertrophied up to the verumontanum which was prominent. There was evidence of enlargement (elongation) of the Prostatic gland along the entire prostatic and membranous urethra with a collar at the bladder neck. There was decrease of muscular and glandular tissue

Fig. 1

Bilateral hydronephrosis and hydroureters with dilatation of bladder and diverticulum (See Fig. 2).

Fig. 2

Dilatation of bladder with Diverticulum (lateral view).

Fig. 3

A stone in the left ureter and another in the bladder diverticulum (pyelogram Fig. 4).

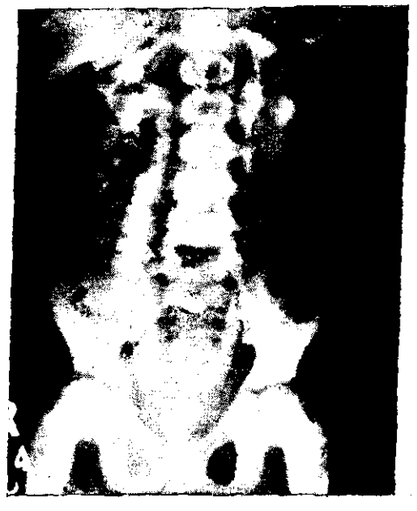

Fig. 4

Bilateral hydro-ureter and hydronephrosis in a case with one stone in the left ureter and one in the diverticulum behind the bladder. Removal of stones and resection of bladder neck was done.

and increase of fibroelastic tissue in the prostate. He did not find evidence for incriminating imbalance of the intrinsic nerve supply because the number of ganglia in the wall of the bladder were not found to be decreased as in one of the cases of Marion's disease.

Bodian feels that the fibroelastosis of the elongated prostatic tissue causes a partial or complete obstruction over a long urethral segment from the bladder neck up to the membranous urethra below the verumontanum.

Bodian thinks that the collar round the bladder neck plays a subsidiary role in the mechanism of obstruction while Keith Thomas (1959) believes, as does Marion, that the bladder neck is the main obstructing agent—Operations on the bladder neck alone have led to cures.

Table No. 1

Age Group.	Class.	
0— 5 Yrs.	4	Congenital Types.
6—10 Yrs.	2	
11—15 Yrs.	1	Acquired Clinical Types.
40—50 Yrs.	3	
50-60 Yrs.	4	

Clinical features

The characteristic clinical features of this syndrome are:—long history of dysuria which may be in the form of difficulty in starting the act, poor voiding stream, feeling of incomplete evacuation of bladder, frequency with burning, either during or at the end of the act of micturition, or collicky pain in the bladder region or perineum due to spasm of the bladder. The other presenting symptoms may be, retention of urine - acute or chronic - with overflow incontinence, recurrent attacks of cystitis, eneuresis, haematuria or high fever with rigors. Very occasionally the patient may come with permanent non-healing supra pubic fistula. Malick and Naryke (1957) have reported newly born patients who come in uraemic states due to unrecognised bladder neck obstruction. Pyuria was the commonest clinical feature in the series of Burns et al (1957). The urinary infection when present may be chronic and intermittent due to cystitis or pyelonephritis uni - or bilateral. Malnutrition and acidosis occur in the later stage of the syndrome.

Clinical features met with in the present series are described in table II.

Table No. 2

Showing Presenting Symptoms.

Particulars.	Children.	Adults.	Total.
1. Dysuria alone ...	3	2	5
2. Dribbling of urine dysuria ...	1	1	2
3. Retention of Urine :—			
(*a*) With previous history of dysuria ...	3	4	7
(*b*) Without previous history of dysuria ...	1	1	2
4. Pyuria ...	1	1	2
5. High fever with rigor ...	2	—	2

Fig. 5

Bilateral hydroureter and hydronephrosis with dilatation of bladder and cystitis. Conservative treatment with antibiotics and dilatation was done.

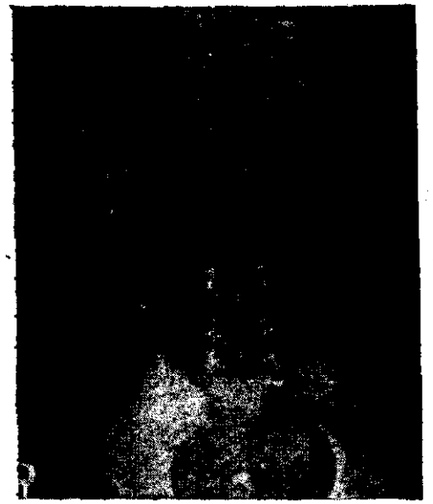

Fig. 7

Bilateral hydronephrosis after descending pyelography (same case). Resection of bladder neck was done.

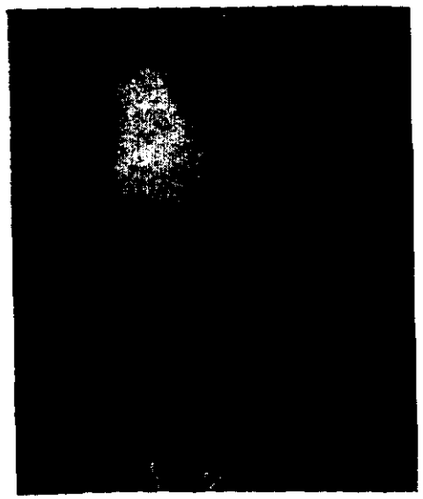

Fig. 6

Bilateral hydronephrosis after ascending pyelogram. Resection of bladder neck done.

Fig. 8

Unilateral hydronephrosis with reversed position of kidney Resection of bladder neck done.

Complications

The various complications that can develop in this syndrome apart from retention of urine are, infection and stone formation due to the stasis. Of all these the most dangerous are those due to back pressure, dilatation of bladder with or without diverticulae and bilateral hydro-ureter with hydronephrosis. The renal damage is further enhanced by the vesicoureteric reflux which occurs in advanced cases. The complications met with in the series reported are described in table III.

Diagnosis

The disease has been met with mostly in children in our group and also as cases of prostatism in ages between 40 and 60 years.

All the cases reported here were males but Pacquain of Cornell Medical College, New York has reported its increased incidence in females. The ratio of males to females is three to one. However it is comparatively more serious in males.

Usually there is a long history of dysuria. Hence it is mistaken for stone in the bladder in children or median lobe enlargement in the aged.

A urethral catheter can be passed without any difficulty and so stricture of the urethra is easily excluded. Residual urine is estimated and sent for culture.

Cystoscopy constantly shows the presence of a well marked collar around the vesical neck which does not disappear, when the

Table No. 3

Showing Presence of Associated Lesions.

Particulars.	Children.	Adults.	Total.
1. Diverticulum of bladder ...	3	3	6
(a) Alone ...	—	1	1
(b) With bilateral hydroureter and hydronephrosis ...	2	2	4
(c) Stone in the diverticulum, hydronephrous and hydroureter ...	1	—	1
2. Dilatation of upper urinary tract only without diverticulum—(among 9 cases examined) ...	2	2	4
(a) Hydronephrosis alone (associated with stone in bladder) ...	1	—	1
(b) Hydro-nephrosis only ...	1	2	3
3. Stone in left ureter and diverticulum and hydronephrosis with hydroureter ...	1	—	1
With stone in bladder and hydroureter and hydronephrosis ...	1	—	1
4. Congenital Abnormalities :—			
a) Anteversion of pelvis of left kidney ...	1	—	1
b) Malrotation (lateral) of unilateral kidney ...	—	1	1

patient attempts to micturate. The bladder may show trabeculation with numerous sacculations in between, a well marked depression between the inter ureteric bar and the neck; the orifice of the diverticulum (when present) is nearly always seen in the region of the ureteric orifice. The ureter may open at the mouth or even inside the diverticulum. Stones, phosphatic incrustations or even pus may occasionally be observed in the bladder.

The presence of diverticulum in the bladder or of bilateral hydro-ureters with an appreciable amount of residual urine is a strong evidence of this disease. The diverticulum when present may be single or multiple, small or large.

As the cystoscope is withdrawn, the neck is seen protruding posteriorly as a concave pad which snaps forward as the beak of the cystoscope is withdrawn over it. Normally the posterior bladder neck shelves away into the trigone. Nanson also points out that during cystoscopy if the patient is asked to strain so as to micturate, the posterior lip of the bladder normally retracts out of the cystoscopic field while in the case of Marion's disease it fails to do so. It is this posterior rim together with the narrow internal meatus which is a very important observation during cystoscopy.

Intravenous pyelography and cystography should always be done. Cystography should be done both before and after the act of micturition to get an idea of the residual urine. Skiagrams should be taken in antero-posterior, oblique and lateral views so as to visualise the shape of the bladder which may show roughened irregular areas indicating early trabeculation. When diverticula are present, their position and number may be noted. They are seen on the postero-lateral wall or base of the bladder with well defined outlines which can be best made out in lateral skiagrams because in the antero-posterior views there is overlapping of shadows. In the lateral view, there may be a gap at the neck of diverticulum, which is due to the thickened muscular wall. Skiagrams taken after micturition shows the presence of the residual urine. In some cases it may be seen that the bladder has emptied into the diverticulum and the shadow of the latter persists after evacuation of the bladder cavity.

Another investigation which is helpful is delayed cystography. Deakins (1957) has pointed out that the child can live indefinitely with the congenital obstruction of the bladder neck alone; but once the vesico-ureteric reflux has developed so as to result in dilatation of the ureter and pelvis with super-imposed infection every moment becomes precious. In such cases, the duration of his life is directly proportional to the amount of viable renal tissue left. Hence early recognition of reflux and its prompt treatment is imperative. Delayed cystography is done by injection of 4 ounces of radio-opaque dye (Sodium Iodide 12·5% solution) into the bladder through a urethral catheter and asking the patient to retain the dye. In cases of young children the urethral catheter is clamped and left *in situ*. Skiagrams taken half an hour afterwards will show the presence of radio opaque dye in the ureters or even pelvis if the vesico-ureteric reflux is present.

In severe cases, pyelography will show elongation and tortuosity of the ureter which may result in the kinking of the lower ureter thus further accentuating the obstruction in the upper urinary tract. Deakin (1957) has shown that long continued stretching of the ureteric musculature lessens the ability of the ureteric wall to return to its normal size and mobility thus making the changes irreversible.

Fig. 9

Delayed Cystography shows hydroureter of left side. Resection of bladder neck was done.

Fig. 10

Reduplication of diverticulum shadow over that of bladder. Diverticulectomy and reimplantation of ureter of right side done.

Fig. 11

Photomicrograph of the resected vesical neck.

Ascending pyelography is very helpful to bring out the outlines of the dilated ureters and pelvis and should be done provided gross urinary infection is not present.

Suprapubic cystostomy has been indicated for diagnostic purposes in doubtful cases. The internal urethral meatus is found to be very narrow and tight and it fails to admit the tip of the little finger.

Urine culture is done to exclude the presence of urinary infection.

Edwards did a cine-radiography and found that the bladder was trabeculated with sacculations and, not infrequently, diverticulum formation. The posterior urethra was narrowed, the hypertrophied neck producing a collar like impression protruding intravesically. After relief of obstruction the bladder took a new configuration and contracted normally.

Treatment

The immediate problem is to recognise the urgency of adequate renal drainage and to employ the best surgical means to insure prompt relief of the obstruction at the renal level.

In cases in whom the urine reflux, which leads to strain on the kidneys, is absent, the problem is easy. The removal of cause at the vesical neck suffices. But where hydroureters and hydropelvis has occurred a careful regime of treatment is indicated.

1. Simple removal of the primary obstructive lesion alone is indicated for early cases having no changes in the upper urinary tract. Diverticulum in the bladder if present should be removed to avoid stasis and infection. It requires prolonged check-up to be certain of the progressive improvement.

2. Removal of obstruction with reimplantation of one or both ureters into the bladder in such a way that the vesico-ureteric reflux if present, may be relieved.

3. Removal of obstruction with prolonged drainage by prolonged indwelling urethral catheter or suprapubic cystostomy. This is indicated for cases with severe decompensation of the upper urinary tract and varying degrees of hydro-nephrotic atrophy of the renal cortex. In females indwelling catheter suffices, but in males there is a tendency for chronic urethritis peri-urethral abscess and urethral stricture to develop. Suprapubic cystostomy is preferable for prolonged drainage. Treatment of associated lesions of diverticulectomy has to be done through an intravesical or extravesical route.

Table IV

Treatment advised.

1. Removal of Obstructive lesion by a transvesical route :
   - (*a*) 1. Wedge resection.
     2. Resection of posterior half of the neck.
     3. Resection of the whole circular internal sphincter.
     4. Resection by diathermy of the posterior half of the internal sphincter and posterior segment of prostatic tissue up to the verumontanum (Keith Thomas).
   - 5. (*b*) Transurethral resection by :
     1. Punch.
     2. Section or resection of neck by prostatic resectoscope.
     3. Destruction by electro-coagulation by urethroscope.
   - 6. Retropubic approach-Posterior wedge resection, after vertical prostatotomy and Y V plasty of anterior wall of bladder and prostate (Burns, Young, Goebels).
2. Removal of associated lesions *e.g.* Deverticulum, stone etc.
3. Correction of vesico-ureteral reflux—Reimplantation of dilated ureters in a valvular fashion (Politane and Ledbetter 1958) or by Fuquas Technique (1938) at one or two sittings.
4. Ureterostomy by T. Tube or Nephrostomy to be followed by transurethral endoscopic resection of bladder neck (Deakins) contra-indications to this procedure :—
   - (*a*) Presence of diverticulum.
   - (*b*) Child below 4 years, where endoscopy is not possible.
5. *Conservative measures* :—
   Dilatation of vesical neck.
   Antibiotics.

Table No. V

Showing Nature of Treatment.

A: Surgical Methods—Total No. of cases subjected to Operation 13.

Particulars.	Children.	Adults.	Total.
1. Wedge resection of vesical neck :			
(*a*) alone ...	1	4	5
(*b*) with removal of stone ...	1	—	1
(*c*) with diverticulectomy ...	—	1	1
(*d*) with diverticulectomy and reimplantation of ureters ...	1	1	2
(*e*) with removal of stone from bladder and left ureter.	1	—	1
2. Supra-pubic cystostomy ...	1	1	2
3. Repeated operations which were as follows in one case...		1	1
I Stage—Suprapubic cystostomy			
II Stage—Widening the mouth of diverticulum			
III Stage—Wedge resection of vesical neck			
B. Conservative measures (Repeated urethral dilatations and antispasmodics) ...	2	—	2

Method of Relief of Obstruction at Vesical neck

Many operations which aim at cutting the internal urethral sphincter have been advocated. These have been described in table IV and the treatment undertaken in the present series is shown in table V.

The modern well-established method to cure the condition consists of wedge-resection of the vesical neck. This can be done by endoscopic transurethral section in older children or by transvesical route in infants or children below 4 years age, as the urethra in them is too narrow to permit any instrumental manipulation.

Each route is, however, not free from disadvantages.

The disadvantages of the endoscopic route are :—

(1) Poor visualization for adequate resection and control of bleeding.
(2) high recurrence rate.
(3) possibility of urinary extravasation and formation of urinary fistula.
(4) decreased semen volume (Sinotra 1957).

The transvesical route has the disadvantage of disturbance in the physiology of the bladder, though the procedure of resection is sure and devoid of the above risks.

Removal of Associated Lesions

Badenoch (1949) who believes in the presence of hydroureter or diverticulum in nearly every case suggested for the first

time, a careful search for this lesion and its treatment at the same sitting. The presence of diverticulum in the bladder is an urgent indication for the correction of the bladder neck contracture. The removal of obstruction alone leads to the persistence of infection due to stasis of urine in the diverticulum, which is impossible to eradicate and as the bladder empties into the diverticulum, there is no improvement in the act of micturition. Further more dangerous associated lesions in the diverticulum *e.g.* malignancy may be neglected. On the other hand, diverticulectomy alone leads to permanent urinary fistula or bilateral hydroureter. Hence both should be dealt with together at the same sitting. Enlarging the mouth of the diverticulum in the bladder or doing a preliminary suprapubic cystostomy before the excision of the diverticulum is strongly deprecated by Ward (1957). This leads to contracture of the bladder, making the next operation more difficult.

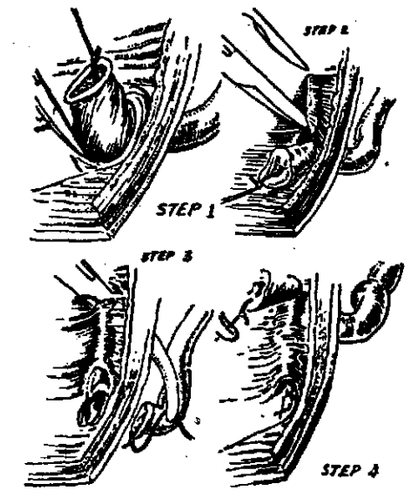

Fig. 13

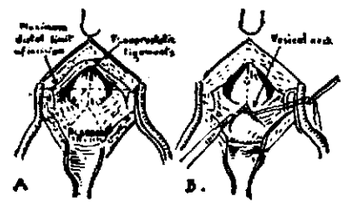

Fig. 12

(Burns, Young and Goel) V. Y. Plasty of anterior wall of bladder and prostate.

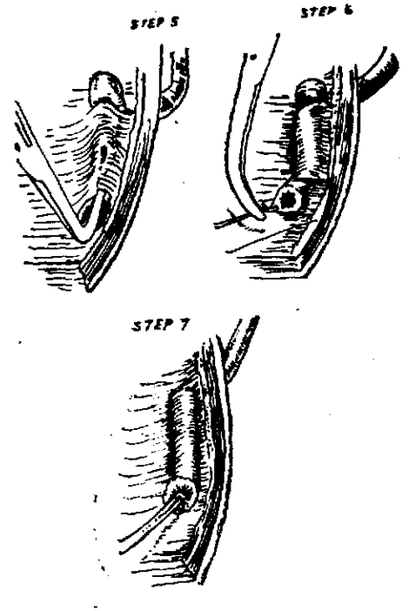

Fig. 14

Fig. 13 & 14—Operation of implantation of ureter in bladder (Politino).

Correction of vesico-ureteric reflux

The method of correction of reflux by ureteric submucous transplantation as described by Pasquier is illustrated in figures Nos. 14 and 15. The clinical result should not be considered as satisfactory unless the reflux when present is cured. In the series of Pasquier et al (1959) of the 9 children who were not entirely well after treatment the reflux persisted in 8 cases (89%). They also found that of the cases where the reflux had disappeared, 90% made complete recovery while of the cases where it persisted only 38% could be considered well. These figures stress the importance of the correction of reflux during the reversible stage.

The other technique of ureteric transplantation, described by Fuquafoster et al, is shown in figure Nos. 16 and no opinion can be expressed on it.

Follow up

The immediate post-operative results Group A (Table I) were very good in all except one (the child in whom suprapubic cystostomy was done and who died later of uraemia). All other cases at the time of discharge were fully satisfied regarding their micturition. The patients who were kept on conservative measures, were able to pass urine in a stream, but the relief should always be considered as only symptomatic. The persistence of the cause of obstruction at the vesical neck, will always keep them in the potential danger of recurrence of

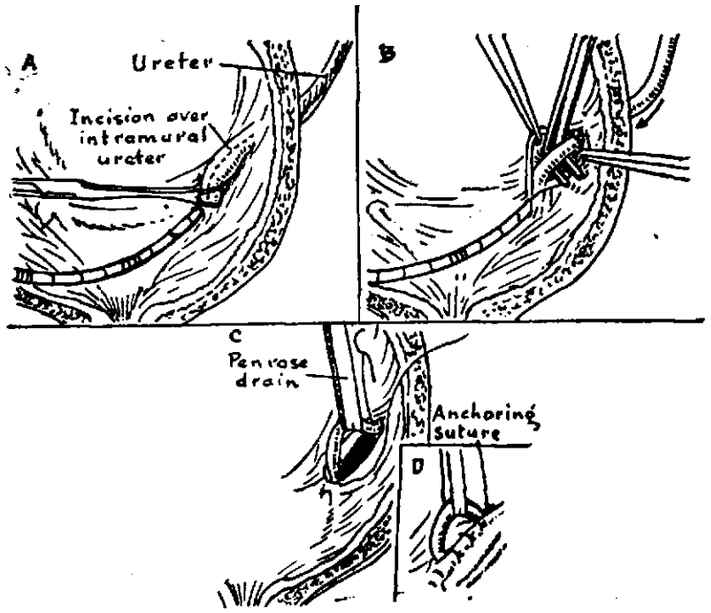

Fig. 15
Another Method of ureteral implantation in bladder (after Fuqua).

their symptoms, and uncorrected subclinical obstruction will always be the source of progressive renal damage.

Table VI

1. Cured	9	Cases including two children who had only Dilatation.
2. Relieved	3	Adults—Dilatated after suprapubic wedge resection.
3. Suprapubic Fistula	2	(a child and an adult who had repeated operations).
4. Death	1	(Child who had suprapubic cystostomy and had uraemia).

The operated cases are still being followed up regarding any recurrence of symptoms and the effect on ureteral reflux after uretero-vesical transplantation.

Deakins suggests that in the early management of bladder neck obstruction associated with vesico-ureteric reflux in children, upper urinary tract drainage instead of the lower has better prognosis. He believes that the urinary bladder in some of these patients should never be opened if adequate upper urinary tract drainage is established. The only exceptions to this are:—(1) associated bladder diverticulum and (2) a child, too small (below 4 years), to admit any form of endoscopic instrument where trans-urethral correction of bladder neck is difficult or impossible. The upper urinary tract drainage as advised can be prolonged as long as 8 months. He prefers ureterostomy by T tube as nephrostomy has the disadvantage of destruction of some more nephrones in an already damaged kidney, and because of the difficulty in maintaining drainage by the nephrostomy tube. The above procedure should be followed by transurethral endoscopic resection of the vesical neck. Conservative measures in the form of urethral dilatations, antispasmodics and antibiotic therapy in the treatment of this

Fig. 16
Bladder with diverticulum showing a muscular partition.

condition are also very beneficial. In our series its immediate results have been quite satisfactory in two cases.

Summary

The history of Marion's disease has been reviewed with particular reference to the pathology, and various types of treatment recommended by other authors.

The term, Marion's disease should be restricted to cases which exhibit prostatism without evidence of enlargement of the prostate or of prostatic obstruction. Late cases may exhibit infective sequalae and effects of back pressure in bladder-trabeculation, sacculation or diverticulum and hydro-ureter with hydronephrosis.

Cases where the symptoms start in early life or childhood have been termed congenital and those where the symptoms start later in life have been termed acquired. It is, however, possible that these latter are also congenital cases with a smaller degree

of bladder neck obstruction and symptoms appear only when due to the natural progression of the disease compensatory mechanisms start to break down. Marion's own observation has been that acquired cases progress relatively fast as soon as the symptoms appear.

A review of fifteen cases—seven children and eight adults has been given with their histories and treatment followed.

The literature on the subject has been exhaustively reviewed. All the cases in this series belonged to the male sex, and taking the period of onset into consideration, the congenital type was found in seven children, and the acquired type in eight adults. The disease is slowly progressive and patients sometimes come for treatment quite late when retention of urine has supervened.

Operative correction of the vesical neck with treatment of the associated lesions gives very good results. Conservative measures *e.g.* dilatation of the urethra may give satisfactory immediate results, but ultimately operative correction of the obstruction with correction of vesico-ureteric reflux if persistent should be the main aim of treatment.

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PLEGMASIA CAERULEA DOLENS WITH GANGRENE

(Review of Literature and Two Case Reports)

BY

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Plegmasia Caerulea Dolens or blue phlebitis is a rare clinical calamity characterised by a Fulminating Thrombophlebitis involving the main and minor venous channels of an extremity, which may lead to gangrene.

Gangrene due to venous obstruction alone was a controversial subject for quite some time. Arterial insufficiency was always thought of as the cardinal factor in gangrene as a general rule. The tissue necrosis can occur either when the blood supply is cut off by arterial block or when the blood flow is interrupted by complete venous obstruction. Arterial obstruction will be characterised by dry, hungry, dying tissue and the venous obstruction by wet, drowning dying tissue. [6]Until 1950, 27 cases of gangrene due to venous obstruction were reported in the literature. Henry Haimovici gives an excellent review of the literature[6]. In 1853, Fabricins Hildcenus recognised gangrene due to venous pathology. Cruveilhier mentioned that only massive venous thrombosis can cause gangrene. Huester (1859), Gaillard (1854) and Pins (1905) published further case reports.

Burger (1924) in his book describes moist gangrene due to massive venous obstruction. DeBackay and Oschner[5] find the dominance of French observers in this malady, only three case reports being American. They further report two cases. Allen et al[1] came across four patients with gangrene of venous origin.

In 1958, Drewes and Schulte[8] collected 115 cases of phlegmasia caerulea dolens out of which 60 developed gangrene. Because of the comparative rarity of the disease and its debated pathology, we are presenting two case reports.

Pathology

Both arterial and venous systems are endowed with collateral circulation. Arterial collaterals have been always emphasised and studied in detail. Before arterial ligation, collateral circulation is always considered. Veins are ligated time and again without much thought. Venous collateral circulation is much more efficient than arterial, with the enormous capacity of the veins to dilate and elongate. Moreover, there is an additional outflow pathway of lymphatics to help venous system.

Gangrene or massive death of tissue can occur either when there is complete arterial block or when there is total failure of venous outflow. In the latter, there will be congestion and stagnation of blood, tissue ischaemia and then necrosis.

It has already been stated that total failure of venous drainage is infrequent because of efficient venous collaterals and thus gangrene due to venous pathology is rarely seen.

The rarity of venous gangrene can be explained by another factor. Whenever an artery is blocked by whatever cause and if the block persists, the artery and its collaterals go into spasm, thus reducing the blood supply. But whenever veins are

obstructed, the venous collaterals rarely go into spasm. On the contrary, other venous channels dilate to maintain the circulation. Total failure of arterial system is thus much more frequent than failure of venous outflow (Fig. 1, 2 and 3 illustrate this point).

Gangrene due to venous block is characterised by massive oedema, pallor followed by cyanosis and death of the affected part.

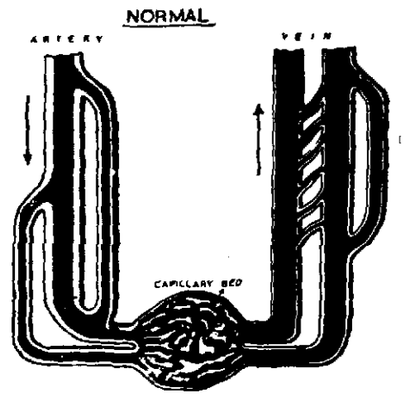

Fig. 1
Normal circulation.

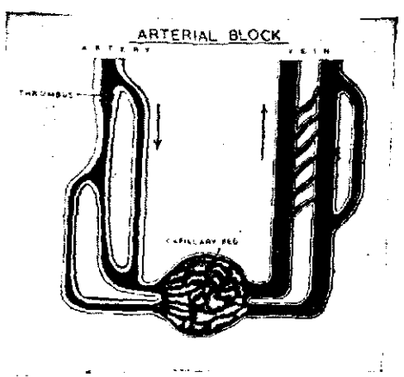

Fig. 2
Circulation with Arterial Obstruction.

The temperature of the limb in incipient gangrene of venous pathology is rarely below normal, this being a striking difference from that of arterial insufficiency.

Massive thrombophlebitis, plegmasia caerulea dolens, is the common aetiology of gangrene due to venous pathology. Inferior vena caval and iliofemoral regions are notorious for such a complication. Mesenteric thrombosis is another variety of the same disease.

The predisposing factors are well enumerated by Drews and Schutte.*

(*a*) Increased tendency to intravascular clotting as in post-traumatic, post-partum or abortum, post-operative states or in polycythaemia ;

(*b*) Slowing of circulation due to confinement to bed, cachexia, cardiac failure, etc. ;

(*c*) Intimal damage due to intravenous infusions, tight bandages, septic processes, etc. ;

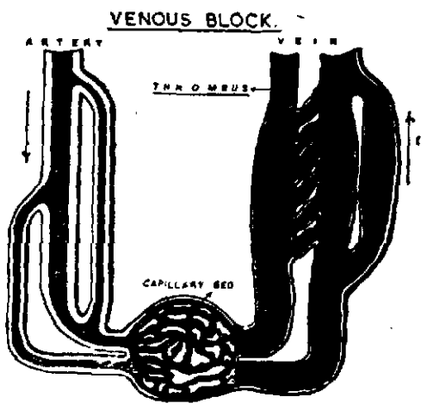

Fig. 3
Circulation with Venous Obstruction

(*d*) Certain diseases like pulmonary tuberculosis, lung abscess, neoplastic diseases, pancreatic diseases, etc.

Diagnosis

Acute painful swelling of the extremity following prolonged illness or non-ambulant treatment suggests massive thrombo-phlebitis. The inferior extremity is affected more frequently. There is enormous oedema distal to the area of thrombophlebitis and the inflamed veins themselves are extremely tender. There is usually a red tender swelling in the iliofemoral region. The swollen extremity is warm due to venous stasis, the arterial pulsations are felt but a little weaker than on the other side. The toes are pale in the beginning but becomes cyanotic and finally gangrenous when venous outflow is minimal. The gangrene is of a wet type but rarely dry gangrene has also been seen.

The general condition is usually below par and the patient is very toxic with rapid weak pulse. It is not uncommon to find this condition being confused with arterial embolism and arteries have been explored for the same. Massive oedema and pulsatile arteries near the gangrenous area should exclude clinically arterial embolism. These patients are usually anaemic and their haemoglobin should be checked. Urine examination and blood sugar studies should be done to detect diabetes mellitus. Routine WBC count will give us the degree of infectivity and the resistance of the patient. Arteriograms or venograms are not necessary for diagnosis and may be harmful in this catastrophe. (Table I indicates the distinction between arterial and venous gangrene).

Table I

Differential Diagnosis

Acute Arterial Obstruction.	Acute Venous Obstruction.
1. Previous history of atherosclerosis and cardiac valvular disease.	Previous history of prolonged immobilisation and trauma, surgical or otherwise.
2. Affected area waxy pale.	Bluish purple, cyanotic.
3. Dry and shrunken.	Massive oedema with vesicles.
4. Cold distal to obstruction.	Warm below the obstruction, cold only in the neighbourhood of gangrene.
5. Collapsed superficial veins.	Turgid superficial veins.
Sudden onset, excruciating pain, paraesthesia and gangrene are common to both the conditions.	

Treatment

Thrombophlebitis and its subsequent manifestations are preventable to some extent. Avoidance of rough manipulations during operative procedures, use of prophylactic antibiotics and anti-coagulants when such a complication is expected, can prevent many disasters. As soon as the diagnosis is made, the patient is put to bed with the affected extremity elevated over soft pillows and further kept cool to reduce the metabolism. The other extremity may be kept warm. The patient is given broad spectrum antibiotics in the full dosage. Anticoagulants like Heparin followed by long-acting drugs (Dindivan) are given, keeping a close watch on bleeding, clotting and prothrombin time. Angiodilators like Priscol are given orally to overcome venospasm, if present. Lumbar sympathetic block with Novocaine 2% by lumbar route aims at similar result. Blood transfusions are given to correct anaemia. The nutrition of the patient is maintained by high protein diet and vitamins. Conservative amputation is

done at the line of demarcation, the wound kept open for drainage and skin grafting done later on. The amputation should be delayed as long as one can, to minimise the excision.

Attempt at amputations at the site of election with primary closure is not advisable, firstly because conservative amputation is good enough and patient can walk on foot without an artificial limb; secondly, primary closure of skin in oedematous infected area will not result in good healing.

DeBackey[2] mentions one case where he did a venous thrombectomy and ligation with good result. This form of treatment in thrombophlebitis is not favoured.

Physiotherapy is of great help in reducting the oedema of the limb after the patient walks about.

Marvin Moser et al[7] mention emphatically that elevation of the affected extremity and passive exercises will help venous drainage and they support their treatment with successful case reports. Drewes et al[8] also stress the importance of exercises to promote venous outflow.

Vasodilators and sympathetic blocks by Novocaine injections are not logical. Vasospasm is not a dominant aetiological factor. Thus, relaxing the spasm of arteries will only worsen the local condition by increasing the blood flow and the load on an already strained venous system. Mild vasodilators may be given on the hypothesis that they would release the venospasm, if present.

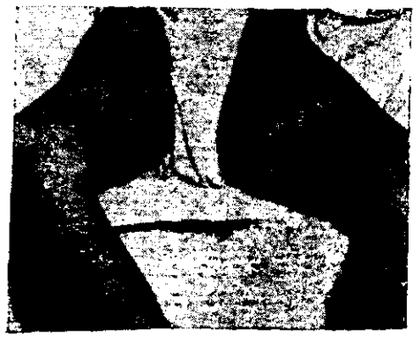

Fig. 4
Swollen iliofemoral region which was oedematous, red and equisitively tender—Case No. 1.

Fig. 5
Oedematous Left Foot and Leg with Gangrene of the fore-foot—Case No. 1.

Prognosis

The mortality of plegmasia caerulea dolens with gangrene was high. Drewes et al[8], reviewing the literature, found that 28% of these patients had a fatal outcome. With anticoagulants and antibiotics, it is certainly lower today. The gangrenous part of the foot has to be amputated, but conservative amputations have given satisfactory results. The patient can walk well on the stump of the foot without the aid of an artificial limb. The pain and oedema of the extremity gradually disappear. Physiotherapy and massage are of great help in avoiding post-phlebitic oedematous extremities.

Case Reports

No. 1.—Mrs. S. B., 21 year-old housewife from Walajah was admitted on 5th March 1960 in the Christian Medical College Hospital with painful swelling of the left lower extremity and gangrene of the toes. The patient had a full term forceps delivery after difficult labour, 25 days prior to admission. She was confined to bed for ten days after childbirth and when she tried to walk on the 11th postpartum day, she had severe pain in the left groin and thigh followed by massive white swelling of the left lower extremity. The patient did not receive any ergot preparations. After a couple of days, there was bluish discolouration of the toes of the left foot. The patient tried some home remedies. The family physician tried Penicillin and then the patient was sent to Christian Medical College Hospital, Vellore, 15 days after the onset of symptoms. On admission, the patient was in agony, toxic and restless, with a temperature of 103·0°F., pulse 140 per minute with poor volume and tension; respirations were 40 per minute. Family history was non-contributory. The patient was very anaemic and the left lower extremity was swollen and pale. There was redness over the femoral triangle and the area was extremely tender. The toes and the left fore-foot were dark, cold and without sensation. The proximal area was warm, cyanotic and oedematous and the skin was tense with a few vesicles. Femoral, popliteal and posterior tibial pulsations were felt but the dorsalis paedis was not felt. Right lower extremity was normal. Systemic examination was normal.

Investigations.—Haemoglobin: 4·0 Gms.%: W.B.C. 6,400 per cmm. Neutrophils 71%, Eosinophils 2%, Lymphocytes 25%, Monocytes 2%.

Bleeding, clotting and prothrombin time were within normal limits.

A diagnosis of massive iliofemoral thrombophlebitis with gangrene of the toes (Plegmasia caerulea dolens) was made and the patient was given the following treatment:—

Antibiotics: Capsule Achromycin: 250 mg. 6-hourly, Vasodilators: Tablet Priscol: 50 mg. 6-hourly, Anticoagulants: Intravenous Heparin: 10,000 units B.D. for 48 hours, followed by Dindivan 100 mg. 8-hourly. Analgesics: Codeine gr. ½ and Luminal gr. 1 B.D.

Transfusion of two pints of blood were given to correct anaemia. The therapy was continued for two weeks, the oedema of the lower extremity was less, temperature settled down and the line of demarcation of the gangrene was evident. On the 15th day after admission, patient had frank haematuria associated with rise in temperature and rapid pulse. Bleeding, clotting and prothrombin time were within normal limits. Focal nephritis was diagnosed and antibiotic therapy was intensified. Conservative amputation was performed just beyond the line of demarcation at the mid-metatarsal level under general anaesthesia. During the operation, the arteries were found to be pulsatile and spurting, and were not thrombosed or in spasm. The amputation wound was kept open for good drainage. Temperature settled down and urine was clear within 48 hours. Skin-grafting was done two weeks later. The skin graft took well. The oedema and cyanotic hue of the left lower extremity disappeared and the patient was discharged four weeks after admission. Follow-up examination after three months revealed that the patient was in good health (Fig. 6 & 7).

There was no oedema of the lower extremities and the patient was walking without the aid of crutches or artificial limb. The amputation stump was healthy.

Fig. 6
Amputation stump 3 months after surgery—Case No. 1.

Fig. 7

Patient walking on the amputation stump comfortably without artificial forefoot—Case No. 1.

Fig. 8

Oedematous left Fore-arm with gangrene of the fingers—Case No. 2.

No. 2.—Mrs. K., 37-year old housewife from Pollachi was admitted in the Christian Medical College Hospital, Vellore, on 18-6-1960 for painful swelling and blue discolouration of the left hand. The patient had an incomplete abortion six days prior to admission, during which she had lost a considerable amount of blood. The local doctor evacuated the uterus and gave 300 cc. 25% glucose and 2 cc. Coramine in a vein on the dorsum of the left hand. The next day she noticed swelling and pain at the site of injection and according to the advice of the doctor, applied hot water fomentation. There was blue colouration of the finger tips spreading later to the whole hand. There was enormous swelling of the hand, the movements of the fingers were painful and the finger tips were cold.

Family history and personal history did not reveal any significant point. On examination, a fairly nourished, middle-aged woman with pale nails and conjunctiva was seen. She was in agony. The pulse was 124 per minute, temperature 102·0°F., and respirations were 20 per minute.

The left hand was oedematous, the skin over it was tense with a few vesicles on the palmar aspect. The finger tips were cold, dark, shrivelled and without sensation, but the palm and the dorsum of

Fig. 9

Gangrene of the Fingers—Dark discolouration of the palm with vesicles—Case No. 2.

the hand were warm, swollen, purple and tender. The wrist and forearm were warm and swollen with visible dilated veins. The radial and the ulnar arterial pulsations were felt equally on both sides. Pulsations of the palmar arch on the left side was also felt. Blood pressure record on either side was 120/60 mm. of Hg. Systemic examination was normal.

Diagnosis of gangrene with massive thrombophlebitis of the left hand was made and the patient was admitted.

Investigations.—Haemoglobin : 3·5 G.%, W. B. C. Total: 12,000/cmm., Urine : N. A. D., Bleeding, coagulation and prothrombin studies were normal. Blood Sugar : A. C. 100 mgms. % ; P. C. 124 mgms. % X-ray of the thoracic inlet was within normal limits.

Treatment.—Tablet Priscol 50 mg. t. d. s. was given for two days and nicotinic acid 50 mg. t. d. s. for 24 hours. Capsule Achromycin 250 mg. 6-hourly was given for six days. Injection Heparin 10,000 units I. V. twice a day for two days and Dindivan 100 mg. 8-hourly was administered for eight days. Iron and vitamins were given orally. Codeine Gr. 1 three times a day for eight days was given to relieve pain.

Three blood transfusions were given to correct anaemia.

The left upper extremity was elevated and four-hourly passive exercises were given to promote venous drainage.

There was subjective improvement after a week, pain was much better, the oedema of the forearm and hand was much less and the line of demarcation of the gangrene was setting in. Temperature and pulse rate were normal. Coagulation studies were within the normal limits.

Conservative amputation at the line of demarcation was done at mid-metacarpal level, six weeks after admission and the case was transferred to the Hand Reconstruction and Rehabilitation Unit. She had an uneventful recovery with no residual oedema.

Discussion

It should be realised that plegmasia caerulea dolens is a serious complication and gangrene can only be avoided by early diagnosis and prompt treatment. Venous obstruction should be clearly differentiated from arterial obstruction. On no account should powerful vasodilators or operative procedures to block sympathetic nerves should be undertaken, as these will lead only to more tissue anoxia due to mounting stagnation of blood. Reflex vasodilation should not be attempted. The affected extremity should be raised and kept cool. Passive exercises should be given to promote venous drainage. In arterial gangrene, we aim at vasodilation and keep the affected extremity dependent or at the level of the body. These two striking differences in the management, call for quick and correct diagnosis.

Case No. 1 was brought in late with established signs of gangrene and the forefoot could not be saved in spite of energetic treatment. On review, it seems that vasodilator therapy was not needed in this case. Profuse transient haematuria prior to amputation can be explained by Focal Nephritis as there was associated rise in temperature and pulse. The coagulation studies were normal and the haematuria subsided on intensifying antibiotic therapy and after amputation.

Gangrene following intravenous injection of glucose is a very uncommon condition. In case No. 2, the injection was given on the dorsum of the hand by a qualified, experienced medical practitioner, thus excluding an intra-arterial injection and subsequent gangrene. There was no extravasation after the injection, which excludes cellulitis and subsequent gangrene. Pain, massive oedema, cyanosis and gangrene in this order, 24 hours after the injection with pulsatile arteries and warm skin in the neighbourhood are in favour of gangrene due to venous pathology. The patient made a good recovery although the gangrenous fingers had to be sacrificed.

Efficient anticoagulant therapy and antibiotics have improved the prognosis of plegmasia caerulea dolens, to-day.

Although conservative amputation was imperative in both of our cases, the extent of resection of the dead tissue was minimised by anticoagulants, antibiotics and passive exercises.

Summary

1. Literature on plegmasia caerulea dolens with gangrene is reviewed in brief.

2. Pathology, diagnosis and treatment of plegmasia caerulea dolens is discussed.

3. Two case reports are presented.

4. Value of anticoagulants, antibiotics and passive exercises in the management of plegmasia caerulea dolens is stressed.

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PRIMARY LYMPHOMAS OF SMALL INTESTINE

(A report of 15 cases)

BY

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Malignant lymphomas primarily involving the small intestine are relatively rare as compared to the generalised form of the disease occurring in the lymph nodes. The tumours in the intestine have been further reported to remain localised for a considerably long time and, therefore, are more amenable to surgery than tumours elsewhere. Ullman and Abeshouse from Mayo Clinic in 1932 reported 126 cases directly studied by them and reviewed another 250 cases collected from literature. Since then a number of sporadic reports and collected reviews have appeared (Warren and Lubenski, 1942; Nigam, 1947; Ohley, 1949; Spellberg, 1949; Marcuse and Stout, 1950; Sperling, 1954). By 1952, the total number of cases reported in literature was 450 (Faulkner and Dockerty). These reports demonstrate lack of agreement among the workers regarding the incidence, pathogenesis and the localised versus generalised origin of these tumours. During a period of 11 years starting from 1949, we have studied 15 cases of primary lymphomas of intestine and the present communication describes our findings on this material.

Methods and Materials

Of the 15 cases studied, 12 were patients admitted to the Gandhi Memorial and Associated Hospitals, Lucknow and 3 were patients admitted to the other civil hospitals of Uttar Pradesh. In 12 of the cases resected portions of the bowel wall measuring 20 to 50 cm. in length were available for study while in 3 cases autopsy was done. A detailed histo-pathological study of the lesions in the intestine and the mesenteric lymph nodes was carried out by examining multiple blocks from the tumour bearing area in the bowel wall and lymph nodes. Sections obtained after paraffin embedding were stained with Harris hematoxylin and eosinol; with Weigert iron hematoxylin and van Gieson stain for collagen and with Wilder's silver impregnation technique for the demonstration of reticulin fibres.

Clinical Features

Age and Sex.—Of the 15 tumours 3 were in females. The ages of the patients ranged from 13 to 50 years with 50% of the cases being in the third decade and 25% in the second decade.

Symptoms and signs.—In one of the autopsied cases no clinical history was available while in the remaining 14 cases the commonest presenting symptoms were abdominal pain and the presence of a palpable mass in the right lower quadrant of the abdomen. Gastrointestinal disturbances like vomiting (5 cases), diarrhoea (5 cases) and constipation (1 case) were complained by some. Two cases were admitted with the clinical features of subacute intestinal obstruction. Four patients suffered from low grade pyrexia and one also had intermittent attacks of jaundice. The three autopsied cases were admitted to the hospital in a low clinical state with ascites, generalised anasarca and severe anaemia. One developed terminal haematemesis while the other two

showed petechiae in the skin. The duration of the symptoms varied from 3 to 24 months at the time of patient's admission to the hospital. On physical examination the mass in the abdomen was found to be related to the bowel or was considered to be enlarged mesenteric lymph nodes. In none of the cases was there evidence of generalised lymphadenopathy.

Laboratory investigations.—These could be done in 10 cases and all of them showed moderate anaemia with haemoglobin percentages ranging from 6·3 to 11·9 g. The total leucocyte count was within normal limits and there was no evidence of immature leucocytes in the peripheral blood. Radiological examination was done in 6 cases and in all of them revealed a filling defect in the region of the terminal ileum and caecum.

Pathological Findings

The classification of the different types of lymphomas used in the present study was as outlined by Gall and Mallory (1942). It is realised that there is often intermingling of the morphological patterns in lymphomas and, therefore, while giving the diagnosis of the various types, emphasis was laid on the predominating cell type in the tumour. The tumours were grouped as follows:

1. Lymphoblastic lymphocytic lymphoma ... 7 cases.
2. Hodgkins lymphoma ... 4 cases.
3. Reticulin cell lymphoma ... 3 cases.
4. Clasmatocytic lymphoma ... 1 case.

Gross Pathology.—In 11 cases the tumour presented itself as a diffuse mass involving 10 to 30 cm. of the terminal ileum (Fig. 1) while in the other 4 cases multiple nodules located in the ileal portion of the bowel were found (Fig. 2). In the affected portion, the whole of the bowel wall was irregularly thickened and in 9 cases the adjoining mesenteric lymph nodes were also enlarged and matted with the growth in the ileum. In all except one case the growth ended abruptly at the ileo-caecal junction. The normal rugosity of the bowel mucosa in the affected portion was completely lost and replaced by an irregularly pitted surface although large or deep seated ulcers were rare, having been observed only in two specimen; and in one of them the ulcer had perforated. The lumen of the bowel

Fig. 1

Terminal ileum showing the diffuse tumour mass involving the bowel wall.

Fig. 2

A loop of ileum, showing two nodules of the growth in its wall.

was narrowed in all instances and the proximal healthy portion of the intestine presented a variable degree of hypertrophy and dilatation. In one case the tumour was found to be extending to the adjoining portion of the caecum. The cut surface of the tumour-bearing area had a grey or light yellow homogenous appearance. In 3 cases the mucosa also showed a few polypoid masses. The lymph nodes in the mesentery of the affected portion of the bowel wall were found to be enlarged in nine cases and were matted together. The cut surface of the lymph nodes presented a uniform greyish appearance. In the 3 autopsied cases tumour deposits were also found in the liver, lung, ovaries, uterus and in one case on the serosal aspect of the rectum.

Microscopic features.—Microscopically the tumour in all the cases was found to be situated in the sub-mucous coat of the bowel wall and at places had extended into the mucosa internally and the muscular and the serous layers externally. At places the tumour appeared as if it were dissecting the various coats of the bowel wall and even growing into the mesentery between its two layers. In areas where the mucosa was ulcerated, the tumour showed infiltration by inflammatory cells and was also covered by necrotic cell debris. The bowel wall at the periphery of the tumour often showed changes characterised by hypertrophied lymphoid follicles with marked germinal activity. At one or two places, these hypertrophied follicles were found to be merging with the tumour. The tumour cells were scattered in a diffuse fashion without any attempt at organoid arrangement. On the basis of the morphology of the tumour cells, the following types of lymphomas were found:

1. *Lymphoblastic lymphocytic lymphoma.*—This pattern was found in seven cases of the present series. The cells were rounded or oval in shape with large nuclei and scanty cytoplasm (Fig. 3). The tumour presented a more or less uniform pattern

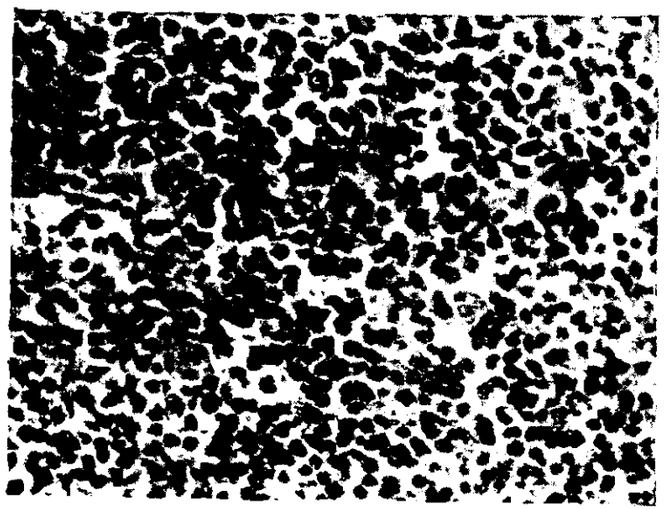

Fig. 3

Lymphoblastic lymphocytic Lymphoma. Shows round cells arranged in a discrete manner. Haematoxylin and Eosin stain × 320.

in all the areas. Reticulin laying down was minimal. In one case, the fibrous stroma of the tumour showed marked hyalinisation of the collagen bundles.

2. *Hodgkins lymphoma.*—The four tumours of this group presented variegated appearances characterised by reticulum cells, lymphocytes, plasma cells and eosinophils. There were a fair number of Sternberg-Reed giant cells which were scattered irregularly in the tumour mass (Fig. 4). Fair amount of reticulin and collagen laying down was in evidence.

3. *Reticulum cell lymphoma.*—This pattern was found in three tumours. The cells were mostly polygonal or irregular in shape with indistinct cell borders and prominent nuclei which had finely-scattered chromatin and often contained more than one nucleoli (Fig. 5). Fair number of giant cells containing two to four nuclei were irregularly mingled with the tumour cells. There was laying down of reticulin fibres between the tumour cells at many places.

4. *Clasmatocytic lymphoma.*—This pattern was present in one case. The tumour had features similar to the reticulum cell lymphoma except that the cells appeared well defined and had distinct cell outlines. Some of the tumour cells showed phagocytosed nuclear cell debris (Fig. 6). Reticulum fibres were scanty. Mitotic figures were present in fair number.

Regional lymph nodes.—Involvement of the regional lymph nodes by the tumour tissue was found in nine cases. The nodes presented microscopic features similar to the tumour in the intestine.

Follow-up.—Three cases which were not operated upon died in the hospital and autopsy was performed, this revealed tumour deposits in the liver, lung, uterus and the ovaries. In the remaining 12 cases, resection of the affected portion of the terminal

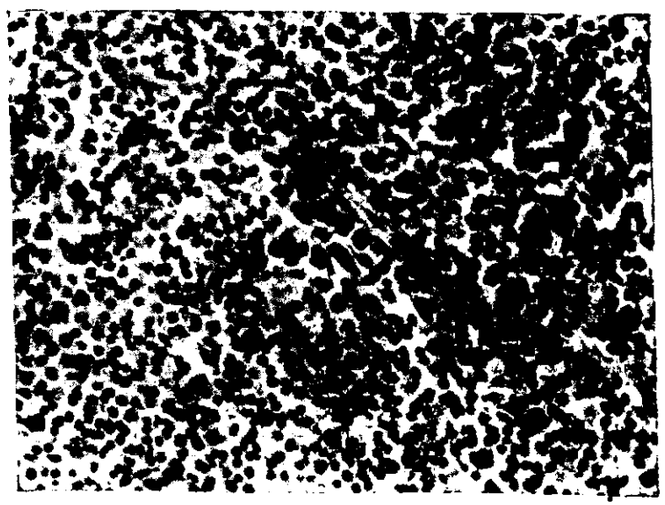

Fig. 4

Hodgkin Lymphoma. Shows pleomorphic tumour cells with many Sternberg-Reed giant cells. H. & E. × 320.

Fig. 5

Reticulum cell Lymphoma. Shows bizzare shaped reticulum cells and tumour giant cells. H. & E. × 320.

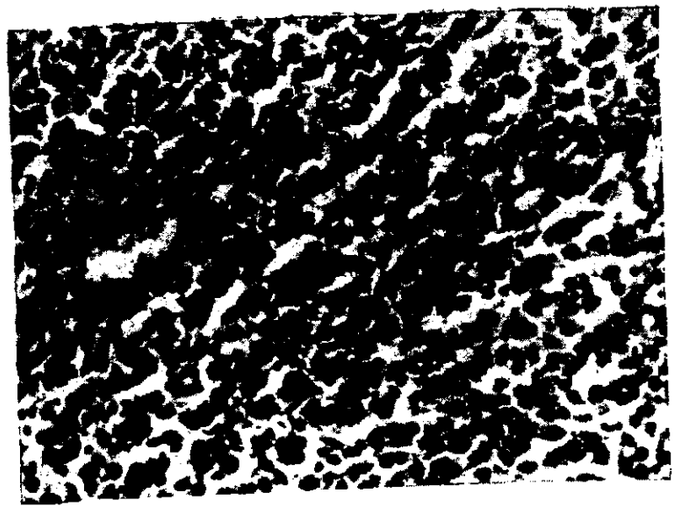

Fig. 6

Clasmatocytic Lymphoma. The cells appear discrete and show phagocytosed nuclear debris. H. & E. × 320.

ileum together with the caecum was done and of these, in three, post-operative follow up was possible for three years and the patients were reported well during this period. Two cases died within ten months of their discharge from the hospital while in three cases follow up was not possible after the patients had left the hospital.

Discussion

Primary malignant tumours of the small bowel are uncommon and more so the lymphomas. The relative incidence of the malignant lymphomas to carcinomas in the small intestine in our series was 15 to 4 respectively. This is in contrast to the reports by other workers who have found a higher incidence for carcinoma. Thus, Cameron (1938) reported 109 carcinomas of the small intestine as compared to 78 sarcomas; Mayo (1940) found only 16 sarcomas out of 108 malignant neoplasms of the small intestine. Fraser (1945) reported 21 cases out of which 12 were carcinomas and 9 sarcomas. Slightly different findings have been reported by Allen et al (1954) who found the relative incidence of carcinoma and sarcoma in the small bowel as 1 : 1. Malignant lymphoma of the small bowel commonly occur in the male as is borne out by our data and those of Marcuse and Stout (1950) and Faulkner and Dockerty (1952). Allen et al (1954), however, reported an incidence of 40% in the females. The age incidence in the present series was found to be maximum in the third decade. This is slightly at variance with that reported by western workers *viz.* Marcuse and Stout (1950), Faulkner and Dockerty (1952) and Allen et al (1954) who have found the maximum incidence in the fifth decade. The clinical symptomatology in the majority of cases in the present series extended from 3 to 24 months while one case had been ailing for about 10 years and yet the growth removed at operation was found to be small and localised to the intestine. Similar observation has been recorded by Raiford (1933) in a patient who had small papillary nodules in the small bowel, though the clinical symptoms had been present for 5 years.

The site of the neoplastic involvement in the present series of cases was the terminal ileum with extension into the caecum in one case and a secondary deposit on the serosal surface of the rectal wall in another. In none of our cases was there evidence of involvement of jejunum or the duodenum. In the cases reported by Marcuse and Stout (1950) 3 each were in the jejunum and the duodenum and 7 in the ileum. In Faulkner and Dockerty's (1952) series 27% of the tumours occurred in the jejunum. The tumour in the bowel usually appears as a diffuse growth involving the terminal ileum or as multiple foci of tumour tissue separated by healthy looking bowel wall. In the present series only 4 cases presented the latter appearances and this agrees with the findings of Faulkner and Dockerty (1952) and Allen et al (1954). Large extensive ulceration of the tumour is uncommon and perforation of the bowel wall rare (Davis 1937 and Monod and Arnal 1937). Marcuse and Stout (1950) did not report any perforation while Faulkner and Dockerty (1952) report this in only one case. In our series also only one case showed intestinal perforation. Histologically, the commonest pattern in the present series was lymphoblastic lymphocytic lymphoma and the next Hodgkins and Reticulum cell lymphomas. The reports by various workers are not comparable in this respect because un form criteria for classifying the various types of lymphomas have not been followed by different workers. Faulkner and Dockerty's (1952) observations are in agreement with the present findings whereas Marcuse and Stout (1950) and Allen et al (1954) have reported a pre-ponderance of Reticulum cell lymphoma in their series. We did not come across a case of giant follicular lymphoma and the rarity of this type has been commented upon by Marcuse and Stout (1950) and Allen et al (1954) as well.

These tumour tends to remain localised in the bowel wall for a long time. In 13 of 15 intestinal lymphomas reported by Marcuse and Stout (1950) the growth was confined to the bowel wall at the time of autopsy or surgery. In Faulkner and Dockerty's (1952) series of 33 cases too, the growth was localised to the viscus wall in 10 cases. Likewise Allen et al (1954) noted that in 5 out of their 11 cases the growth remained confined to the bowel wall. In the present series in 6 instances the tumour was localised to the ileum. The question whether the growths in the bowel wall are multifocal in origin or not is difficult to decide. The general opinion in literature appears to be that the tumours are multifocal in origin and later on fuse into a large mass. Our findings also lend support to this concept. The incidence of regional lymph nodes involvement in cases of the present series was 67% which is in agreement with the findings of Raiford (1933) and Faulkner and Dockerty (1952). An incidence of 40% has been reported by Marcuse and Stout (1950) and Allen et al (1954). That the involvement of lymph gland is secondary to the disease in the bowel wall is supported by the observation that in the majority of the cases the affected mesenteric lymph nodes are those belonging to the drainage area of the growth. Spread of the tumour to organs other than regional lymph nodes is infrequent and occurs late as reported by Raiford (1933), Faulkner and Dockerty (1952); this has been observed in the present series.

Summary

Clinico-pathological features of 15 cases of primary lymphomas of the small intestine observed during a period of 11 years have been described and the relevant literature on the subject has been briefly reviewed.

It is concluded on the basis of this study that these tumours tend to remain localised to the bowel wall for a long period and as such they are amenable for an early operative treatment.

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INTUSSUSCEPTION DUE TO AMOEBOMA OF THE CAECUM

BY

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Chronic amoebiasis is known to produce a localised marked thickening of all the layers of the wall of the large intestine; such a productive inflammatory mass has been called variously as 'Inflammatory Tumour' or pseudotumour, Amoeboma (Ochsner and DeBakey)[3] or 'Amoebic granuloma'. It should be pointed out that the 'Granuloma' is a misnomer for no granulomas *i.e.* focal collections of histiocytes are seen. Of all amoebomas of the large intestine, Lasnier[2] found the incidence in the caecum to be 34%, and Spicknall and Pierce[6] reported an incidence of 40·9% of all their collected cases. In a detailed analysis of 119 cases of amoeboma of the intestine, Radke[4] lists 7 cases causing intussusception, out of which 6 cases were those reported by Reddy and Rangam[4] from India. It is quite possible that many cases of this type either go undiagnosed or unreported. The purpose of this paper is to report the clinical and pathological findings in a case of intussusception due to amoeboma, and draw attention to this entity in the differential diagnosis of the lesions in the caecum or large intestine.

Case Report

B. R. a 20 years old farmer, had an acute episode of colicky pain in the right abdomen, accompanied by vomiting while driving a tractor, one and a half months prior to admission. The pain was relieved in a few hours by alcohol. Since then mild continuous pain with occasional exacerbations had persisted. He never had distention of the abdomen or absolute constipation.

For about 5 days before admission to the hospital, he was having frequent scanty motions, with fresh blood and mucus, accompanied by a griping pain in the abdomen. There were no other complaints. There was no previous history of diarrhoea, dysentery or bleeding per rectum. The past history revealed that the patient used to have a mild crampy abdominal pain lasting for a few minutes for the past two years.

Personal and family history were non-contributory.

Physical examination on admission showed a well built and well nourished individual with a pulse of 96/minute, blood pressure 115/85 mm. Hg. and a temperature of 98·6°F. There was a slight fulness in the abdomen. No visible peristalsis was present. A firm, irregular slightly mobile, linear mass was felt lying transversely in the umbilical and right lumbar regions. Rectal examination was negative. Sigmoidoscopic examination showed a few areas of congestion with no evidence of any ulceration. Other systems were essentially normal.

Repeated examinations of the stools for amoebae and other parasitic forms were negative. Liver functions were within normal limits. Other laboratory examinations were noncontributory.

Plain skiagram of the abdomen taken in prone and vertical positions showed a few fluid levels in the small intestine. There was gas in the descending and transverse colon, which suddenly stopped in the region of hepatic flexure suggesting the possibility of intussusception (Fig. 1).

Barium enema examination (Fig. 2) confirmed the above suspicion and the head of the intussusception was reaching the hepatic flexure. With the usual pressure of barium enema, the intussusception did not show any sign of reduction. No further attempt at reduction was made.

Laparotomy was performed. Exploration of the abdomen revealed an intussusception of the ileo-colic variety. The colon and the mesentery were markedly thickened, oedematous and congested. The ileum was dilated and hypertophied. Reduction of the intussusception seemed to be hazardous. A right hemicolectomy with end to end ileo-transverse anastomosis was done and the abdomen was closed.

Fig. 1
Prain X-ray abdomen showing fluid levels and absence of gas in right colon.

Fig. 2
Barium enema showing the characteristic appearance of intussusception.

The post-operative period was fairly satisfactory. Occasionally moderate griping pain was experienced by the patient.

On gross examination, the specimen was a segment of intestine measuring 17 × 9 × 7 cms. with a small segment of congested and edematous mesentery attached. On making an incision into the wall, an intussusception of the terminal ileum into the ascending colon was seen (Figs. 3 and 4). At the apex of the telescoping mass, the mucosa had ulcerated over a 5 cm. annular area and presented a granular appearance. The surface of these ulcers was covered

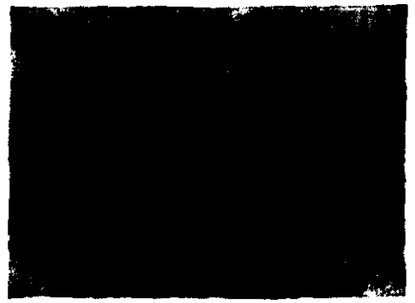

Fig. 3
Mass of intussusception with the enveloping sheath slit open. Note the ulcerated granular surface of the apex of the intussusceptum × ½.

Fig. 4
Bisected specimen showing the entering and returning loop of the intestine, and the appendicular orifice near the apex of the intussusceptum × ½.

by greyish and greenish sloughs. Just below the apex and to one side was the appendicular orifice opposite which was the transversely located ileocaecal valve; the caecal mucosa between the two orifices was normal. A napkin-ring like area of ulceration around the ileocaecal valve was seen to be contiguous with the ulcerated area on the apex. Elsewhere the mucosal folds were normal with no ulcers anywhere. The intussusceptum measuring about 10 cms. and the intussuscepiens, were bound together by a gelatinous exudate, and towards the apex, by firm fibrous adhesions. The walls as well as the serosa of the entering and returning loops were thickened and yellowish white.

Sections through the appendix revealed an oedematous thickened wall. The attached portion of the mesentery showed a large number of enlarged, firm and discrete lymph nodes. These on section, showed congestion and edema but no caseation.

Multiple sections from various parts of the intussusception were studied. Section from the apex of the intussusceptum revealed extensive ulceration of the colonic mucosa. The edges of the ulcer were sharp instead of being undermined. The surface of the ulcer was formed by necrotic debris, beneath which was a zone of fibrinoid necrosis, merging with the succeeding zone of exuberant granulation tissue, containing foci of haemorrhage. The necrotic debris was mixed with an inflammatory exudate characterised by neutrophils, eosinophils and histiocytes. Located in the debris singly or in groups were numerous vegetative forms of E. histolytica (Fig. 5 & 6). The nuclei of these were characteristic and the cytoplasm contained numerous ingested red blood cells. The amoebae were seen at the junction of the necrotic debris with the granulation tissue and never strayed beyond the latter, which was characterised by abundant vascularized fibroblastic tissue. Scattered in the latter were eosinophils, lymphocytes and a few histiocytes. The sub-mucosa was extremely thickened due to edema and young fibroblastic tissue. Areas suggestive of para-amyloid (the material has the appearance of amyloid but does not give its characteristic tinctorial reactions) were seen scattered in the submucosa. A few blood vessels composing the granulation tissue showed fibrinoid necrosis. The muscle bundles of the muscular coats were dissected by the inflammatory infiltrate of a similar composition as the exudate. The subserosa was likewise thickened due to fibrous tissue and granulation tissue. A plastic exudate, scattered in which were foci of suppuration, covered the serosa where the two layers of the intussusception were adherent. It was remarkable that the amoebae were not seen either in the sub-muscosa or over the serosa.

Fig. 5

Ulcer covered with exudate. Note the amoebae at the edges. H. & E. × 120.

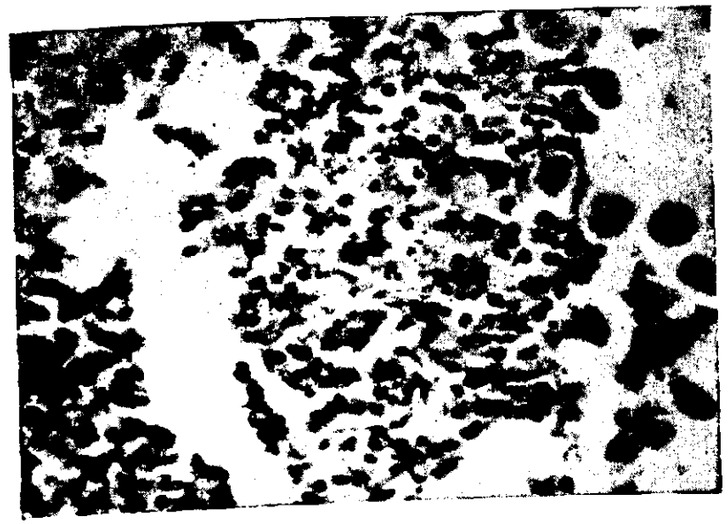

Fig. 6

High power view of the exudate showing the nests of E. histolytica H. E. × 240.

Sections through the appendix disclosed an edematous mucosa and a peri-serosal zone of granulation tissue. No amoebae were seen either in the lumen or outside.

The regional lymph nodes showed sinus catarrh and other reactive changes. No eosinophils or amoebae were seen in the lymph node.

Following the histopathological diagnosis of "amoebic granuloma" of the caecum with intussusception, the patient was given anti-amoebic treatment comprising of emetine (1 gr. daily for 10 days) and diiodoquine. At the end of the treatment, the stools were examined repeatedly for amoebae and were reported to be negative as also the swabs taken from the congested colon during sigmoidoscopy. Three months after the operation the patient reported himself for a follow up at which time the laboratory examinations were repeated and found to be negative. Barium enema revealed a well functioning stoma with normal mucosal pattern.

Discussion

The presenting clinical signs and symptoms of lower abdominal cramps of a variable duration followed sooner or later by an acute episode of colicky pain, vomiting, diarrhoea and dysentery were also observed in all the reported cases and appears to be the common pattern. On examination, a mass, often described as sausage-shaped, in the right iliac fossa has been discovered in cases of intussusception due to amoeboma. In the majority of the reported cases the diagnosis of intussusception has been made on radiological examination but the exact etiology has been determined only on histo-pathological or smear examination of the resected specimen. It is interesting to point out that repeated examination of stools for amoebae may be negative inspite of the patients harbouring amoebae in the ulcerated parts of the amoeboma. Reddy and Rangam[8] in their analysis of six cases reported one negative and two positive cases on stool examination. Speaking generally for amoebomas, Radke reported 59 positives and 12 negatives, and 48 "not mentioned" as regards the findings of stool examination in 119 cases of amoeboma. The smear from the surface of the ulcer in the resected specimen has been

positive in two out of six cases of Reddy and Rangam[5]. It is pertinent to remark that unless the diagnosis is suspected the smear is rarely taken from the resected specimen.

Histologically Lasnier[2] described 3 zones : from within outwards (i) an internal necrotic zone, (ii) a middle zone of granulation tissue and (iii) an outer zone of fibrous tissue. The necrotic zone usually contains vegetative forms of E. histiolytica but they may be absent from the site of maximal involvement[4], thus accounting for the failure of the diagnosis. The cellular infiltrate containing, amongst other cells, the eosinophils, should direct a thorough search for amoebae.

The sub-mucosa is the layer which is most extensively involved in these cases. Oedema, hyalinisation and fibro-plasia associated with infiltration by inflammatory cells accounts for the thickening. The other layers of the wall show a variable degree of involvement by the inflammatory infiltrate. In the present case the wall measured 12 mm. in thickness as compared to the normal wall which is 4 mm. in thickness. One case in which the wall measured 225 mms. in thickness has been reported (Kartulis)[1]. The amoebae are usually confined to the surface, the granulation tissue acting as a barrier, as it were, for the spread of the amoebae into the lymphatics and venules of the sub-mucosa. This is the probable explanation for the low incidence of amoebic hepatitis and hepatic abscess in cases of amoeboma. On this basis it is even suggested that amoebic granuloma represents a good resistance on the part of the host to amoebic infection. The amoebae, however, have been reported to be present in all the layers of the wall[5]. One should be cautious in identifying the vegetative form of amoebae in the deeper layers of the intestinal wall because of the frequently hypertrophied ganglion cells of the Auerbach's and Meissner's plexuses being mistaken for clusters of amoebae.

The usual type of intussusception is ileocolic. In the present case judging by the position of the appendicular orifice and the Ileocaecal valve, and the extension of ulceration from the apex of the intussusceptum to the contiguous area of the ileo-caecal valve skipping the mucosa on the medical wall of the caecum, the possibility of a caeco-colic intussusception being followed by an ileocolic intussusception should be entertained.

Effective anti-amoebic treatment is known to effect complete regression of the mass produced by amoebic granuloma[3]. It is, therefore, urged that especially in the tropics, any mass in the right iliac fossa producing intussusception or volvulus should be investigated from the point of view of "amoebic granuloma". It is only when this possibility is kept in mind that the laboratory investigations for detecting amoebae could be pursued to one's satisfaction and the resected or biopsied tissue be thoroughly examined.

Summary

1. One case of amoebic granuloma of the caecum causing intussusception is reported.

2. The salient clinical and pathological features are discussed with reference to the reported cases. It is strongly urged that the diagnosis of amoeboma be considered in the differential diagnosis clinically and pathologically of a mass in the right iliac fossa in order that this rare complication of amoeboma may be recognised, and effectively treated.

Acknowledgements

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EOSINOPHILIC GRANULOMA OF THE BREAST

BY

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Non-neoplastic swellings of the breast continue to pose diagnostic problems. The clinician rightly looks upon lumps in the breast as neoplastic and malignant and is justified in the majority of cases for adopting radical surgical measures. In such cases a pre-operative biopsy report must be insisted upon, as this alone discloses the real nature of the lesion. An drastic surgical measure inflicted on a patient for non-neoplastic breast lesion is likely to leave lasting adverse effects on the patient, especially when patient learns later that the lesion might have regressed by conservative therapy and that the breast could have been retained. Scelerosing adenosis, chronic indurating mastitis and plasma cell mastitis are sometimes confused both by the surgeon and pathologist as cancerous, mainly because of the failure to recognise the variable clinical and tissue reaction in the different phases of the lesions. Most interesting of the non-neoplastic lumps of the breast is the eosinophilic granuloma of the breast recorded by Gupta and Rao in a case of tropical eosinophilia. The explanation offered by them has not clarified the exact pathogenetic mechanism of the lesion. Recently our attention was focussed on to an unusual histological picture of an excised breast swelling in a pregnant woman. The histological picture of the breast tissue was typical of eosinophilic granuloma. This has prompted us to record the clinico-pathological findings of the same.

Case Report

A Hindu female aged 27 years, third para (with the history of 6 months ammenorrhoea) noticed a lump in the right upper quadrant of the breast. She had observed that the swelling had rapidly increased in size during the last two months of pregnancy. The skin of the breast and the regional lymph nodes appeared normal. The other breast was normal. Clinically the lump was suspected to be cancer and was excised. The excised specimen was referred to us from Nellore with a special request to confirm the presence or absence of malignancy.

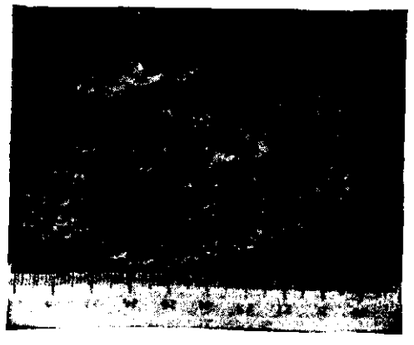

Fig. 1

Photograph illustrates excised lump from the breast.

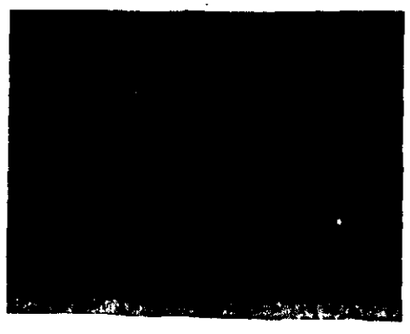

Fig. 2

Photograph illustrates sectioned surface of the excised breast tissue, faint outlines of lobulation and occasional cyst are seen.

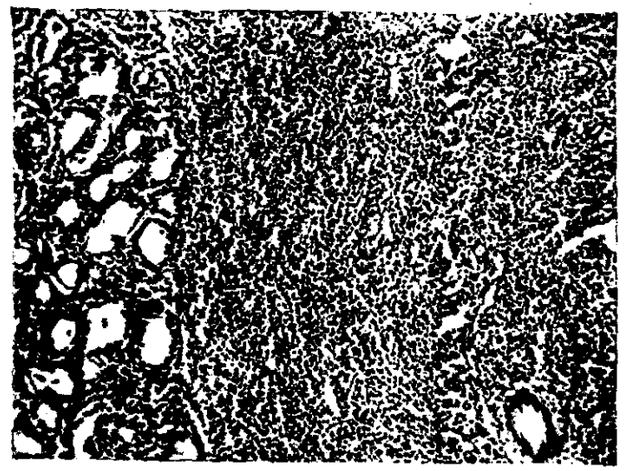

Fig. 3

Photomicrograph illustrates proliferation of the acine and eosinophil cell aggregates in the interacinar spaces. The eosinophils appear densely packed. (H. & E. × 100).

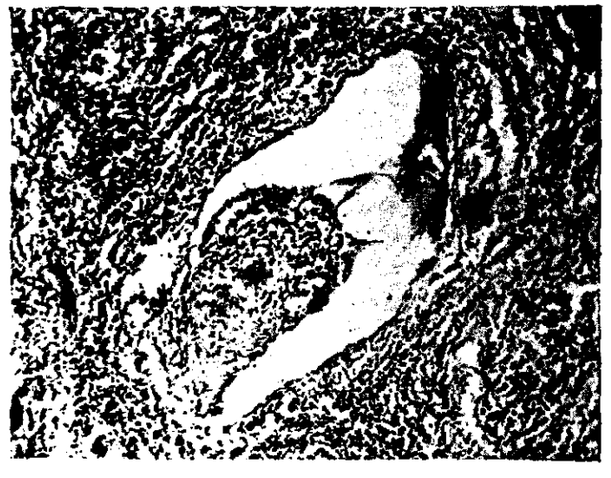

Fig. 4

Photomicrograph illustrates dilatation of the lymphatic, eosinophil cell infiltration of the interstitium and granulomatous reaction with giant-cell formation within the lumen of the lympatic (H. & E. × 100).

Fig. 5

Photomicrograph illustrates considerable amount of fibrosis intermingled with cosinophils. (H. & E. × 100).

Morbid Anatomy and histology.—(1137, A & B/60) Yellowish soft circumscribed mass of 2½ inches in diameter (Fig. 1) on sectioning disclosed uniformly yellow colour with lobulation and minute cysts in places (Fig. 2). Sections studied from the tissue showed marked proliferation of the acini and ducts (Fig. 3). These findings are typical of pregnancy. The most conspicuous and significant finding is the presence of innumerable eosinophils exclusively in the interacinar and perilobular tissue spaces. These cells were seen infiltrating the wall of the ducts and in the lumena and lymphatics (Fig. 3). The lymphatics were greatly dilated and some of them were the sites of granulomatous reaction with giant cell formation (Fig. 4). Occasional plasma cell and round cells were seen. In some areas moderate amount of fibrosis was noticed and this was observed as a transition to the eosinophil cell reaction and often bordered cellular infiltrates (Fig. 5) A large number of serial sections were screened and no filarial worm was spotted.

In the light of the histological picture the parent of the patient who is a doctor furnished additional information at our request.

Total White Blood Cell Count: 8,700 cmm, Absolute white blood cell count: Polymorphs 5,394 cmm. Lymphocyte 2,088 cmm. Eosinophil 1,218 cmm, Faeces: Ova of ankylostomes and ascaris were seen, Night peripheral blood: No microfilaria were detected.

For a second opinion the slides were referred to Drs. E. W. Gault, and M. V. Sirsat. Dr. Sirsat suggested the possibility of filarial granuloma. Dr. Gault also was of similar view and cited a personal experience of a case of eosinophilic granuloma in which a further search disclosed filarial worm.

Comment

Aggregates of eosinophils have been described in the portal tracts, in the skin, in the gastro-intestinal tract etc. in cases of tropical eosinophilia. To an appreciable extent such eosinophil cell clusters were noticed in the lungs in tropical eosinophilia. In allergic states it is frequently encountered. In fibrosing lesions of the vermiform appendix and fallopian tube eosinophil cell infiltration is met with. In all these cases there is coincident infiltration with round or plasma cell to moderate extent. The patient is free from symptoms and the other breast is nil remarkable, four months after excision of the lump. Moderate degree of fibrosis, ectasis of the lymphatic spaces of the breast associated with exclusive infiltration of eosinophils even in the absence of filaria compel us to share the views of Drs. Gault and Sirsat and label it "Eosinophilic granuloma of the breast of filarial origin." There is every possibility of the filaria lurking in the nonexcised portion of the breast tissue or in the regional lymph nodes. A careful watch over the patient for recurrence of similar lesion either in the other breast or elsewhere in the body may throw light on the aetiology of the condition.

This does not seem bear any resemblance to eosinophilic granuloma of the bone. The occurrence of the eosinophilic granuloma during the second and trimester of pregnancy reminds one of the remote possibility of allergic or hypersensitive reaction to an albuminous or lipoid material spilling into blood and tissue.

Summary

1. Pertinent literature on eosinophilic granuloma is reviewed.

2. Clinico-pathological findings in a case of eosinophilic granuloma of the breast of uncertain aetiology are recorded and filarial aetiology as probability is suggested.

Acknowledgement

We thank Drs. E. W. Gault, Professor of Pathology, Christian Medical College, Vellore and M. V. Sirsat, Pathologist, Tata Memorial Hospital, Bombay for their opinion of the slides.

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LEIOMYOSARCOMA OF THE DUODENUM

BY

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Leiomyosarcoma of the duodenum is one of the rare tumours. Only 69 cases have been reported up to date, since it was first described by Wesener[11] in 1883.

Sarcomas of the small intestine account for 0·03% of all neoplasms found at autopsy and surgical material, (Frank, Miller and Bell[4]). Of 129 sarcomas of the small intestine collected by Crowther[3] in 1919, 19 were from duodenum of which 7 involved the jejunum also. These figures serve to indicate the rarity of the leiomyosarcoma, which, however, is the commonest of all sarcomas of the duodenum. Operative removal of these tumours is reported in 38 cases only. It was therefore felt desirable to report one case of Leiomyosarcoma of the duodenum removed successfully and to summarise the available literature so as to bring out the salient features of this condition.

Case Report

D. M., a 58 year old male, presented himself with the complaints of a mass in the abdomen, progressive anorexia and weakness for the past 3 months. He had a mild, dull pain in the epigastrium and right hypochondrium, at the onset. The pain was not accompanied by any bowel or urinary symptoms and did not radiate. Ever since the onset he never felt well and he had noted a mass in the upper abdomen. There was no history of jaundice or fever.

Past and personal history were not contributory. Physical examination on admission revealed a well-built, moderately nourished elderly male with a slight pallor. There was no jaundice, oedema or lymphadenopathy. Abdominal examination showed slight fullness in the upper abdomen, more marked on the right side. An irregular, lobulated, firm, slightly movable, intra-abdominal mass approximately 15 cm. × 10 cm. in size was felt occupying the umbilical, right hypochondriac and lumbar regions. The mas was distinctly separate from the liver. Other systems were essentially normal.

Laboratory Investigations of blood, urine and stools gave essentially normal values except for Haemoglobin which was 9·2 Gms. percent.

A plain skiagram of the abdomen revealed a large soft tissue mass in the right lumbar region posteriorly, having well defined borders. The Right kidney shadow looked normal. Intravenous pyelography revealed hydronephrosis of a moderate degree on the right side (Fig. 1) and a normal left kidney. Barium meal studies disclosed a mass in the right lumbar

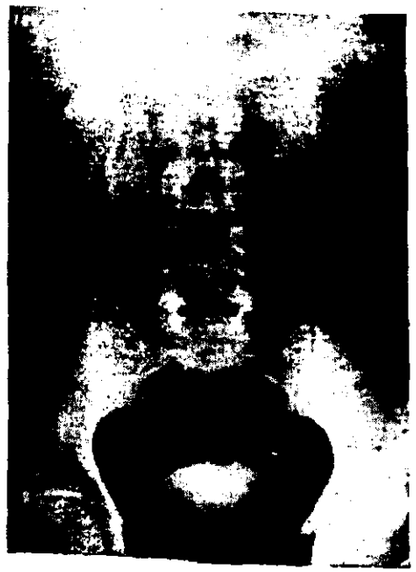

Fig. 1
Intravenous Pyelography, showing hydronephrosis of right kidney.

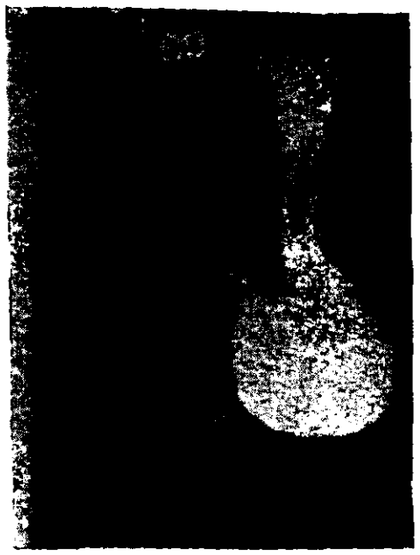

Fig. 2
Preoperative Barium Meal showing displaced and deformed duodenum with a Barium tract.

region displacing the second part of the duodenum to the left. There was a small tract of barium going from the second part of the duodenum into the tumour mass (Fig. 2). No duodenal obstruction was noted. Most of the small intestine was pushed to the left. The right half of the transverse colon was displaced downwards. The skiagram of the chest was normal.

The patient was given blood transfusions and the haemoglobin level was brought up to 11·5 Gms%. Laparotomy was done. On exploration of the abdomen by a right paramedian incision, a lobulated, retroperitoneal tumour displacing the stomach upwards and anteriorly, the duodenum medially, and the colon downwards was seen. It was closely related to the right kidney which was slightly enlarged. The tumour was well encapsulated and was almost free except for a few flimsy adhesions to the inferior vena cava; it was inseparable from the duodenum medially. The incision was extended horizontally to the right for a better exposure. The duodenum was mobilised, and a vertical strip of the anterolateral wall of the second part of the duodenum was resected along with the tumour which was infra-ampullary in position. The sphincter of Oddi was found to be intact with no involvement of the common bile duct. The pancreas was normal. The duodenum was repaired in a transverse fashion to prevent narrowing of the lumen. The abdomen was closed with drainage.

The patient stood the operative procedure well and was transfused with 600 cc. of whole blood. The post-operative period was uneventful.

A post-operative barium meal examination done 4 weeks after the operation did not reveal any abnormality in the duodenum (Fig. 3): the lumen was of normal calibre and the mucosal pattern was normal. The patient's progress has been followed for 6 months. He is well and normal with no complaints.

On gross examination the specimen was a well-encapsulated, spheroidal, mass measuring 16 × 13 × 10 cms. in greatest dimensions (Fig. 4). Irregular strands of fibroareolar tissue were adherent to the smooth, shiny capsule, beneath which were seen prominent blood vessels. On one surface was an oval defect measuring approximately 3 × 1·5 cms. The edges of the defect appeared to be formed by mucosa and alongside this was seen a broad groove made apparently by the duodenum. Bisection showed the defect to be communicating with an irregular

Fig. 3
Post operative Barium Meal showing normal reconstructed duodenum.

Fig. 4

Gross specimen. The irregularly oval cleft was rimmed by duodenal mucosa. Note the bossellations, and the broad groove adjacent to the oval defect.

Fig. 5

The bisected specimen showing the tract (arrow) leading from the defect into the substance of the neoplastic mass. Also note the areas of necrosis and cystic degeneration.

Fig. 6

Ulceration of the duodenal mucosa by the neoplastic tissue. H. & E. × 25.

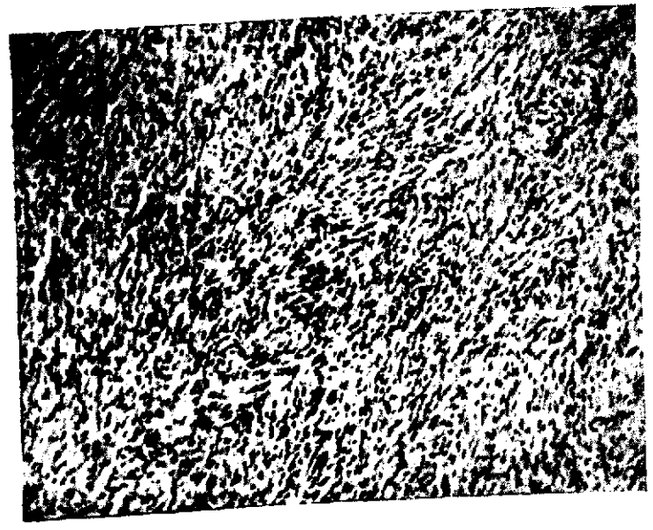

Fig. 7

Section showing the arrangement of fusiform neoplastic cells in bundles which interdigitate. H. & E. × 120.

Fig. 8

Section from the periphery of the tumour showing a poorly delineated capsule. Also note the vascularity of the tumour. H. & E. × 120.

tunnel (Fig. 5) which in turn ended in a yellowish coloured necrotic mass located in the centre of a grey rubbery and fleshy tissue which constituted the bulk of the tumour. Additional sections disclosed the tendency of the tissue for lobulation, necrosis and haemorrhage.

On microscopic examination of multiple sections a highly cellular and fairly vascular neoplasm was seen arising from the muscular coat and ulcerating through the overlying duodenal mucosa (Fig. 6) It involved all the coats of the duodenum and at its periphery was a poorly delineated capsule of variable thickness (Fig. 7) which was broken through by the neoplasm in some area. The neoplasm was characterised by spindle shaped or fusiform cells which were arranged in broad sheets or in interdigitating bundles (Fig. 8) which were out in various planes. The cells presented a variable degree of pleomorphism from area to area. In some areas, the cells tended to be oval and hyperchromatic while in others they were elongated and palisading, thus presenting a picture suggestive of neurilemoma. Areas of myxomatous, fatty or hyaline degeneration were also found (Fig. 9). Mitotic figures were variable in number; in some areas they were 2-3 per high power field.

Special stains for fat on frozen sections were negative. A diagnosis of leiomyosarcoma of the duodenum was made and the smooth muscle nature of the neoplastic cells was confirmed by Masson's trichrome stain and Mallory phosphotungstic acid haematoxylin stain.

Review of Literature

The literature on the duodenal leiomyosarcoma is reviewed in detail by Weinstein and Roberts[10], Bradham[2] Amerson and Lumpkin[1] and Starzl, Bernhard and Henegar[8].

The highest incidence of these tumours is in 5th to 7th decade. The youngest reported case was 21 years of age and the oldest was 81. The incidence was same in both sexes (Table I).

Anaemia, pain, weight loss, diarrhoea, a palpable abdominal mass and severe gastro-intestinal haemorrhage are some of the chief presenting features. Their frequency is indicated in Table II.

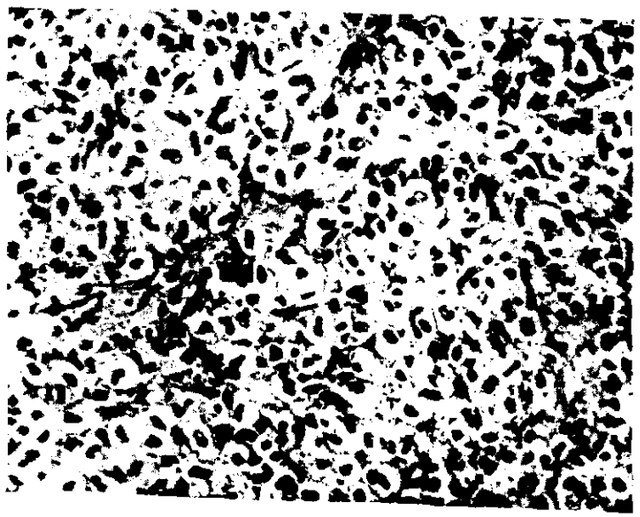

Fig. 9.

An area in the neoplasm showing pseudolipoid degeneration H. & E. × 240.

Table I—*Showing Age and Sex Incidence*

Age	20–29	30–39	40–49	50–59	60–69	70–79	80–89	Total	Data not available.
No. of patients.	3	8	18	12	9	1	2	69	16
Male	29								
Female	29							69	11

Table II— *Symptomatology*

		Present	Absent	Not mentioned
1. *Duration of symptoms*:				
Less than one year More than one year	30 18 ...	48	—	21
2. *Gastrointestinal Bleeding*:				
Slight Moderate Severe	11 11 13 ...	35	2	32
3. Pain Abdomen	...	30	4	35
4. Palpable Mass	...	25	14	30
5. Weight loss	...	32	—	37

Gastro-intestinal bleeding is the commonest feature occurring in 35 patients: 13 patients had a massive haemorrhage thereby pointing to its consideration in the differential diagnosis of rare causes of gastro-intestinal haemorrhage.

Pain in the abdomen having a vague similarity to a peptic ulcer pain was recorded in about 50% of the cases and half of these had pain as the presenting symptom.

Significant weight loss and progressive general weakness were reported in 32 patients.

In 25 cases an intra-abdominal mass of variable size and mobility was palpable.

Jaundice was an uncommon accompaniment of this lesion and strangely enough duodenal obstruction, has never been reported.

The duration of symptoms has been quite variable. In the majority of the cases the symptoms were less than one year's duration. In the rest, a history of 1-13 years was noted indicating thereby the slow growing nature of the tumour: however, the possibility of a malignant change in a benign tumour cannot be ruled out. Nevertheless, the short duration of symptoms in the majority of the cases suggests the rapidity of growth of this tumour. Radiological examination showed abnormal findings in 28 out of 38 patients in whom it was carried out.

Other recorded complications include rupture of the tumour with fatal peritonitis and formation of duodenal fistula.

Out of the 44 cases submitted to surgery, resection of the tumour was carried out in 38. The various procedures carried out included simple excision, pancreaticoduodenectomy, pancreaticojejunostomy, right colectomy with ileotransverse-colostomy depending upon the location of the tumour and the involvement of the other neighbouring structures. The operative mortality in the reported cases has been high. Only one patient has been reported to be alive 5 years after operation (Starr[7]). In most of the cases, no follow-up data are available. The consensus of opinion is that even in the face of metastatic disease, a palliative resection should be carried out to prevent the dreaded complications of haemorrhage, perforation or fistula formation.

These tumours are often detected at autopsy. They are located most frequently in the 2nd part of the duodenum; next in frequency of involvement is the 3rd part, then the 1st part, the 4th part of the duodenum being the least involved segment.

Their size varied from 2 cms. to 20 cms. In many reported cases, the actual size has not been recorded. The tumour tends to ulcerate the duodenal mucosa, thus accounting for the signs and symptoms of duodenal ulcer, and also for gastro-intestinal haemorrhage. Frequently, however, it involves all the coats of the duodenum and extends into the retroperitoneal space. Neighbouring structures like pancreas, colon, and inferior vena cava are occasionally invaded.

As in Leiomyosarcomas of the stomach, so also with those of duodenum, a variety of histological patterns *i.e.* neurilemomatous, myxomatous, pseudolipomatous changes, are seen.

Histologically, in conformity with the smooth muscle tumours of the gastro-intestinal tract, the differentiation between benign and malignant forms may at times be difficult. Golden and Stout[5] emphasise the following features as helpful in deciding in favour of malignancy: many mitoses, invasiveness outside the serosa and marked haemorrhages and necrosis of the tumour substance. The tumour will probably prove to be malignant even if mitoses are few provided that there are severe haemorrhages and necrosis.

The slow growth of these tumours has suggested to some observers the possibility of a malignant change supervening on a benign leiomyoma. Opinion is however divided on this point.

These tumours are of low grade malignancy and involve the neighbouring structures by infiltration. Metastases to the regional lymph nodes, liver and diffuse peritoneal dissemination have been recorded.[6, 9, 12] However, widespread visceral metastases are very uncommon. The tumour is radio-resistant.

Discussion

It is obvious from the above resume of the literature that leiomysarcomas present difficult diagnostic and therapeutic problems. The clinical diagnosis is often missed since some are asymptomatic or symptoms, if any are vague. The difficulty of demonstrating the predominantly extraluminal tumour by radiological examination delays the diagnosis. Demonstration of a fistulous tract in a soft-tissue mass connected to the duodenum should lead one to suspect leiomyosarcoma of the duodenum. Histopathologically also, the diagnosis becomes difficult due to variety of histological patterns; and the decision as to its malignancy may become difficult and often a matter of individual opinion. The operative procedure is difficult and the high incidence of post-operative complications inherent in duodenal surgery due to its location and proximity to, (and often, involvement of) important anatomical structures has served as deterrants to operative intervention even when the diagnosis was made pre-operatively. It is hoped that the present report of successful operative removal of a large duodenal leiomyosarcoma will encourage surgical intervention in these cases.

Summary

1. A case of successful resection of duodenal leiomyosarcoma in a 58 year old male has been reported.

2. The diagnostic and operative difficulties have been emphasised.

3. The natural history of this disease as revealed in the reported literature is summarised. In spite of the rapid growth of the tumour, distant metastases are rare. Therefore, resection should be performed in all cases in order to avoid one of the fatal complications, namely severe uncontrolable G. I. haemorrhage.

Acknowledgements

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CANCER OF THE STOMACH

BY

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Cancer of the stomach is one of the most frequent cancers, accounting for roughly ¼th of all fatal malignant neoplasms. The first successful treatment of gastric cancer was initiated on January 29th, 1881, when Theodore Billroth performed the first successful gastrectomy for carcinoma of the stomach. In 1885, *i.e.* just four years after the initial gastric resection, William Welch in his "Classical study of Welch" of 37 gastric resections reported 27 operative mortalities only 10 surviving none more than 1·5 years. Long strides have been made since then. A lot is owed to the Mayo Brothers for mastering the technique of gastric resection for cancer of the stomach and for keeping alive the enthusiasm and interest in the surgical treatment of this disease. The present day resectability rate for cancer of the stomach is around 70-80% with an operative mortality of around 5–7%. In a follow-up of a series of 1708 patients with cancer of the stomach, Marshall, from the Lahey Clinic, showed a 5 year survival in 32·9% of all curative resections. Accurate statistics of this disease are not available in India. In England and Wales 13,000 and in U.S.A. 38,000 die annually of this disease.

The greatest drawback in effecting cures for cancer of the stomach is the fact that about 75% of the patients subjected to gastrectomy have metastasis in the regional lymph nodes.

We wish to present in this paper a follow-up result on 12 cases of gastric carcinoma treated in the last 4½ years in the Railway hospitals at Dinapore and Calcutta.

Aetiology.—The aetiology of gastric cancer is still obscure. Fibiger in 1913 by feeding rats on cockroaches infected by the gastric nematode ganglyonema neoplasticum produced chronic gastritis, polyposis and finally cancer of the stomach. This work lacks confirmation and there is no evidence that chronic irritation is responsible for human gastric cancer. The relationship of achlorhydria to gastric cancer is more intimate and achlorhydria frequently precedes the development of gastric cancer. In our series of 12 cases, however, only one patient showed achlorhydria, 8 had a normal acid curve and in the other three there was hypochlorhydria.

Sex and Age.—Out of these 12 cases, 9 were males and 3 females. Two cases in males were seen at the relatively young ages of 32 and 35 years. One female was 40 and the other 60 at the time of admission. The average age in the other 8 cases was 51 years.

Site.—Six of the cancers were in the pyloric part of the stomach, three along the lesser curve, two on the posterior surface of the stomach—one 3" away from the pylora-duodenal junction and the other 5" away. One case was on the anterior wall 3½" away from the pyloro-duodenal junction. There was one case of double ulcer along the lesser curvature.

Pathology

Two of the cancers proved to be of the colloid, mucoid or gelatinous variety. The rest were of the ulcerative type. No case in this series conformed to the polypoidal or proliferative type or the diffuse, atrophic or schirrous type. The ten cases of the ulcerative form showed in one case very early invasion. 2 of the ulcers were roundish—with an unbroken edge, (Bormann type II) and 4 of the ulcers showed a broken edge with sloping areas of infiltration—(Bormann type III) one case along the lesser curvature had two distinct ulcers 6 m.m. apart the higher one of which was carcinomatous.

Spread to lymph nodes

Four of the cases with ulcers showed no lymph node metastasis. Three of the cases with palpable tumour showed spread to the regional lymph nodes. One of the colloid cancers showed a localized peritoneal deposit. In one female, there were metastases in the pouch of Douglas but no Krukenburg tumour was palpated.

Symptoms and signs at admission

Lump in the epigastrium	...	4 cases.
Pain	...	4 cases.
Anorexia	...	8 cases.
Melaena	...	2 cases.
Visible peristalsis	...	2 cases.
Asymptomatic	...	2 cases.
Anaemia	...	2 cases.
Loss of weight	...	2 cases.

Two cases had no symptoms referable to the stomach. They were admitted for loose stools with blood and mucus. Examination of the abdomen showed tenderness in the epigastrium and routine Barium meals revealed gastric ulcers. Two of the patients had visible peristalsis, and there was a palpable lump in four cases. There was no jaundice or ascites in any of these cases. The left supraclavicular lymph node was not palpable in this series of 12 cases.

Treatment

At exploration, resection was possible in all the cases giving a resectability rate of 100%. A high sub-total radical gastrectomy was done in 4 cases. This entailed removal of more than 7/8ths of the stomach together with the spleen and the tail of the pancreas, and the greater omentum. In the remaining 8 cases sub-total gastrectomy was done without removing the spleen or the whole of the greater omentum. In two of these cases, the diagnosis was of gastric ulcer alone and malignancy was found only on histopathologic examination. In four cases the general condition was quite poor, the average weight of the patient was 60 lbs. and it was not felt advisable to do a very high resection.

As the lymph nodes showed metastases in 8 cases, the resection in these may be considered as palliative. In the other four, 2 had a simple sub-total gastrectomy and the other two a radical sub-total gastrectomy. The resections in these four cases may, therefore, be considered as 'curative'. Of these eight palliative resections, 6 of the patients were dead at 14 months, 6 months, 12 months, 19 months, 24 months, 22 months, 10 months and 16 months following resection. It would, therefore, appear that only one patient survived for 2 years and that the majority died within 1-2 years following a palliative resection. Of the 4 curative resections performed, one is alive 3 years and 2 months following resection. One patient died 14 months after operation. This was a patient aged 32 years and although a radical sub-total gastrectomy was carried out, he was re-admitted with extensive secondaries 14 months later and died in the hospital. One case is alive 2 years 4 months after operation. The last case is too recent being alive at a 7 months follow-up.

Case Reports

Case 1.—A male aged 32 years was admitted in the hospital with a history of pain in the epigastric region for the past one year related to meals. The pain was relieved 1–1½ hours after taking meals and started again, after 4 hours or so. Of late the pain had become more or less constant. There was no history of loss of weight, haematemesis or melaena.

On examination.—Besides tenderness over the epigastric region, the examination was essentially negative. Fractional analysis showed a normal acid curve. Stools were negative for occult blood. A barium meal showed an ulcer crater in the stomach about 2½" from the pylorus. Hb. 9·2 gm. per cent.

At operation, a gastric ulcer about 3" from the pylorus on the posterior surface of the stomach was felt. There were no enlarged lymph nodes in the mesentery. A sub-total gastrectomy was carried out with Polya Hoffmeister, ante-colic, anti-peristaltic anastomosis.

Macroscopic examination showed an ulcer on the posterior wall of the stomach towards the lesser curvature, 3" from the pylorus. The serosa was intact. One edge of the ulcer towards the lesser curvature was broken, as shown in figure 1.

Histopathology.—The section shows infiltration with one type of cells which have pale eosinophilic cytoplasm and hyperchromatic vesicular nucleus, and occasional prominent nucleolus. There is no gland formation. This is due to the rapidity of growth in this case—adenocarcinoma of stomach. This is shown in figure 2. The patient was re-admitted with secondaries in the abdomen and ascitis and was dead 14 months from date of operation.

Fig. 1

Photograph showing an ulcer on the posterior

Case 2.—A male aged 50 years was admitted with a history of pain in the epigastric region for the last 1½ years. The pain was relieved 1 hour after taking food. History of melaena 3 times and haematemasis once over the past one year. History of some loss of weight within the last 6 months.

On examination, there was tenderness in the epigastric region to the left of the midline, but there was no palpable mass. Fractional analysis showed a low acid curve with blood in 3 specimens. Stool was positive for occult blood. Barium meal showed a normal duodenal cap and an ulcer in the stomach. Hb. 8·7 gm. per cent.

At operation a hard mass high up on the posterior wall of the stomach encroaching towards the lesser curvature was felt. The growth was adherent to the tail and distal 1/3rd of the body of the pancreas. A few enlarged lymph nodes were seen in the greater omentum. The coeliac lymph nodes were normal. No metastases were seen in the liver.

The abdominal incision which was left paramedian was then enlarged into the bed of the 9th intercostal space. The growth was visualised further. 1" of the lesser curvature above the growth was free. A radical sub-total gastrectomy with removal of 7/8th of the stomach, spleen, tail and distal 1/3rd of the body of the pancreas, and the greater omentum from the transverse colon upwards was carried out, and an ante-colic Polya anastomosis was done. The removed specimen is shown in figure 3. The post-operative course was uneventful.

Pathology.—On opening the resected specimen a high ulcer was seen about the size of an 8-anna piece penetrating into the body of the pancreas with a sloughing base situated on the posterior wall of the stomach towards the lesser curvature. The ulcer was situated about 5½" above the pylorus. It was densely adherent posteriorly to the body of the pancreas forming a mass. Four enlarged lymph nodes were present in the greater omentum.

Histopathology showed a typical adeno-carcinoma of the stomach. The patient was re-admitted with secondaries, and ascites and was dead 22 months after operation.

Fig. 2-a

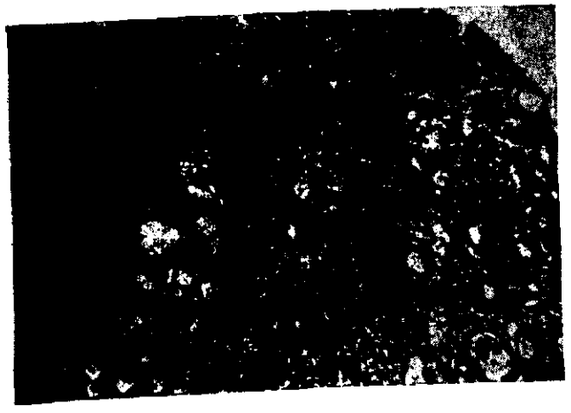

Fig. 2-b

(a) & (b)–Microphotographs of the ulcer in Figure 1, showing an adeno-carcinoma.

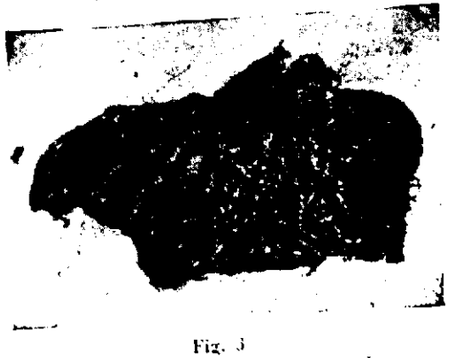

Fig. 3

A radical subtotal gastrectomy specimen with a post wall malignant gastric ulcer

Case 3.—A male patient aged 48 years was admitted for pain in the epigastric region with vomiting off and on. The patient was having epigastric distress with relation to meals for the past 10 years. Of late, the pain had become more constant, had lost its periodicity and vomiting had become a predominant feature. There had been marked loss of weight. The patient had been seen 2 years previously when he was advised operative treatment, but had refused.

Barium meal examination showed pyloric stenosis and there was charcoal retention for 2 days. An F.T.M. showed normal acidity.

The patient was prepared for operation and under general anaesthesia by a right paramedian incision the abdomen was explored. Scaring was found on the

Fig. 4
An anterior gastric ulcer.

anterior surface of the pyloric antrum about 1" away from the pyloro-duodenal junction. A sub-total gastrectomy with an ante-colic, anti-peristaltic Polya Hoffmeister anastomosis was done. On opening the specimen, an ulcer 1" in diameter with everted margins, was seen on the anterior surface of the stomach, 3/4th" away from the pyloro-duodenal junction. The margins of the ulcer laterally were broken with evidence of infiltration in the stomach wall, Figure 4. The appearance clinically was suggestive of malignancy. A section was sent for histo-pathology with one lymph node from the greater omentum. The histopathology report was adeno-carcinoma of the stomach with early invasion. The lymph node showed reactive hyperplasia.

The post-operative course was uneventful and the patient was discharged 3 weeks after operation.

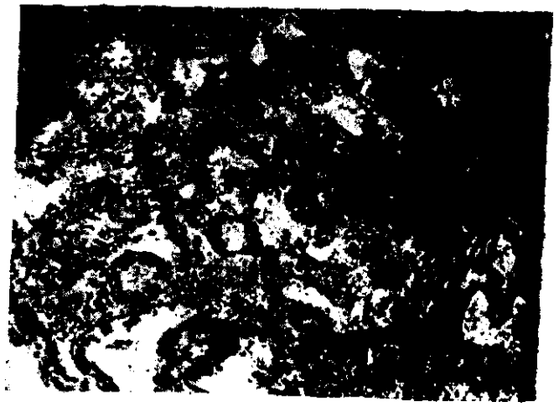

Fig. 5-a

Fig. 5-b

Microphotographs of the ulcer in Figure 4, showing early invasive carcinoma of stomach.

Figures 5 are microphotographs of the histopathology.

Follow-up.—The patient is well 2 years 4 months after operation with no evidence of secondaries.

Case 4.—A male patient aged 53 years was admitted for pain in epigastrium and right hypochondrium for the past 6 months. The pain had been more or less continuous over the epigastrium with no radiation to the back. There was some relief of pain following meals. There was no history of heamatemesis or melaena. A barium meal x-ray report was inconclusive. A gastric analysis showed a normal acid curve.

The patient was operated on by a right paramedian incision. On opening the abdomen induration was felt along the lesser curvature 3" from the gastro-duodenal junction with some enlarged lymp nodes in the greater omentum. The stomach was mobilised, and on further examination the induration was found to extend up to half an inch from the oesophagus. A radical sub-total gastrectomy leaving just a small cuff of the stomach was carried out, and an ante-colic Polya anastomosis was done. Macroscopic examination of the stomach showed two ulcers along the lesser curvature, the lower one 2½" from the gastro-duodenal junction 1" × 1" in size with hard everted margins. The upper ulcer was situated 4" from the gastro-duodenal junction, smaller in size 1/8" in diameter. The two ulcers were separated from each other by about half an inch of normal gastric mucosa, and appeared as two independent ulcers - Figure 6.

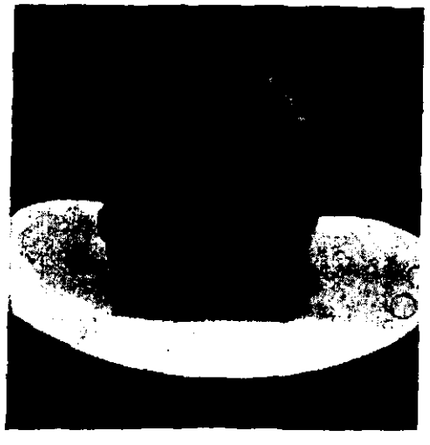

Fig. 6

Showing a double ulcer along the lesser curvature with normal gastric mucosa in between the higher ulcer was malignant.

Histo-pathology of the section showed it to be a case of adeno-carcinoma.

Follow up.—The patient was dead 9 months after operation.

Discussion and conclusions

Surgical treatment is as yet the only satisfactory method available for management of carcinoma of the stomach. Although much improvement has occurred in the results of treatment of this disease during the past 35 years—the five year cure rate having increased from 25% to 35%—the present results leave much to be desired. According to Berkson and his associates between the time when diagnosis of cancer is first made and five years later 86 of 100 patients are lost. 20 of these 86 are lost because the lesion is found inoperable at the time of examination, and 36 more are lost when on laparotomy the lesion is found not resectable. This delay in diagnosis, therefore, appears to be the main reason for poor follow-up results. Any individual suffering from gastric dyspepsia over the age of 45, which is not relieved promptly by appropriate diet or medication should be suspected to have gastric carcinoma. A vague decline in health, loss of weight, and lack of well being, even though not associated with any definite symptoms pointing to the stomach, in elderly patients, calls for a thorough examination and investigation. There is certainly a proportion of 'silent' gastric cancers which are difficult to detect. Prognosis here is necessarily poor as at the time of operation metastases may already have occurred in the regional lymph nodes.

Cases who at admission are found to have a palpable gastric tumour have a poor follow-up result. All four of our cases were dead within 2 years. In the Lahey Clinic series only 14·6% with a palpable tumour survived 5 years or more. Cancer occurring in a younger age group carries a poor prognosis. In two of our cases, occurring at ages between 32 and 35 years, without lymph node metastases, the patients were dead after a sub-total gastrectomy at 14 months and 10 months.

The surgical operation performed has a bearing on the length of survival. It is essential that gastric resection for carcinoma must include a removal of the regional lymph nodes, and for this a thorough knowledge of the lymphatic drainage of the stomach is essential. For lesions in the pyloric region, we have been content with doing a 7/8th sub-total gastrectomy with removal of the greater omentum and the first part of the duodenum in 8 cases. For lesions higher up a radical sub-total gastrectomy with removal of the spleen, tail of the pancreas, and greater omentum leaving a small cuff of stomach has been practised in four of the cases. Total gastrectomy is not employed routinely for gastric cancer, and may be considered only for those cases where the lesion is high and all of the malignant tissue cannot be removed by a radical sub-total resection.

The relationship of gastric ulcer to carcinoma must always be borne in mind if one is to get better follow up results. It is estimated that about 10% of gastric ulcers prove to be malignant on histopathological examination. In our surgical department, out of 152 gastrectomies carried out for peptic ulcer in the last four years, 21 were gastric ulcers of which five were malignant, *i.e.* roughly 24% gastric ulcers were malignant.

The size of the ulcer bears no definite relationship to malignancy. This was brought home to us in one case where a large ulcer 2" in diameter on the post wall of the stomach adherent to the pancreas was found on laparotomy. A radical sub-total gastrectomy with splenectomy and resection of the tail and body of the pancreas was carried out, but histopathology revealed no evidence of malignancy.

Fractional analysis has not been of much help in aiding diagnosis. 3 cases showed hypochlorhydria and 8 cases a normal acid cure. Only one case showed achlorhydria.

Wangensteen in an attempt to improve the follow up results advocated his "second look" or "post-operative reoperation", in cases with evidence of lymph node metastases. The patients thus operated on during the "silent" period of their recurrence have shown recurrent cancer. This procedure, although theoretically sound, has not effected materially the 5 year follow up results.

It would appear, therefore, that an early diagnosis of this condition is imperative, if one is to improve the follow up results. This means awareness on the part of the individual that any untoward symptoms referable to the stomach after the age of 40 means a medical consultation; awareness on the part of the attending physician as to the importance of these symptoms and their thorough investigation; a change in the attitude towards the medical treatment of gastric ulcer knowing that a good percentage of these are malignant; and after diagnosis the adequate extirpation of the lesion by a radical sub-total gastrectomy, or a total gastrectomy as the need may be. It is only thus that we can increase the "cure rate" for this most frequent of neoplasms.

Summary

(1) Twelve cases of Carcinoma stomach as seen in the past 4 years are presented.

(2) The resectability rate has been 100% with no operative mortality.

(3) There were 8 palliative resections with four curative resections in this series.

(4) Radical sub-total gastrectomy is considered the procedure of choice for the majority of cases of this disease.

(5) The reasons for poor follow up results in this disease are discussed briefly and a plea made for early surgical treatment of gastric ulcers.

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ORTHOPAEDIC SECTION

OSTEOCLASTOMA

(Report of three cases)

BY

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Formerly the clinicopathological entity of Osteoclastoma was much confused with other benign bone lesions. The main cause for this was the undue emphasis laid on the presence of Osteoclasts in the lesional tissue much to the exclusion of more important clinical and pathological considerations. Thus entities like Benign chondroblastoma, Aneurysmal bone Cyst, Non ossifying fibromas and solitary focus of fibrous dysplasia were all included in one group called variants of Osteoclastoma. When the above mentioned conditions are excluded on clinical radiological and pathological grounds there remains a residuum of true Giant Cell tumour, a formidable neoplasm which is potentially malignant. Another factor responsible for confusing other entities with true Giant Cell tumour is the undue emphasis laid on the so called soap bubble appearance. It has now been shown that trabeculation is often absent in a true Giant Cell Tumour. Hence the presence of trabeculation should make one hesitate to label a bone lesion as osteoclastoma unless the other benign entitities have been excluded (*Jaffe*).

As regards the age incidence it is now recognised that true osteoclastomas seldom occur before the age of 20. So any diagnosis of osteoclastoma in individuals before 20 years require careful examination because the more benign lesions alluded to previously are common in the younger age group.

Osteoclastoma almost always involves the epiphyses. Any osteolytic lesion occurring in the metaphysis leaving the epiphyses free is unlikely to be an osteoclastoma.

It is important to know that if a true Osteoclastomatous tumour is examined histologically, it may show a variegated picture; in some areas the appearance may closely simulate a fibrosarcoma with little or no tumour osteoclasts. If the biopsy happens to sample these less typical areas an erroneous diagnosis may be arrived at. Hence it is important to examine a widely representative sample of tissue.

It is not uncommon for certain type of tumours to exhibit accelerated growth during physiological states like pregnancy. This is well known to occur in cases of mammary carcinoma. A similar exacerbation of growth can occur in osteoclastoma if the patient is pregnant.

Codman, Coley, Geschicter and *Copeland*, noted a high incidence of trauma in the history of their cases.

The following three cases illustrate some of the above features.

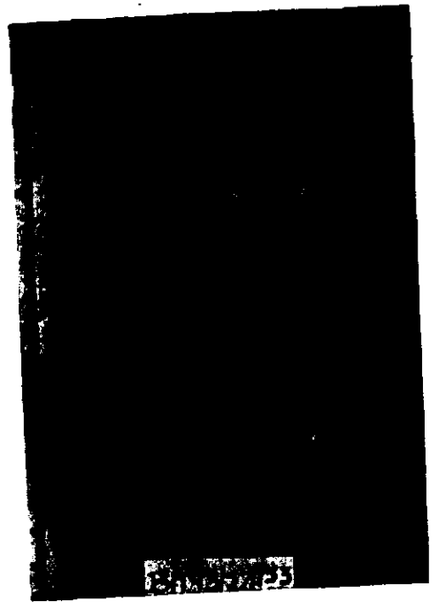
Case 1.

A female aged 35 years was admitted with swelling on the left knee. She was pregnant. Four days before admission she knocked her left knee against a cot. She noticed a rapidly growing swelling over the outer half of the left knee. Clinical examination showed a circular swelling 4" in diameter occupying the outer

half of the left knee involving the head of the fibula. Skiagram (Fig. 1) showed a large cystic lesion involving the head of the fibula. The tumour was excised along with the peroneal nerve which was densely adherent to the tumour capsule. The patient developed peroneal palsy and later on she had a normal delivery.

The specimen (Fig. 2) consisted of the upper 1/3 of the fibula including its head and the muscles inserted thereon. The head was completely destroyed by the haemorrhagic growth. The surrounding muscles showed irregular strands of infiltrations.

Fig. 1 (Case 1)



(Case 1)

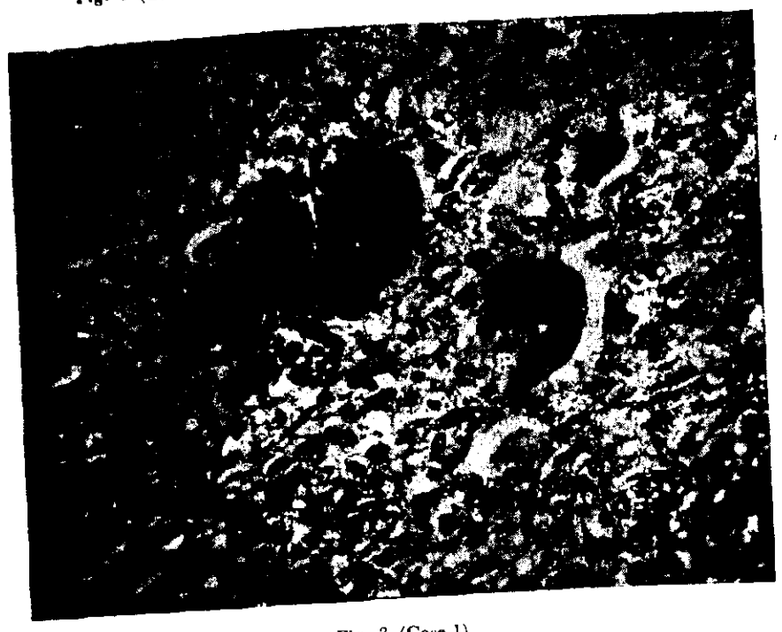


Fig. 3 (Case 1)

Fig. 4 (Case 1)

Histological examination of the tumour showed a picture of osteoclastoma in which sarcomatous transformation had taken place (Fig. 3).

The patient was examined a year later, when she sought aid for her foot drop. She had no other complaints. The local wound had healed well (Fig. 4).

Comments

In this case the features of note are the rapid growth of the tumour following trauma in a woman in pregnancy, the histological evidence of sarcomatous transformation, and the successful results following local excision of the involved bone.

In osteoclastoma the ideal treatment is local excision of the bone bearing the growth. Such a procedure is possible only in certain situations where excision can be done with no detriment to locomotion. This was possible in this case as the growth happened to involve only the upper end of the fibula.

Case 2.

A male aged 44 years was admitted with pain, swelling, and inability to use the left knee. The complaint was of a few hours duration following a fall while doing exercise. Formerly he had experienced more or less continuous dull aching pain over the left knee for four months.

Clinical examination showed a swelling over both the condyles of the left knee more pronounced over the medial side (Fig. 5).

Skiagram showed a large cystic area over the lateral condyle with a pathological fracture running through the intercondylar notch (Fig. 6).

Biopsy of the lesion was done. The appearance was interpreted as "Osteoclastoma with fibrous change". He was given a course of deep X-Ray therapy. The response to deep X-Ray therapy was unsatisfactory as evidenced by increasing swelling and pain. Skiagram taken at this stage showed increased destruction of the bone (Fig. 7). So the diagnosis of osteoclastoma was questioned at this stage and a second biopsy was done. Examination of this tissue showed an appearance suggestive of fibrosarcoma with very few giant cells. Now a diagnosis of endosteal fibrosarcoma with extra osseous spread was entertained. Since fibrosarcomas usually do not respond to deep Xray therapy an Above Knee amputation was done.

Fig. 5 (Case 2)

Fig. 6 (Case 2)

The specimen consisted of the lower 1/3 of the femur, the knee joint and both bones of the leg. A coronal section through the specimen showed a large cystic and solid haemorrhagic growth destroying most of the condyles and infiltrating into the shaft (Fig. 8). The overlying muscles and the joint cavity were free. The gross appearance of the whole tumour was typical of osteoclastoma.

The histological picture was consistent with that of osteoclastoma of Grade II malignancy.

Comments

In this cases, the preamputation biopsy was not really representative of the tumour and hence it was misinterpreted as Fibrosarcoma. The diagnosis was not borne out when the post amputation specimen was examined. Here one striking thing noted was the extreme variability of the histological picture from place to place in the same tumour. It is interesting to speculate whether the fibrosarcomatous change seen in the second biopsy could be due to the deep Xray therapy given previously.

It is well known that the histology of a tumour can be distorted by previous radiation therapy. In pathological evaluation of osteoclastoma it is important that biopsy

Fig. 7 (Case 2)

Fig. 8 (Case 2)

should be done before any radiation is given. While doing the biopsy it is important that only those areas that are free from secondary changes like inflammation, haemorrhage, necrosis, and cyst formation should be sampled if we are to obtain a reliable and true picture of the neoplasm. The patient was fitted with above knee prosthesis and has been followed for over two years with no local recurrence or systemic spread.

Case 3

A female aged 26 years was admitted on 7 Oct. '59 with complaints of severe pain in the left knee of one month's duration. She gave a history of trauma six months before.

Clinical examination showed no swelling but there was definite tenderness over the medial condyle of the femur. The movements of the knee joint were free and painless. Skiagram at this stage showed only a non descript erosion of the trabecular pattern over the medial condyle of the femur (Fig. 9).

Inspite of the absence of a swelling and impressive destruction of the bone, a biopsy was resorted to. At operation the medial condyle showed a fleshy vascular tumour.

Histological examination of the tissue showed an appearance typical of osteoclastoma of Grade II malignancy.

The patient refused amputation and had to be discharged against medical advice.

She got readmitted in Nov. 1960 one year after the first admission and biopsy. By then the tumour had increased in size and had produced a well marked swelling over the knee (Fig. 10) and the tumour had fungated through the overlying skin just to the lateral side of the patella.

The skiagram (Fig. 11) showed almost total destruction of the lower 1/3 of the femur with formation of Codman's triangle. Absence of trabeculation is noteworthy. Lungs were free radiologically.

Disarticulation of the hip joint was done. The coronal section of the amputated specimen showed a large haemorrhagic cystic and solid growth almost completely replacing the lower 1/3 of the femur with invasion of the overlying muscles and the articular cartilage (Fig. 12).

Fig. 9 (Case 3)

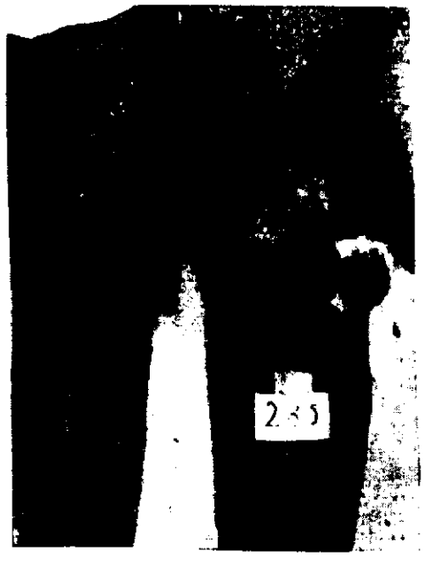


Fig. 10 (Case 3)

Fig. 11 (Case 3)

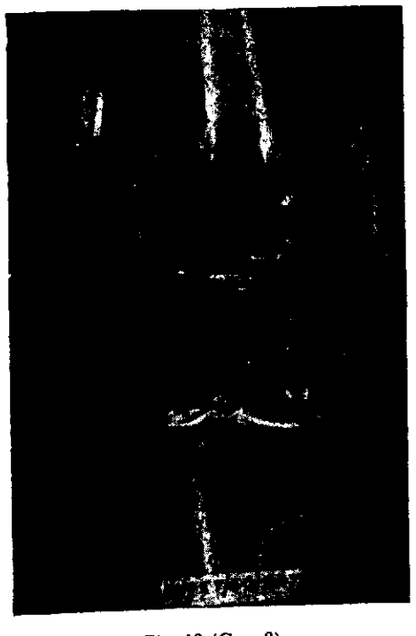


Fig. 12 (Case 3)

Histological examination of the amputated specimen showed a picture of osteoclastoma of grade II malignancy. The interesting feature in the histopathology of this lesion was the presence of areas of collagenization. This feature is significant since the patient had no previous deep Xray therapy to account for this fibrosis. The presence of spontaneous fibrosis in osteoclastoma indicates a regression.

The bone marrow from the shaft showed evidence of infiltration by the tumour cells. The extent of infiltration was patchy.

Comments

In this case when the patient was admitted for the first time the radiological evidence though non-descript was yet quite significant as proved by the biopsy. At this stage when the local destruction was minimal, a conservative surgery may have done good.

Within a period of one year the tumour had grown exuberantly, had destroyed the cortex and infiltrated the overlying muscles. Skiagram taken at this stage, showed the presence of Codman's triangle—a feature usually considered diagnostic of osteogenic sarcoma. Presence of Codman's triangle with wide spread osseous destruction as evidenced in the skiagram may easily be mistaken for an osteogenic sarcoma as it was done in this case, at one stage. It should be emphasised that presence of Codman's triangle indicates only a subperiosteal new bone formation—a feature that can occur in many conditions where the periosteum is lifted up. Detection of tumour cells in the diaphyseal marrow is of significance. Any surgical procedure short of disarticulation at the hip would have left a stump which will be menaced by the possibility of local recurrence. This was obviated by the disarticulation through the hip.

Areas of spontaneous fibrosis seen in the tumour of this case requires comment. It is said (*Jaffe 1959*) that the presence of spontaneous collagenization in the stroma of an osteoclastoma is a harbinger of good prognosis and such cases do well after amputation.

At the time of writing the patient has no evidence of clinical or radiological recurrence and has been successfully fitted with Artificial Limb, trained and rehabilitated.

Treatment

There is a broad degree of correlation between the histological grading of the tumour and the type of treatment to be employed.

In the grading of osteoclastoma the main emphasis is on the stromal cells. In grade I the stromal cells are arranged in a loose manner with well formed intercellular fibrils which in some areas may advance to collagenization. Scattered over such a stromal background are seen large number of tumour osteoclasts bearing on an average 50 to 60 nuclei in each cell. There is no evidence of cytological atypysm. Osteloclastomas of this grading are associated with good prognosis whatever the treatment employed (Curettage, deep Xray or amputation).

In grade II the stromal cells become very compact in their arrangement, with reduction in intercellular collagen formation. The size of the giant cells are reduced and each cell bears a lesser number of nuclei (14 to 20). The nuclei of the giant cells and the stromal cells show evidence of hyperchromatism and variation in size. Osteoclastomas of this grading are prone to recur locally after conservative surgery and a proportion of these become sarcomatous.

In grade III the picture is outspokenly malignant and sometimes may not be identifiable as a sarcoma which arose from an osteoclastoma. These tumours metastasize widely and kill rapidly.

It should be emphasised that the histological grading is not absolute and rigid. Sometimes the primary lesion may show a picture of grade I malignancy and still it may metastasize, the secondary deposits also showing no advancement in the grade of malignancy—a situation analogous to that seen in the so called metastasizing goitres.

Radiation as a method of treatment of osteoclastoma is now looked upon with increasing volume of doubt as to its safety and efficacy. There is considerable volume of evidence now to show that the development of post radiation sarcoma in bone is very real. Hence radiation therapy should as far as possible be avoided.

Since osteoclastomas are now no longer considered benign, surgical attitude towards this neoplasm should be more aggressive and wherever possible excision of the lesion or amputation or disarticulation should be done.

Summary

Three cases of osteoclastomas are presented. Two of them had to undergo amputation and were successfully fitted with artificial limbs, trained and rehabilitated.

It is emphasized that osteoclastoma is a potentially malignant lesion and should be considered as a separate clinico-pathological complex requiring radical surgery.

The danger of mistaking benign lesions like Chondroblastoma, Aneurysmal bone cysts, solitary focus of fibrous dysplasia and Non ossifying fibromas with Osteoclastoma is stressed, because conservative surgery for these lesions give admirable results.

The limitations of histological grading is emphasised. The importance of sampling a representative tissue for correct histological assessment is brought out.

Radiation as a method of treatment is not favoured. The importance of disarticulation is brought out in case 3 where the tumour had extended into the shaft.

Exacerbation and even malignant transformation occur if there is associated pregnancy as seen in case 1.

The importance of age incidence in the diagnosis of osteoclastoma is emphasised. The cases reported are all above 20 years of age.

The importance of the epiphyseal location of the tumour is also brought out. The 3 cases reported showed involvent of the epiphysis.

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AN EVALUATION OF THE DIAGNOSIS OF BONE TUMOURS BY ASPIRATION

(Review based on study of seventy seven cases)

BY

V. DAVID EDWARD and D. BHASKARA REDDY, Visakhapatnam.

Aspiration biopsy was established as an aid in the diagnosis of bone tumours as early as in 1931 by Coley[2], Sharp and Ellis. Their study was based on 35 cases when this method was just being tried. Martin and Ellis[4] (1934) made a more exhaustive study of the use of aspiration biopsy when 140 bone lesions were aspirated. Coley (1934) discussed the value of aspiration biopsy of bone tumours among 100 cases and recorded 75% of success. No diagnosis could be given to 22% of cases and in 3% of cases a false diagnosis of malignant tumour of bone was made due to errors in the types of cells seen. Khanolkar[3] and Nerurkar (1946) from Tata Memorial Hospital, Bombay described the various diagnostic techniques of aspiration biopsy in the diagnosis of bone tumours and discussed the advantages in their 30 cases. Snyder[5] and Coley (1945) discussed further the diagnosis of bone tumours by aspiration which was established as a routine in the bone tumour department of Memorial Hospital, New York. The study of the authors included 567 aspirations out of 474 individuals during a period of 12 years with a success of 67·5%.

Technique.—The technique mentioned briefly below is adopted in the surgical wards and orthopaedic section of the King George Hospital, Visakhapatnam.

Technique of Aspiration Biopsy of Bone Tumours employed in King George Hospital

1. Preparation of the part as done in bone operation cases.

2. Instruments required for aspiration.

   (*a*) a sterile big bored 18 gauge aspiration needle.

   (*b*) 10 c.c. aspiration record syringe.

3. *Technique.*—The aspiration needle is thrust deep into the tumour directly through the skin, previously anaesthetised with 1% novocaine, at the easily accessible part of the tumour. The syringe is locked over the needle. The needle along with the syringe with its piston partially withdrawn, as a unit, is pushed upto the outer limit of the tumour (*i.e.*) upto the subcutaneous tissue. Then the syringe is unlocked and the needle pushed deep into the tumour mass. The needle is then locked on to the syringe and withdrawn completely. This method is repeated twice or thrice to get sufficient amount of tissue.

The tissue inside the needle and the syringe is squirted out into a test tube containing 10% neutral formalin.

The material is stained with toluidine blue and the wet smear is examined immediately to note the characters of the cells.

The remaining tissue and blood clot were massed together on a small square of blotting paper and dropped into a specimen bottle containing 10% formalin and run through paraffin section. The clot was treated as a small biopsy, care being taken to preserve every particle of tissue and the sections are stained routinely with H & E stain and Unna Pappenhiemer's stain, to differentiate plasma cells from the other tumours of round cell etiology such the metastatic tumours, neuroblastomas, reticulum cell sarcomas, lymphosarcoma and the Hodgkin's sarcoma.

The total of 77 cases have been studied in this manner and the results analysed in table No. I.

Table I shows the analysis of the results of the aspiration biopsies.

From the table it is observed that the aspiration biopsies have been very useful in cases of multiple myeloma, fibrosarcoma, Ewing's tumour and benign osteoclastoma (Figs. 1, 2 & 3). In all these cases we have had 70 to 80% success. It has been fairly useless in many of the benign conditions and also in chondrosarcoma whereas in osteogenic sarcomas we had only 50% success. In nearly 37% of the cases the aspiration biopsy was unsatisfactory and had to be repeated.

Multiple myeloma is one of the tumours wherein aspiration biopsy was done as a routine in all suspected cases. 20 cases were aspirated and out of which in 14 cases the diagnosis could be established with certainty.

Out of 4 cases of malignant giant cell tumours aspiration was performed in one case. Though the elements found were not specific for the diagnosis of malignant giant cell tumour, yet the malignant nature of the tumour was revealed. Later, when a local excision has been performed further detailed study revealed it to be malignant giant cell tumour.

We have found only 61% of success in the cases studied whereas Bloodgood[1] (1934) met with 75% of success and Snyder (1945) with 67% of success. The biopsy was found

Table I

Diagnosis	Total number of cases in which aspiration was done	Aspiration was diagnostic in	Aspiration was unsatisfactory and had to be repeated	Benign celled malignant
Osteogenic sarcoma ...	17	8	9	—
Ewing's tumour ...	5	4	1	—
Multiple myeloma ...	20	14	6	—
Fibrosarcoma ...	21	13	6	—
Malignant osteoclastoma ...	1	—	—	—
Chondrosarcoma ...	2	—	2	—
Benign osteoclastoma ...	11	8	3	—
Total ...	77	47	27	—
Percentage ...	—	61	33	—

Fig. 1

Photomicrograph illustrates uniform round cells and peritheliomatous arrangement in an aspiration biopsy from a case of Ewing's tumour (H. & E. × 50).

Fig. 2

Photomicrograph shows the presence of osteoclasts and stromal cells in an aspiration biopsy from a case of osteoclastoma (H. & E. × 50).

Fig. 3

Photomicrograph showing the plasma cells in an aspiration biopsy obtained from a case of multiple myeloma (H. & E. × 1680).

to be unreliable in determining the malignancy of the debated tumours such as malignant giant cell tumour. In all cases where there was doubt as to the nature of the tumour it was found advisible to repeat the aspiration. In no case did a false aspiration biopsy of benign tumour led to the amputation or local excision of the tumour. Whenever an aspiration material was insufficient for diagnosis it only meant that no tissue was obtained and only blood was drawn and above all in the diagnosis of bone tumours, the clinical and roentgenographic findings are also to be taken into consideration.

The advantages of aspiration biopsy have been frequently emphasised in the literature as a simple, rapid, economic procedure. It may clear up a questionable diagnosis or provide histological material in an obvious case without the need for hospitalisation and preliminary operation. In many instances it provides microscopic proof for inoperable cases. While an open biopsy may eventually be necessary no time is lost by aspiration first, and it frequently eliminates the more formidable procedure with its attendant hazards of non-healing, dissemination, and other operative hazards.

The foremost disadvantage of this method of diagnosis is the difficulty of interpretation. The Pathologist is usually confronted with a minute bit of tissue or isolated cells which requires guarded interpretation. Only with the aid of full clinical and radiological features in mind, the value of this method of diagnosis could be established. Stewart (1933) emphasised that if one has to interpret the abnormal cells correctly, he has to take into consideration the clinical setting, the site of aspiration, the normal cells of this region, and the possible tumour

occurring in that location. It was not found possible to classify the tumours precisely in every case of aspiration biopsy as noted in the chart, but it might be possible to state whether or not the questionable tumour is benign or malignant and whether it is primary or a metastatic tumour.

Though it may be argued that aspiration may implant tumour cells in the path of the needle and that it may produce haemorrhage in the tumour or loosen cells into the blood stream and thus help further in dissemination of the tumour cells, as observed from our case records and follow up series no immediate untoward effect was noted, such as the development of the tumour at the site of aspiration by implantation of cells or metastases elsewhere being hastened by aspiration.

Summary

(1) Literature on aspiration biopsy in the diagnosis of bone tumours has been briefly reviewed.

(2) The technique of aspiration biopsy in the diagnosis of bone tumours as followed in King George Hospital, Visakhapatnam is recorded.

(3) Total of 77 cases have been studied in King George Hospital, and Andhra Medical College, Visakhapatnam during the period of 10 years by aspiration biopsy technique.

(4) The results are analysed and the advantages and disadvantages of the method are critically discussed.

Acknowledgments

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THE RAPID TREATMENT OF SPINAL TUBERCULOSIS

BY

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In our attempt to discover a more rapid method of effectively treating tuberculosis, which is prevalent in large areas of the world, we have to take into consideration both the low economic standards of the patients as well as their lack of realization of the seriousness of their disease. Jones and Smith and others report relatively rapid improvement with bed rest and antituberculous drugs. I have also found this to be the case. This may lull both the doctor and the patient into a false sense of security. The patient, after a few months' treatment, is prone to stop his medication and resume his work. This is the rule rather than the exception in these countries. A great advantage of operative treatment is in insuring an adequate period of rest until bony immobilization can be achieved.

This report is on 100 cases of spinal tuberculosis treated from 1954 to 1959. My program of treatment has evolved from a conservative background to radical early surgery. The aim is (1) to relieve any pressure in cases of paraplegics; (2) to fuse the involved area and at least one vertebra above and one below the affected vertebrae; (3) to evacuate the abscess and radically curette the walls and remove any sequestra, bone, disc material and debri; (4) early discharge from the hospital as soon as the sutures are out, but to follow the surgery by a minimum of four months absolute bed rest on a hard bed and until there is x-ray evidence of solid bony fusion; (5) to give anti-tuberculous drugs for at least one year.

If there is pulmonary involvement, consultation by the chest service is obtained. Treatment for both the spine and chest can proceed at the same time, and frequently a better response is seen in the lungs when the spine is immobilized surgically or a paravertebral abscess is curetted out. Moore reports similar findings.

Draining sinuses pose the greatest problem as no definitive surgery is ever carried out in the presence of a sinus near the operative site. Repeated curettings at intervals of about six weeks in conjunction with antibiotics and bed rest eventually clear up these sinuses.

The usual examinations and laboratory tests are carried out. Frequently marked anemia is present. It is found best to correct this with whole blood transfusions rather than wait for the response to medical treatment as these patients seem to respond very slowly. They are often toxic and extremely debilitated. As soon as the blood is approaching normal the patient is operated on. If the patient is toxic and debilitated, I evacuate the abscess with a costotransversectomy or lumbar or abdominal (extra peritoneal) procedure, or if not too toxic, a transthoracic approach.

It is amazing how quickly the patient will respond following evacuation of the abscess. He will be relieved of his pain, anxiety and restlessness. This latter is sometimes so severe before surgery that he

cannot remain lying down. His temperature will return to normal and he will begin to gain weight.

Drainage of the cold abscess is an excellent opportunity to explore and follow it down to the bony source which may not have been detected on x-ray. This bony focus can then be curetted along with the walls of the abscess with relative impunity. I rarely insert drains post-operatively and feel that the drainage should not be carried out for more than forty-eight hours at the most, as the danger of secondary infection is greatly increased. It should be emphasized that the tuberculous abscess should be handled as a clean case (Harris et. al.) Once a secondary infection occurs it will spread throughout the abscess cavity and may be very difficult to eradicate.

A posterior spinal fusion is done two weeks after the costotransversectomy. The fusion extends from one segment above to one segment below the lesion. Meticulous care is used to clean all soft tissue off of the spinous processes and lamina and these are cut with a sharp osteotome, leaving a row of shaving of bone attached at one end. Rib bone taken from other patients who have had a segmental resection for tuberculosis of the lung is used when available. Allen also reports good results with rib bone. This is cut up in match sticks using a bone cutter and interwoven between the spinous processes. When this bone is not available either autogenous or homogenous iliac bone is used.

Post-operatively the patients are placed on a hard bed and allowed to turn from side to side when they are able. The adult patients operated are not put in plaster casts unless there is extreme instability of the spine as was encountered in several cases where both the posterior as well as the anterior elements of the spine were destroyed. Menard in 1900 observed that movement with respiration caused the vertebral bodies to move thus aggravating the disease. This indicates that the thoracic spine cannot be immobilized whether in plaster or not. The patient is certainly much more comfortable on a bed than on a Bradford frame or in a plaster cast, and as they can move their arms and legs more they keep their general body tone in better condition. In several cases I have had opportunity to go back into some of these fused spines where rib had been used as described and they had a solid sheet of bone which incorporated the spinous processes. The patient is kept in the hospital until his stitches are removed and the wound is well healed. He is then sent home in an ambulance and is cautioned that he is to remain on a hard bed with no sitting at any time for a minimum of four months. He is then brought back for x-ray and evaluation of fusion and healing. I feel it necessary to continue anti-tuberculous medication for at least one year.

Paraplegics

Nineteen of twenty-three cases had a decompression either by laminectomy or lateral decompression. The results are not as good as desired. There were 10 cures, 3 still active, five died and five were not followed up. The patients usually are in much worse condition than when they have caries spine without cord pressure. The average duration of paraplegia before coming in for surgery has been four months. I feel that this is the most important factor in their failure to get complete recovery. We know that irreversible changes, depending upon the pressure, occur. Occasionally a portion of sequestrated body or an entire intervertebral disc is found. These are rarely diagnosed before surgery, and conservative treatment will not cure this type of pressure.

Discussion

Although cures are reported by radical evacuation only, this procedure alone should be reserved for those cases where there is little or no bony or disc involvement. Where a tuberculous focus can be excised, leaving a normal spine, it is possible to obtain a cure. As this is usually impossible in the spine, fusion becomes the next best thing. Bony immobilization by fusion is superior to any external support.

Fusion in the presence of the abscess can be done in selected cases. This does not seem wise, however, when a costotransversectomy is done and large amounts of pus evacuated. Also, it is difficult to prepare any sort of bed along the lateral border of the bodies of the vertebra and to hope for a firm contact of the bone graft. This has been attempted on several occasions but the graft appeared to lie as an inert or sterile sequestra.

Occasionally in doing a posterior fusion an abscess is inadvertently encountered. In this situation the fusion is carried out.

Finally, a method described by Hodson and Stock should be discussed. This is the anterior approach to the spine through the thoracic cage. A rib is excised corresponding to the level of the lesion. The anterior bodies of the vertebrae and the paravertebral abscess are then explored either extra or transpleurally. An excellent exposure is obtained through this method. The abscess can then be entered and thoroughly cleaned out, removing all necrotic material and sequestra. The rib that has been removed can then be used as a graft. From this exposure of the bodies a good preparation of the bed and insertion of the graft can be done. Adequate fusion can be obtained in this method, whereas it is doubtful in a costotransversectomy as the preparation of the bed in the latter is inadequate.

Table I
Relation of Spinal Tuberculosis to Peripheral Tuberculosis

Involvement	Patients Treated	Percentage
Spine ...	100	59%
Peripheral bones and joints.	71	41%

Table II
Treatment of Spinal Cases

Type of Treatment	Number of Cases
Operated ...	92
Conservative* ...	8

*Treated with body casts and anti-tuberculous drugs.

Table III
Complications

Description	Number of Patients
Active pulmonary disease ...	28
Paravertebral abscess ...	65*
Draining sinuses ...	7*
Amyloid disease** ...	3

*50 shown on x-ray.
**Not routinely examined for.

Table IV
Analysis of Deaths

Cause	Number of Patients
Far advanced pulmonary tuberculosis ...	4
Moderately advanced pulmonary tuberculosis ...	1
Cardiac arrest ...	1
Amyloidosis ...	1
Unknown ...	1
Not operated ...	1
Total ...	9

Table V

Summary of Results in Operative Treatment of Tuberculosis of the Spine

Procedure	Cured **	Lesion Active or Relapse	Deaths ***	Under Treatment	Lost to Follow-up	Total
Evacuation of abscess and Spinal Fusion...	13	0	1	3	3	20
Spinal Fusion only ...	11	1	1*	4	7	24
Evacuation of Abscess only ...	11	5	1	1	7	25
Paraplegics ...	10	2	5	2	4	23
Conservative ...	2	1	1	—	4	—

*Cardiac arrest at time of surgery.

**Cure indicates follow-up of a minimum of twelve months, and average of 31 months.

***See Table IV.

Conclusion

100 cases of spinal tuberculosis in which ninety-two were operated are reported. Early radical evacuation of the abscess either by costotransversectomy or abdominal extra-peritoneal approach, preceded or followed by spinal fusion, is found to be the easiest method of treatment. However, transthoracic approach has certain definite advantages. Curable pulmonary tuberculosis is no contraindication to surgery. The patients are prepared for surgery within one to two weeks, and are discharged as soon as their operative wound is healed. In general, six weeks hospitalization and a total of four months at absolute bed rest is sufficient. Body casts or Bradford frames are not used except in children. Anti-tuberculous drugs are given for twelve months *minimum*.

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THE XXIII ANNUAL CONFERENCE

The 23rd Annual Conference of the Association of Surgeons of India will be held at the Medical College, Baroda, from the 27th to the 30th of December 1961.

The main Subjects for the scientific discussion at the Annual Conference are as *follows :—*

1. (*a*) **Injuries of the Hand.**

by Dr. Subir K. Chatterjee, Calcutta.

(*b*) **Early repairs of Hand Injuries.**

by Dr. C. Balakrishnan, Nagpur.

2. **Spinal Cord Tumours.**

by Dr. R. Chatterjee, Calcutta.

Besides this, a few "Short Papers" will be presented at the Conference.

Dr. A. B. Kothari, M.B., F.R.F.P. & S., M.S., F.I.C.S., Lecturer in Surgery, Medical College, Baroda, is the Local Secretary, who is making arrangements for the Conference.

Further details about the Conference, accommodation at Baroda during the Annual Conference, etc., can be had from the Local Secretary.

* * *

SUBJECTS FOR DISCUSSION AT FUTURE MEETINGS

24th Meeting (1962)

1. **Tumours of Urinary Bladder.**
by Drs. K. K. Ghosh and H. K. Sarkar, Calcutta.

2. **Management of Burns.**
by Dr. Anjali Mukherji, Calcutta.

3. **Experiences in the Use of Extracorporeal circulation for Cardiac Surgery.**
by Dr. A. K. Basu, Calcutta, P. K. Sen, Bombay and Dr. S. N. B. Roy, Calcutta.

4. **Septic and Suppurative Arthritis of the Hip.**
by Dr. B. Mukopadhaya, Patna,

and

5. **A Paper on Anaesthesia (to be decided in due course).**

25th Meeting (1963)

1. **Hypothermia.**

2. **Experiences in Surgery for Chronic Pancreatitis.**
by Dr. R. S. Gupta, Calcutta.

ORTHOPAEDIC SURGERY SECTION

Australian Orthopaedic Association

The Hony. Secretary, Australian Orthopaedic Association, Dr. Richard Hodgkinson, 147, Macquarie St., Sydney, writes :

The next meeting of the Australian Orthopaedic Association will be a combined meeting with New Zealand. It is to be held at Wairakei, from Monday 5th February through to February 8, 1962.

I have been asked to extend an invitation to all members of the Association of Surgeons of India to be present at the meeting in New Zealand.

If there are any enquiries regarding accommodation, please contact the Hony. Secretary, New Zealand Association :

Dr. John Saunders,
Kelvin Chambers,
16, The Terrace, Wellington, New Zealand.

* * *

OBITUARY

Dr. M. L. BARMAN

Born : 16-4-1911 **Died : 28-4-1961**

Passed M.B.B.S. (Patna Uuniversity) 1935. Proceeded to U. K. at the end of 1938. Passed F.R.C.S. (Edin.) 1943. Worked as Orthopaedic Registrar in U. K. for about a year and returned to India in 1944. Worked as a Surgeon in various Institutions, such as Campbell Medical School and Hospitals, Calcutta, Lake Medical College and Hospitals, Calcutta, Marwari Relief Society, Calcutta and Medical College Hospital, Calcutta.

From 1952 he had been working as the Hony. Senior Visiting Surgeon of the Orthopaedic Dept., Nil Ratan Sarkar Medical College Hospitals, Calcutta, till his death. He was an active member of the Executive Committee of the Orthopaedic Section of the Association of Surgeons of India.

He is survived by his widow, six children, two younger brothers, and four sisters.

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THE

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RUPTURE OF INTESTINE DUE TO NON-PENETRATING ABDOMINAL TRAUMA

BY

Dr. B. R. KALKE.

"It is safer to look and see than to wait and see"

—Sir Cuthbert Wallace.

The extreme vulnerability of the intestine to trauma was known even to Aristotle, who said, "A slight blow will cause rupture of the intestine without injury to the skin". In spite of this knowledge for hundreds of years, the condition still presents diagnostic difficulties in some cases and it is this fact which tends to raise the mortality.

The intestinal perforation due to non-penetrating or subcutaneous injury is a rare and deceptive lesion and sometimes challenges the diagnostic acumen of the attending surgeon. Seriousness in subcutaneous injuries arises because of its late recognition and delayed diagnosis; the surgical intervention when the patient's condition is already grave adds an added insult to the injury and may serve only to hasten his demise. The indications for operation in penetrating wounds are unquestionable as a penetrating abdominal wound probably always means a penetrating wound of the abdominal viscus and the treatment is always prompt. The delay in the institution of treatment in subcutaneous injuries makes the odds against recovery more formidable and raises the mortality to appallingly high level. Hicken and Carlquist rightly attribute this "not to our inability to repair the damaged bowel but rather to our ineptitude in arriving at an accurate diagnosis during the curative phase". In some cases the causative trauma or accident appears too trivial to cause visceral damage and in others the severe associated injuries focus the attention of the surgeon so that the abdominal condition is not recognised till peritonitis develops when the serious nature of the abdominal catastrophe becomes evident to all concerned.

The present paper is based on the 12 consecutive cases seen by the author in about 7 years in two general hospitals. Since the condition is rare in civilian life, collection of a large series of cases is unusual. The interest in the subject was aroused because of the diagnostic difficulty that was present in the first case. It is desired to discuss here the various aspects of the problem in the light of the experimental work and experience of those interested in the subject.

Causative Agents

The rupture of the bowel by subcutaneous injury may be caused by a variety of agents. The history of the exact nature of the injury is important. Bailey states that the street accidents are the most frequent cause; next in order come the blows or kicks in abdomen and falls from a height. The findings in this series are given in table I.

Table I

Type of Trauma	No. of cases.
1. Fall on some solid metal, wooden or stony object ...	4
2. Fall of weight on abdomen ...	3
3. Kicks or blows in abdomen ...	3
4. Automobile accident ...	1
5. Struck in abdomen by metal ring ...	1
Total ...	12

It will be evident that automobile accident has caused rupture only in one case. Most of the other reports give a high incidence due to motor accidents; thus Bosworth, and Poer and Woliver report an incidence of 30 percent due to traffic accidents. Clarke states that more than 50 per cent of the closed abdominal injuries in his series were due to automobile wrecks.

Though intestinal rupture often results from a severe type of trauma, it should be remembered that the rent in the bowel may be caused by what appears to be an insignificant blow on abdomen. The patient is not likely to be aware of this and is likely to refuse operation in the early stage when the results of the operation are excellent.

Sometimes the rupture of the intestine is caused while trying to reduce a strangulated hernia or by a direct blow on the hernia when it is in the sac; in none of the cases in the present series was the perforation caused in this way.

According to Grant Massie the blow or trauma is inflicted below the umbilicus in a large majority of cases, and in this series 7 patients had injury in the umbilical or subumbilical region.

Age and Sex Incidence

It will be evident from the type of trauma mentioned above that there is no reason why a particular age or sex should be more prone to rupture but it has been found that it is more common in the working type of people and in males. Clarke states that in the majority of his cases, such injuries occurred between the ages of 5 and 65 years and sex incidence was 102 males to 18 females. In the present series the ages ranged from 15 to 50 years and only 2 of the 12 cases were females.

Site and size of Rupture

Isolated nature of the perforation is the notable feature in most of the cases; Bailey states that 10 per cent of cases have multiple ruptures. As noted by Welch and Giddings, this is in striking contrast to the effects of penetrating wounds where the multiplicity of organ injury is the rule. In the series reported here, only one patient had a double perforation; the rest of them had only a single rupture.

It has been reported by Rowlands, Massie, Counseller and McCormack, Gordon-Taylor etc. that most of the rents occur near the relatively fixed points of the small intestine (duodeno-jejunal flexure or ileo-caecal junction) and this is attributed to the limited mobility enjoyed by these sections of the intestine. Bosworth reports that in 82·2 per cent of all cases in which the tear was accurately localised (51 of 62 cases) the

lesion occurred at or close to the place where the bowel was firmly fixed to the parieties. Geoghegan and Brush are opposed to this view and they believe from their experience in 20 cases (where 6 of the 9 jejunal perforations and 6 of the 10 ileal perforations were 30 cm. or more from ligament of Treitz or ileo-caecal junction respectively) that short mesentery does not increase the susceptibility of bowel to non-penetrating traumatic rupture and should it occur, it suggests crushing type of injury rather than compression type. According to them the commonly operating mechanism is the latter one, and the rupture occurs in a part of small bowel far removed from the fixed points. In this series, out of the total of 8 cases of rupture of jejunum or ileum, 5 patients had it within 3 feet of the duodeno-jejunal flexure (1 case) or ileo-caecal junction (4 cases). It is quite possible that the coils of intestine near the fixed points are prevented from escaping due to their relatively fixed attachment on one side and are thus more liable to rupture even in the compression type of injury.

The most commonly affected part of the gastro-intestinal tract is the small intestine (jejuno-ileum). See Table II.

Table II

Site of Perforation

Site.	No. of Cases.	Mortality.	Percentage of total mortality.
1. Ileum ...	5	2	16·66%
2. Jejunum ...	3	—	—
3. Colon ...	2	—	—
4. Duodenum ...	1	—	—
5. Multiple sites ...	1	1	8·33%
6. Stomach ...	—	—	—
Total ...	12	3	25·00%

The stomach and duodenum enjoy relative immunity due to their well protected position and also probably due to the fact that the trauma is unlikely to occlude the two ends and convert then into a closed loop. The stomach is, however, liable to rupture immediately after food when it is distended and its two ends remain closed for some time. One patient from this series (See Table II) had a rupture of the chronic duodenal ulcer (ulcer could be palpated and the mucosa was not pouting) on the anterior wall of the first part of the duodenum. Traumatic perforation of peptic ulcer is a known complication though rare, and Maingot states that 4 percent of all the perforations of peptic ulcer are due to blunt trauma.

There were two cases of subcutaenous perforations of the colon—one at the hepatic flexure (case No. 9—Table III) and the other in the sigmoid colon (case No. 12—Table III). Both these cases, though operated 24 hours after injury, made uneventful recovery.

The patient with double rupture had one perforation in the stomach and the other in the ileum.

The size of the perforations varied from 5 mm. to 5 cm. in the 11 cases in which the size was recorded; in one case it was just mentioned as small. But in 7 of them the size was 1 cm. or smaller. In most of the cases the perforation was surrounded by normal-looking bowel wall. It is because of the small size of the perforation and the normal-looking surrounding bowel wall that the perforation is likely to be missed sometimes during exploration.

The perforation is usually located on the antimesenteric border. In one case, it was near the mesenteric attachment with an associated tear in it and in the other it was on the lateral wall.

Complete transection of the bowel due to subcutaneous trauma is described but none was present in this series. It will be interesting to note, in this connection, that a complete division of bowel was successfully sutured for the first time by Rambdohr in 1730 though the credit for first successful operation for subcutaneous rupture of the bowel goes to Sacherus (1720).

Mechanism and Pathogenesis of Rupture

The subcutaneous rupture of the bowel can be caused by a variety of mechanisms. Usually there is no associated injury to the skin or muscles of the anterior abdominal wall; as stated by Maingot "a blow which ruptures a strong muscle of the abdominal wall is frequently too spent to damage the intestines". When the blunt force applied to abdomen is sudden and sharp and catches the abdominal muscles unawares, when they are off their guard, even, a trivial or insignificant looking trauma can rupture the intestine particularly if it is distended with gaseous or fluid contents. The trauma should necessarily be sharp and sudden (Penberthy); the mobile viscus might, otherwise, slip from under the injuring force if it is applied slowly and no injury would result. It has been suggested by Burnett et al and others that a narrow force has predilection for hollow viscera and that a wide force is more likely to damage a solid organ.

It is easy to understand the rupture of the bowel caused by crushing injury where the intestine is crushed between the external force and the spine or the sacral promontory or thick musculature of the posterior abdominal wall. Similarly it is not difficult to follow when the intestine is torn off from its mesentery due to force applied tangentially to the abdominal wall. The characteristic features of such lesions are that they consist of large gaping wounds with extravasation of blood, and contused bowel wall and mesentery surrounding the rent. What is difficult to understand is the mechanism of the clear-cut, small or moderate sized single perforations surrounded by normal-appearing bowel wall and caused by trivial or moderate type of trauma. This was explained by Sauerbruch in 1903 by an ingenious theory when he postulated that the injury force, by striking two ends of a bowel loop which is distended with gaseous or fluid contents, creates a closed loop and raises the intraluminal pressure whereby a bursting type of perforation results in the loop at a distance from the part struck. Wangensteen has shown that the minimum intraluminal pressure required to approach the bursting strength of the human small intestine is about 140 mm. of Hg. and it is conceivable that this pressure can be attained in a closed loop that results when the two ends of the loop are caught between the striking force and the spine or the sacral promontory particularly when the loop is filled with fluid or gaseous contents. These facts have been very convincingly shown and proved by the canine experiments conducted by Geoghegan and Brush. If the striking force cannot form a closed-loop, the contents of the intestine may be driven either proximally or distally with no chance of raising the pressure to optimal bursting point and no perforation will result. Many of the perforations in this series (see Table III) were of the bursting type with clear-cut perforation and normal-appearing surrounding bowel wall.

Aird has drawn attention to the importance of inguinal hernia which has a very strange relationship to the subcutaneous rupture of the bowel. In the series of three cases reported by him, all were associated with hernia. The mechanism of rupture is obvious when the blow is directed to the

TABLE III

Twelve Cases of Subcutaneous Rupture of Intestine

No.	Name	Age Sex	Nature of Injury and duration at admission	Associated Injuries	Symptoms and Signs	Provisional Diagnosis on Admission	Investigations Screening or X-ray abdomen W.B.C.-T & D	Treatment and Findings at Operation	Result	Autopsy Findings
1	K. D.	32 M	Kick in abdomen during a fight 3 hrs. before admission. H/o unconsciousness for one hour.	C.L.W. 1" × ½" × scalp deep with crack fracture in occipital region.	Breath smelling of alcohol. Vomiting once. Pain and tenderness in abdomen. No rigidity. Peristalsis-heard. P-96/mt. vol-good. B.P. 110/70 mm. Hg.	Concussion; and contusion of abdomen.	X-ray scalp-fissure fracture in occipital region Screening abdomen-No free gas in peritoneal cavity on admission. Free gas seen after 22 hours.	Suturing C.L.W. Treatment for head injury. Patient went in severe shock 20 hours after admission. Did not rally enough for operation to be performed.	Expired on 3rd day.	Faecal peritonitis with 300 cc. of blood stained and dirty fluid. Perforation 3 cm. × 2 cm. with pouting mucosa seen in small intestine 10' away from ileo-caecal junction. Brain and Meninges congested.
2	K. J.	25 M	First blow in epigastrium during a fight-1 hour before admission.	C. L. W. 1½" × ½" × scalp deep left frontal region.	Severe pain all over abdomen. Marked tenderness and board like rigidity in upper abdomen. Liver dullness obliterated. Peristalsis-heard, P. R.-no tenderness.	Perforative peritonitis.	Free gas seen under diaphragm.	Exploratory laparotomy through rt. paramedian incision. 0·7 cm. perforation seen in the ant. wall of 1st part of duodenum. Ulcer felt and mucosa not pouting. Perforation sutured, fluid aspirated and abd. closed in layers.	Uneventful recovery.	—
3	D. S. M.	30 M	Acc. fall on the handle of a hand-cart with injury in lower abd. (below the umbilicus) 5½ hours before admission.	—	Vomiting-once, Pain, tenderness and guarding lower abd. Liver dullness not obliterated. Peristalsis not heard. P. R.-Tenderness +. No evidence or h/o hernia, P-80/mt. BP-110/70 mm Hg.	? Perforative Peritonitis.	No free gas seen under diaphragm.	Pt. first refused opn. Consented for it on the next day. Expl. Laprthroughright lower paramedian incision. Brownish fluid in peritoneal cavity. Small perforation about 3' from ileo-caecal junction. Sutured. Rt. indirect hernial sac felt. Abdomen closed in layers.	—	—

TABLE III—(*Contd.*)

Twelve Cases of Subcutaneous Rupture of Intestine

No.	Name	Age Sex	Nature of Injury and duration at admission	Associated Injuries	Symptoms and Signs	Provisional Diagnosis on Admission	Investigations Screening or X-ray abdomen W.B.C.-T & D.	Treatment and Findings at Operation	Result	Autopsy Findings
4	R. K.	40 M	Accidental injury in lower abd. by a metal ring 1 hr. before admission.	C.L.W. 1" × ½" muscle deep lt. iliac crest. C.L.W. 1"×½"× bone deep front of left leg.	No vomiting. Marked tenderness and guarding lower abd. Liver dullness obliterated. Peristalsis heard. P.R., Tenderness +. P. 64/m. Vol - good, B.P.-128/84 mm. Hg.	Perforative Peritonitis.	Free gas seen under diaphragm.	Exp. Laparatomy through lt. paramedian incision. Semidigested food material + fluid present in peritoneal cavity. Perforation 1 cm. in diam. in ileum about 1' proximal to ileocaecal junction, Mucosa pouting out. Sutured. Pelvis drained with supra-pubic drainage tube. Abdomen closed in layers.	Moderate fever for 3 days. Good recovery.	—
5	M. P.	50 F	3 years old child fell on abd. from a ht. of 8', 22 hrs. before admission.	—	Vomiting ++. Distension ++. Marked tenderness and guarding in umbilical region and left iliac fossa, Liver dullness obliterated. No shifting dullness. Peristalsis-not heard. P. R.-tenderness ++.	Do.	Do. W.B.C.-T-17300/cmm. D-P-90% L-10%	Refused operation first but consented fot it later. Expl. laparotomy through rt. paramadian incision. Perforation 4 cm. × 2 cm. in jejunum 2' from duodeno-jejunal flexure. Edges oedematous and friable. Mucosa pouting out. Sutured. Fluid from peritoneal cavity sucked out. Abd. closed in layers.	High Fever for 5 days. Good recovery.	—
6	S. S.	28 M	Accidental fall on a stone bench & Blunt injury in umbilical region 17 hrs. before admission.	—	No Vomiting. Distension lower abdomen. Tenderness & guarding lower abdomen. Liver dullness not obliterated. Peristalsis-heard. P. R. not tender. P-108/mt. B.P.-100/82 mm. Hg.	? Contusion abdomen.	No free gas under diaphragm. Distended coils of intestine seen.	Operated on next day of admission. Expl. laparotomy through rt. paramedian incision. Perforation 5 mm. in diam. near mesentery (with injury in mesentery) about 5' from duodeno-jejunal flexure. Mucosa-pouting out. Perforation sutured. Abd. closed in layers.	Uneventful recovery.	—

TABLE III—(Contd.)

Twelve Cases of Subcutaneous Rupture of Intestine

No.	Name	Age Sex	Nature of Injury and duration of admission	Associated Injuries	Symptoms and Signs	Provisional Diagnosis on Admission	Investigations Screening or X-ray abdomen W.B.C.-T & D	Treatment and Findings at Operation	Result	Autopsy Findings
11	G. C.	20 F	Accidental fall of stones on abdomen 1 hr. before admission.	C.L.W. ½" × ½" × muscle deep lower lip.	Vomiting twice. Tenderness and guarding all over. Liver dullness not obliterated. Peristalsis heard. P. R.-not tender. Pt. in severe shock. Pulse-120/mt.	Contusion abdomen with ? injury to abdominal viscus.	No free gas seen on repeated screening. X-ray abdomen-Fracture of pubic rami.	Intravenous fluids with nor-adrenaline drip. Blood transfusions. Ryles tube & aspiration. Antibiotics.	Pt. deteriorated rapidly in spite of supportive treatment & expired on 3rd day of adm.	Dirty yellow in fluid peritoneal cavity & fibrinous adhesion on rt. side. Perforation 2·5 cm. in diam. on ileum on anti-mesenteric border about 8" away from the ileo caecal junction. Mucosa pouting out. Surrounding area congested & contused. Retroperitoneal haemorrhage near rt. kidney & extraperitoneal haemorrhage in the folds of lesser omentum.
12	V. S.	30 M	Fist blow in left iliac fossa 44 hrs. before admission.	—	Vomiting-twice. Tenderness and rigidity all over the abdomen. Liver dullness-? obliterated. Peristalsis-absent. P.R.-tenderness ++. No evidence of Hernia.	Perforative Peritonitis.	A narrow strip of free gas seen under diaphragm.	Expl. laparotomy through rt. paramedian incision. Plenty of light yellow coloured fluid in peritoneal cavity. Sucked out completely. Perforation 1 cm. in diam. in sigmoid colon on lat. aspect. Mucosa pouting out. Perforation sutured. Potential hernial sac found in left inguinal region. Abdomen closed in layers with drainage.	Uneventful recovery	—

N.B.—During exploratory laparotomy search was made for potential inguinal hernial sac in all cases.

hernia when it is in the sac. It is difficult to deduce the mechanism when only a potention hernial sac exists or when the contents are not in the sac at the time of injury. Bange gave an ingenious explanation when he postulated that the sudden rise of intra-abdominal pressure is associated with a rise of intra-luminal pressure (in the bowel) and the wall of the bowel which is applied to the abdominal orifice of the hernial sac, being unsupported (as there is no rise of pressure in the hernial sac), bursts; other parts of the intestine do not burst due to equality of pressure on the two sides of the bowel wall. In this series, there were two patients (Nos. 3 and 12 in table III) who had potential hernial sacs present; none of them gave history of previous hernia.

Cases have been reported where ruptures have been caused by blast injuries, indirect violence, and muscular action; none from the present group were due to any of these.

The presence of shock following subcutaneous injury is suggestive of internal haemorrhage and crushing type of injury of solid or hollow viscera; it is not encountered immediately following compression type of rupture of the bowel but comes when generalised peritonitis sets in. The predominant feature of rupture of bowel is peritonitis; internal haemorrhage indicates rupture of solid viscera or mesenteric blood vessels. The peritonitis may follow immediately or may be delayed for several hours or few days. Poer and Woliver furnish three explanations for the delayed appearance of symptoms:

(1) Incomplete rupture - some hours or days elapse before local necrosis gives rise to complete rupture and spillage of intestinal contents.

(2) The injury causes reflex or direct paresis of the injured bowel loop. A small rent may be sealed by plastic adhesions due to local plastic peritonitis. When the peristalsis restarts due to local recovery or ingestion of food, the rent opens out and leakage starts. This theory was originally propounded by Cope in 1914.

(3) Prevention of leakage. Leakage may be prevented by plugging of the opening by the pouting mucosa which is a characteristic feature of the traumatic perforation; in complete transection openings may be closed by contraction of the circular musculature of the divided ends.

It is this slowly developing peritonitis that masks the real nature of the underlying pathology and keeps the surgeon in dark for a long time. The surgeon has to keep this in mind for when the symptoms restart the condition suddenly becomes grave due to severe shock and fulminating peritonitis.

It is quite possible that some cases of the ruptures of the bowel may be healing up without being clinically recognised.

The other associated injuries may themselves be serious and cause death of the patient or they may not allow exploration to be performed at the right time.

Signs and Symptoms

The signs and symptoms which were present in this series at some time or other during observation are listed in Table IV.

Table IV

Signs & Symptoms	No. of Cases.
1. Abdominal Pain ...	12
2. Tenderness ...	12
3. Vomiting ...	5
4. Distension ...	4
5. Guarding and/or Rigidity (Local & Generalised) ...	9
6. Obliteration of liver dullness ...	5
7. Dullness in flanks ...	—
8. Peristalsis—absence of ...	5
9. Shock ...	2

Shock was present in only 2 cases in this series at the time of admission. In one patient (No. 1 in Table III) where the condition was not recognised early, irreversible shock developed about 22 hours after injury. Poer and Woliver report that shock was not present in a majority of their cases (only 10 out of 36 cases reported by them were in shock).

It will be apparent from the above table that abdominal pain and tenderness are the commonest manifestations for which the patients usually present. They were present locally in the cases that presented early; generalised tenderness and pain were present in cases that reported late.

Vomiting is not a common finding and was present only in 5 cases. It has diagnostic value particularly when it is repeated or continuous.

Another important sign is the muscular rigidity. Muscle guarding may be present even in contusion of intra-abdominal viscus; in the absence of fracture of ribs or injury to the spine, rigidity is diagnostic of irritation of parietal peritoneum—localised in early cases when local peritonitis exists but later spreads all over the abdomen when generalised peritonitis supervenes.

Other findings such as distension, obliteration of liver dullness, and dullness in the flanks are dependent for their development on the amount of air that escapes into the peritoneal cavity, on the amount of fluid that is poured out in peritoneal cavity as a result of peritonitis and on the amount of haemorrhage and will vary from case to case. These are decided by the size of perforation, amount of spillage and the condition of the loop of intestine at the time of rupture.

Absence of peristalsis (5 cases) is a very valuable sign, peristalsis may, however, be present in some cases which report many hours after injury and thus may not help in early diagnosis. The abdomen is "silent" when generalised peritonitis sets in.

The presence of emphysema of abdominal wall in the absence of fractured rib suggests retroperitoneal rupture of duodenum or colon.

Diagnosis

Suspicion should be the watch-word in diagnosis of subcutaneous rupture of bowel. Early diagnosis is difficult and delay in diagnosis is dangerous. The patient must, therefore, be kept under close observation, and repeated examinations conducted if the diagnosis is not clear at the first examination. If the diagnosis is apparent from the signs and symptoms, the course of action is obvious, *viz.* supportive therapy and exploratory laparotomy.

The pain and tenderness when they last for more than 6 hours, when they tend to spread and when they are associated with any of the other signs and symptoms should arouse strong suspicion. Rigidity which is first localised and then tends to spread should be diagnostic even in the absence of other signs. Obliteration of liver dullness is a finding of diagnostic importance in early stage suggesting free gas under diaphragm. "Silent" abdomen as found on auscultation is another finding of diagnostic value.

A regular record of temperature, pulse and respiration is indispensable in the observation period. A rising pulse-rate particularly when associated with abdominal pain and tenderness should suggest intra-abdominal mischief and exploration should not be delayed. In rare cases, however, the pulse-rate does not show much rise and remains steady even when peritonitis is present. A rise in temperature with spreading pain and tenderness should suggest peritonitis. Tenderness in recto-vesical pouch in the male or pouch of Douglas in the female on per rectal examination indicates pelvic peritonitis, and makes operation imperative.

Adequate radiological examination of the abdomen and chest in vertical position forms a most important investigation when such facilities are available and when the condition of the patient permits such an examination. A flat x-ray plate of abdomen in vertical position (with the patient standing or sitting) must be taken in all suspected cases. Free gas in the peritoneal cavity rises to the top under the dome of diaphragm and when present in sufficient quantity can be seen in an x-ray plate or on screening. In rupture of lower abdominal viscus, gas sometimes collects at the level of the second lumbar vertebra being confined there by the omentum in front and the attachment of the transverse mesocolon above (Gordon-Taylor). Zachary Cope makes another important observation that free gas may be localised near a ruptured portion of the gut. The presence of free gas in peritoneal cavity, in whatever position it lies, is a positive evidence of rupture in the gastrointestinal tract. Free gas may not, however, be present in all the cases and its absence should not deter the surgeon from undertaking surgery when he has decided to do so from other evidence. In the present series, 6 out of 11 patients (55 percent) had free gas under diaphragm; one patient could not be x-rayed due to his poor general condition.

The urine must be examined in all the cases for macroscopic or microscopic haematuria to exclude gross lesions of the urinary tract.

Leucocytosis will be present when peritonitis supervenes and may be an additional aid to diagnosis.

Prognosis

The difficulty in early diagnosis and the delay in operation are the most important factors which are responsible for a high mortality rate that is associated with such lesions. As stated by Ficarra the lowering of this mortality resides with the surgeons. The constant vigilance as impressed by the previous writers, the frequent use of radiology, and the modern developments in resuscitative measures (non-adrenaline drip, blood transfusion, etc.), anaesthesiology, and the management of infections by antibiotics have already helped in lowering the mortality as can be seen from Table V;

Table V—Mortality Rates

SERIES.	Operative Mortality	Total Mortality
1. Counseller & McCormack (1935) (All available case reports upto 1935) ...	60·7 %	73·4 %
2. Poer & Woliver (1942) (All available case reports between 1935 and 1942).	50·4 %	61·3 %
3. Hunt and Bowden (1944) ...	40·0 %	40·0 %
4. Bosworth (1948) ...	29·3 %	34·5 %
5. Geoghegan & Brush (1956) ...	30·0 %	30·0 %
6. Present series ...	—	25·0 %

it should be the aim of the surgeon now, to reduce it still further by exercising more watchfulness. Some deaths are bound to occur due to serious abdominal injuries and other associated lesions, but cases which are curable should not be missed. The advice of Gordon, Gordon-Taylor that "it is far better to look and find nothing than to waste valuable time in diagnostic speculation until all the evidence of peritonitis is forthcoming, the harbinger of early dissolution" should be followed precisely.

Treatment

The supportive treatment with anti-shock measures (flat or head low position, warmth to the body, intravenous saline drip and in certain cases nor-adrenaline drip and blood transfusions, is of paramount importance when shock is present or intra-abdominal mischief is suspected. The injection of morphia or pethidine should be withheld till definite diagnosis of the abdominal condition is made. Oral feeds should be avoided and gastro-intestinal decompression started with Ryle's tube. The maintenance of a regular chart of temperature, pulse, respiration and blood-pressure is important during the observation period and definite decision for or against operation should be taken within 6 hours for good results to accrue. A reasonable suspicion should make exploration mandatory. Blood should be grouped and antibiotics started forthwith.

Once the decision for operation is taken, there should be no hesitation or delay. The anaesthesia is usually general anaesthesia with intra-tracheal intubation, and relaxant drugs may be used for good relaxation. The incision should be right paramedian as this can be extended in an upward or downward direction if required; it should be adequate so that excessive retraction of the wound edges and traction on the viscus can be minimised. The exploration should be thorough and quick; every inch from cardiac end of the stomach to the rectum must be inspected carefully. When perforation is found, the loop should be isolated and kept out by applying Babcock's forceps but since multiple perforations are present in 10 per cent of cases (Bailey), complete exploration must be done. The mesentery and solid viscera must be examined to exclude associated lesions in them. Active bleeding if present must be stopped first. Once a thorough search has been made, the perforation should be sutured transversely (to avoid narrowing of the lumen) in two layers—through and through and sero-muscular and omental graft stitched over for reinforcement. If a large rent is present in the bowel it should be closed by the ingenious technique advocated by Poth and Martin. If the loop is badly traumatised or gangrenous (No. 9 in table III) if there are multiple perforations in a small segment, or if there is a tranverse tear in the mesentery jeopardizing the viability of the bowel, resection and anastomosis of the part is necessary. Exteriorisation of the intra-peritoneal rupture of colon is desirable though not always essential, and in small perforations with little damage to the bowel wall, it may be justifiable to close it by suture and return it to the peritoneal cavity (Farquharson). Retro-peritoneal rupture of colon or duodenum will require drainage through a separate incision after closure of the perforation. In both the cases of intra-peritoneal rupture of the colon in this series (No. 9 and 12, table III), the bowel was returned to the peritoneal cavity after necessary treatment and both the cases recovered uneventfully. All the fluid from the peritoneal cavity must be aspirated, and if there is extensive soiling or fulminating peritonitis use of one or more drainage tubes is prudent. The closure of the wound should be as expeditious as the rest of the

performance. A solution of crystalline penicillin and streptomycin may be introduced into the peritoneal cavity before closure.

Intravenous infusions and blood transfusions, morphia or pethidine, antibiotics and decompression of the gastro-intestinal tract through Ryle's tube are of prime value even in the post-operative period. The convalescence may be stormy or uneventful depending on the condition of the peritoneum and intestines before operation and the manipulations required during operation. Paralytic ileus may be a troublesome feature in the post-operative period. Adequate fluid and electrolyte balance and vitamin intake (particularly vitamin C) should be ensured by parenteral route till such time as the oral feeds can be started. In addition to early diagnosis, the successful outcome also depends on the proper management of the case in the pre-operative, operative and post-operative periods.

Conclusions and Summary

1. High mortality rate in the subcutaneous rupture of the bowel is due to difficulty in early diagnosis and delay in operation.

2. The various causative agents and the sites of the rupture are discussed.

3. The mechanism and pathogenesis of rupture as found in most cases are discussed at length. The delay in the onset of peritonitis masks the underlying intra-abdominal pathology for a long time.

4. The signs and symptoms that are present in the different cases are described.

5. Early diagnosis of the condition is important and must be based on clinical findings and ancillary investigations. Suspicion should be the watchword in diagnosis.

6. Constant vigilance on the part of the attending personnel and modern advances have lessened the mortality; the aim of the surgeon should be to reduce it still further. A case which is curable should not be missed.

7. The points of importance in the treatment are stressed.

8. Relevant literature on the subject has been reviewed.

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TRANSRECTAL AND PERINEAL NEEDLE BIOPSY OF THE PROSTATE

BY

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Carcinoma of the prostate because of its frequent occurrence and insidious onset presents a problem of great magnitude to both the surgeon and the pathologist. It is one of the commonest cancers occurring in the male over the age of fifty years. More men are living beyond this age now as the life span is being steadily extended by advances in medical science. This increasing life expectancy and consequent higher anticipated incidence of prostatic carcinoma and the small number of possible radical cures, makes it imperative to detect carcinoma of the prostate at a stage when it is still amenable to radical surgery.

Various methods have been employed for detecting carcinoma of the prostate at this stage. First and the most important investigation which makes a clinician think in terms of prostatic carcinoma is the digital rectal examination of the prostate. The value of this procedure has been aptly emphasized by Van Buskirk and Kimbrough (1954) as more than 54% of carcinoma cases amenable to radical surgery could be detected by carrying out a routine annual rectal examination in males above 50 years at the Walter Reed Army Hospital.

Impressions gathered on digital examination regarding the diagnosis of prostatic cancer need confirmation by histological evidence, before labelling a prostate as definitely malignant. Pieces of prostatic tissue have been secured for this purpose by various procedures like open perineal exposure, transperineal needle, transurethral resection or transrectal punch.

The transrectal and perineal needle biopsies in the present study were conducted as a part of routine urological investigations in cases of apparently benign prostatic hypertrophy, in order to compare the adequacy of tissue secured by each method and to study their role in diagnosing early carcinoma of the prostate.

Material

Thirty cases of apparently benign prostatic hypertrophy admitted to the Rajendra Hospital, Patiala were studied in this series. Most of this cases came with acute retention of urine and had to be subjected to a preliminary suprapubic cystostomy. So taking advantage of the spinal anaesthesia the biopsies were performed just before the suprapubic cystostomy, thus causing no additional pain or inconvenience to the patient. In cases where one stage prostatectomy was indicated, biopsies were performed 5 to 6 days prior to prostatectomy under saddle block anaesthesia.

Patients were given sulphaguanidine, 4 tablets six hourly, for 1 to 2 days prior to biopsy, a plain water enema was given on the evening before operation and a plain water bowel wash on the morning of operation. Pre-anaesthetic medication consisted of injection morphine sulphate 1/6th gr. and atropine sulphate 1/150 gr. half an hour before operation. Saddle block anaesthesia was administered in all cases, except in those who came with acute retention and had been given spinal anaesthesia for emergency suprapubic cystostomy.

Biopsies were performed in modified jack-knife position.

Technique

1. Perineal Needle Biopsy.—Needle biopsy was performed with a Silverman's biopsy needle (Fig. I-II) through a small nick in the skin of the perineum about an inch in front of the anal margin and a little away from the middle line on the side from which biopsy was to be taken.

The left-index finger in the rectum guided the point of the needle to the biopsy site as the needle could be easily felt skirting the rectal wall and entering the lesion in the prostate. This way tissues measuring approximately 1·5 centimeters x ·2 millimeter could be secured (Fig. 2). One or two pieces were taken from each prostate and fixed in one in ten formalin.

2. Transrectal Biopsy.—Needle biopsy was followed immediately by transrectal biopsy in all cases. The technique followed was essentially the one advocated by Grabstald and Elliot (1953). However certain improvisations in the instruments had to be effected because of nonavailability of the ones used by the aforesaid workers. A narrow bladed suprapubic self retaining retractor (Fig. 1-I) was used in place of Fansler's operating rectal speculum and it proved highly satisfactory. Grunwald's Nasal Punch Forceps (Fig. 1-III) was found to be more easily manoeuvreable than the pituitary rongeur.

Preliminary rectal sphincter dilatation helped to a great extent in relaxing the part and the introduction of the retractor. The lubricated blades of the retractor were introduced completely into the rectum, and gradually opened out, thereby stretching the rectal mucosa over the underlying prostate. The site for biopsy was carefully localised by palpation with the right index finger and a 2 cm. long vertical incision made in the rectal wall directly over this

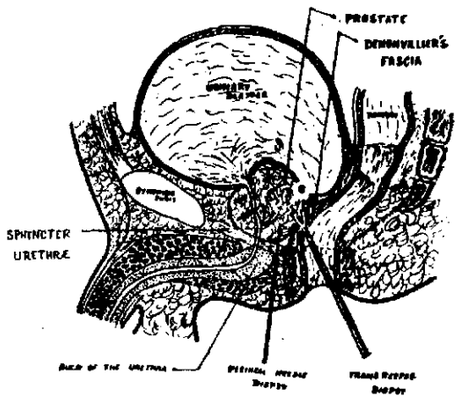

FIG. 2 —DIAGRAMMATIC REPRESENTATION OF THE PATH TRAVERSED BY NEEDLE AND PUNCH FORCEPS

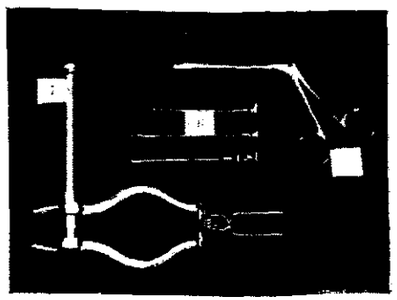

Fig. 1
Showing the instruments used for needle and transrectal biopsy.

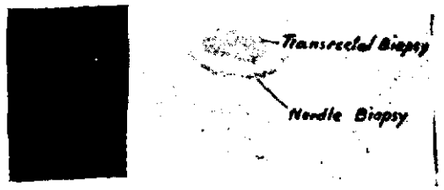

Fig. 2-a
Showing the size of tissue secured by needle and transrectal biopsy.

Table No. I

Showing the accuracy of needle and transrectal biopsy in securing prostatic tissue.

	NEEDLE BIOPSY	TRANSRECTAL BIOPSY
Adequate tissue	28 cases (93%)	30 cases (100%)
Fibromuscular tissue	28 cases (93%)	30 cases (100%)
Acinar tissue	26 cases (87%)	29 cases (97%).

site. The prostate was reached by blunt dissection with a curved artery forceps through this incision. Punch biopsy pieces were taken from the prostate while the assistant fixed the retractor. The left index finger over biopsy site guided the action of the punch forceps. By this manoeuvre sufficiently big pieces (1 x ·5 x ·3 cm.) of tissue could be obtained (Fig. 2). The wound in the rectal wall was sutured with No. 30 cotton thread. A rectal pack was left inside and the speculum removed.

Post-operative sulphaguanidine, 4 tablets six hourly, were given for two more days. The rectal pack was removed after 24-48 hours.

Observations

Both the techniques were found to be simple and could be easily performed in about 15 minutes.

Needle biopsy could collect sufficient tissue in 28 instances out of thirty. In most cases both fibro muscular and acinar tissue could be secured but in two cases, only fibromuscular tissue could be obtained.

Transrectal biopsy could secure adequate tissue in all the thirty cases. Both fibromuscular and acinar tissue could be detected in all but one instance which showed only fibromuscular tissue.

Six cases in this series presented abnormal induration of the prostate on rectal examination. Four of these were diagnosed as carcinoma on both needle and transrectal biopsies and were subjected to carcinoma treatment like orchidectomy and oestrogen therapy. One other showed chronic inflammatory tissue alongwith benign prostatic hypertrophy, this diagnosis being further confirmed on histological examination of the enucleated prostate.

In one case biopsy showed only benign prostatic hypertrophy, but proved to be malignant on histopathological examination of the enucleated prostate. Obviously we must have missed the area which was carcinomatous.

Table 2

Showing the diagnostic value of the biopsies

Particulars		Needle Biopsy	Transrectal Biopsy	Post Operative Histopathology
6 cases showing abnormal induration.	4 cases ...	Carcinoma	Carcinoma	No Prostatectomy
	1 case ...	Benign prostatic hypertrophy	Benign prostatic hypertrophy	Carcinoma
	1 case ...	Chronic prostatitis	Chronic Prostatitis	Chronic Prostatitis
24 cases showing no abnormal induration	...	Benign prostatic hypertrophy	Benign prostatic hypertrophy	Benign prostatic hypertrophy

The following complications were observed after these biopsies :—

1. *Haemorrhage.*—A moderate degree of bleeding did occur in all the cases following transrectal biopsy but was easily controlled with a little pressure.

2. *Fall of Blood Pressure.*—Considerable fall in blood pressure was observed in six cases while changing the patient into the jack-knife position. This was managed with Vasopressor drugs and oxygen therapy alongwith lowering the head end of the table.

3. *Discomfort in the Perineum.*—Two cases complained of perineal discomfort following this procedure on the second post-operative day. This was probably due to mild infection of the prostate.

4. *Urethral Injury.*—Urethral injury was observed in one case following transrectal biopsy where it had created a through and through passage between the urethra and the rectum. The rectal wall was sutured immediately and sulphaguanidine, 4 tablets six hourly, and injection streptomycin, one gram daily, for five days were administered. The patient had an uneventful recovery without any resultant recto-urethral fistula.

5. *Orchitis developed in one case, on* the second day after the biopsy. This cannot be attributed entirely to the transrectal biopsy or needle biopsy alone as in this case suprapubic cystostomy was also performed at the time of biopsy, orchitis being quite commonly seen after cystostomy.

Discussion

The earliest mention of prostatic biopsy was probably made by Young in 1906 who utilised perineal exposure of the prostate in suspected cases of prostatic carcinoma and excised small portions of the lateral lobes for microscopic study. He recommended that open perineal biopsy should be performed in all cases where cancer of the prostate is suspected. Since then open perineal biopsy had been used quite widely in diagnosing early carcinoma of the prostate.

Henline (1943) suggested frozen section biopsy in suspected cases of carcinoma. If the diagnosis was proved on frozen section one could go ahead with radical prostatectomy, otherwise the perineum could be closed and the patient discharged on the 3rd or 4th day. According to Henline the main advantage of this method was that one could secure an adequate specimen of the prostate under direct vision.

Hudson et al. (1954) in their famous Bowery series found the open perineal biopsy to be more than twice (89%) as dependable as rectal palpation (37%) in diagnosing early prostatic carcinoma and provided an opportunity to proceed with immediate curative surgery on frozen section diagnosis of cancer.

One is inclined to think from the foregoing observations that open perineal biopsy is ideal for early carcinoma cases, but it has the obvious disadvantage of being a major operative procedure, time consuming, necessitating prolonged convalescence and resulting in some diminition in libido (according to Pearlman 1955).

Ferguson (1930) described aspiration biopsy through the perineum with 70 to 80% success in securing prostatic tissue, whereas Barringer (1935) could obtain only 50% success with this technique. Although it is simple to perform the fact that it is difficult to secure sufficient tissue for examination and to make a cystological diagnosis from the aspirated material has kept it from becoming popular.

Transurethral biopsy has long been abandoned as a method of detecting early carcinoma of the prostate as it most commonly arises in the posterior lobe of the prostate near the capsule and the transurethral resection is most likely to miss it unless the resection is extended to the capsule, a major procedure which is time consuming necessitating prolonged hospitalisation. Moreover even if it is successful in diagnosing carcinoma it has to be followed by a major surgical procedure *viz.* radical prostatectomy. Furthermore, apart from being only half as accurate in diagnosing early carcinoma of the prostate as the open perineal biopsy (Hudson et al 1954) the hazard of tumour cells entering the blood stream in the same manner as the irrigating fluid during transurethral resection has to be borne in mind (Franco Bianchi 1956). While aspiration biopsy was being gradually discarded Pierson and Nickerson (1943) utilised Silverman's biopsy needle through a puncture in the perineum for securing tissue from the prostate.

Since then different modified needles have been described by various workers *e.g.* the screw biopsy instrument (Rose 1944), Turkels' needles (Semple 1951) and Fenestrated biopsy needles (Melick1951).

However, we have found Silverman's biopsy needle to be quite satisfactory. Accuracy of needle biopsy in securing adequate tissue from the prostate has been variously estimated as follows :—

Author	Year	Percentage of accuracy of needle biopsy.
Rinker and Shuman	1952	95%
Pierson & Nickerson	1943	85%
Needell et al	1955	90%
Present study		93%

No significant complications have been observed with needle biopsy in this study. But several complications like perforation of the urethral bulb, rectum and bladder have been reported by others; however, no serious sequelae are likely to follow except transient haematuria (Bianchi 1956). The only serious complication reported in the literature following needle biopsy has been described by Clarke and co-workers (1953) which concerned the implantation of cancer cells along the needle tract. We don't think that the risk of disseminating cancer cells is greater with this method than with any other method of tumour biopsy. Development of epidymitis following needle biopsy has also been mentioned in two cases by Needell and co-workers (1955).

Transrectal biopsy was successful in securing tissue in all the thirty cases (100%). The quantity of prostatic tissue secured by transrectal biopsy is much more than with the needle biopsy, thereby presenting a wider field for study under the microscope to make a definite diagnosis. This procedure

combines all the advantages of open perineal biopsy in that it can obtain adequate tissue from the postero-inferior surface of the prostate where 90% of prostatic carcinoma arise under direct vision (Poutasse 1953). This technique has been found to be simple and requires comparatively little time. The tissue obtained can be studied by Paraffin section and definitive surgery including radical perineal prostatectomy is possible following this procedure.

In one case, however, the biopsies failed to reveal the carcinomatous nature of the prostate although the prostate felt hard on rectal examination. Similar observations have been made by Rinker and Shuman (1952) who reported 6 cases of false negative carcinomas out of 48 cases of carcinoma of the prostate with needle biopsy. No such observation has been reported with transrectal biopsy. In such cases where there is a strong doubt on clinical examination about the prostate being malignant it is advisable to repeat the biopsy before subjecting the patient to sub-total prostatectomy.

The value of needle and transrectal biopsy in diagnosing occult carcinoma of the prostate is very doubtful, although Spring and Alden (1954) while studying 103 cases for prostatic disease performed needle biopsy as a routine and found that in one case where there was no doubt about its being benign on clinical examination they could detect carcinoma by needle biopsy. Although it has been demonstrated that it is possible to detect occult carcinoma by a biopsy the chances for such an occurrence are so remote that no reliance can be placed on any particular method of biopsy for diagnosing occult carcinoma as it is merely by chance that the instrument strikes one of the few acini in the prostate which are undergoing a malignant change.

One may come across the following complications after transrectal biopsy :—

1. *Haemorrhage.* — Unusual haemorrhage may occur during the biopsy but is easily controllable by digital pressure for a few minutes. Post-operative haemorrhage from the site of the biopsy and post-operative haematuria may occur. (Pearlman, 1955, Grabstald 1955) but was not encountered in the present series.

2. *Prostatis.* — Prostatic infection may occur following transrectal biopsy as two of our cases had mild infection and complained of perineal discomfort. Similar observations have been reported by Grabstald (1955) also in three cases.

3. *Uretheral Injury.*—We encountered urethral injury in one case only and although the fear of recto-urethral fistula was great, luckily no such sequel followed this incident. Pearlman (1955) has also described similar instances where the urethra was injured but no recto-urethral fistula followed. We feel that this injury can easily be avoided if one keeps away from the median plane.

4. *Epidydymo-Orchitis.*–Epidydymo-orchitis may follow this procedure as has also been mentioned by Pearlman, (1955) and, in one patient, by Grabstald and Elliot (1953). Two cases which we came across in our series cannot be definitely assigned to transrectal biopsy alone as in these cases needle biopsy and suprapubic cystostomy were performed simultaneously.

Conclusions

1. Needle biopsy, of its simplicity and absence of complications can be performed even as a routine procedure in all cases of prostatic pathology where the diagnosis needs histopathological confirmation.

2. Transrectal biopsy takes a longer time than needle biopsy and is followed by comparatively more complications than the needle biopsy. But the fact that one can obtain adequate tissue from the postero-inferior aspect of the prostate under direct vision, and can be followed by any type of radical surgery, outweighs the disadvantages and we would recommend its use in all cases of suspected carcinomas of the prostate.

3. In cases where there is a strong doubt of prostatic carcinoma on rectal examination, even if the biopsies fail to detect it in the first instance, it is worthwhile repeating the biopsy before subjecting the case to subtotal prostatectomy.

Summary

30 cases of apparently benign prostatic hypertrophy in whom needle and transrectal biopsies had been carried out simultaneously as a part of urological investigations, are reported. The results of both needle and transrectal biopsies have been encouraging in securing adequate tissue for histopathological examination and in diagnosing early carcinomas of the prostate.

Acknowledgements

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A CASE OF SUBDURAL HYGROMA

BY

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Subdural hygroma is an infrequent condition which consists of a collection in the subdural space of clear, colourless or yellow tinted fluid. Even though it has been honoured by a different name, it does not materially differ from subdural haematoma and a preoperative distinction between the two is very difficult.

Case Report

Abdul Salam, a 14 year old boy was admitted on 20-11-59 in an unconscious state. A few hours earlier, he had fallen to the ground from a height of 25 feet and was found to be unconscious. On the way to the hospital he vomited once and there was bleeding from the left nostril.

On examination, the boy was unconscious and there was evidence of epistaxis from the left nostril. There was no fresh bleeding and but for an abrasion over the left side of the face there was no evidence of external injury. The pupils were equal in size and reacted to light. All the four limbs were flaccid and the deep reflexes were absent. The plantar response was indefinite.

The cardiovascular, respiratory and alimentary systems were normal.

The next day the depth of unconciousness lessened. The boy was semiconscious, was lying curled up and resented any interference by actively moving all the four limbs. His condition gradually improved with conservative treatment. On the fifth day after admission he was fully conscious and responded to calls.

The patient, however, had a slurring of the speech and was not moving his right upper and lower limbs. This persisted and on examination of the nervous system on the 8th day after admission revealed the following :—

Patient had slurring of speech.

All the cranial nerves, except the facial were normal. There was a supranuclear facial palsy on the right side. There was complete loss of motor power of the Right upper and lower limbs. Both the limbs were spastic, the spasticity was much more marked on the upper limb than the lower.

There was no disturbance of sensory functions. All the deep reflexes were exaggerated on the Right side. The abdominal and cremasteric reflexes were absent on the right side and the plantar response was extensor on the right side.

The organic reflexes were normal.

Lumbar Puncture.—C. S. F. was clear and was not under tension.

Skiagram of the skull did not reveal any abnormality.

A provisional diagnosis of subdural haematoma was made and a craniotomy was decided on.

On 5-12-59 Craniotomy was done under General anaesthesia. A burr hole was made over the motor area on the left side and this was enlarged. On exposure the dura bulged out and was not pulsating. A crucial incision was made in the dura and clear, colourless C. S. F. under tension flowed out. The underlying brain matter was found to be pressed down by the collection and when the fluid escaped, the brain started pulsating vigorously. However, the pulsation lessened and became feeble. There was no further escape of C. S. F. and the wound was closed.

On the day after the operation patient was able to move the right lower limb and the spasticity of the Rt. upper limb was found to me much reduced. Gradually motor power returned and within a week after the operation the patient was able to move both the upper and lower limbs and his speech had become normal.

At the time of discharge, but for a slight weakness of the muscle power on the right upper limb, his motor functions were normal. The deep reflexes were normal, the plantar response was flexor and the abdominal and cremasteric reflexes were normal. There was a mild facial palsy on the right side.

Discussion

Subdural hygroma consists of a collection of clear, colourless or yellow tinted fluid in the subdural space. The literature on the subject is meagre, probably due to the rarity of the condition.

It is said to develop in one of two ways :—

In severe head injuries, occasionally, a valve like tear occurs in the arachnoid. Through this one way passage CSF enters the subdural space. The fluid lies free in the subdural space and appears to be unencapsulated, thereby forming a cystic collection diffusely over the cerebral hemispheres. It has a high protein content when compared to the C. S. F. obtained by Lumbar puncture or ventricular puncture and may go up to 3 to 5 grammes per 100 ml. The source of this large amount of protein is still not clearly understood.

This cystic collection may act either as an acute compressing lesion or it may cause an arrest in the improvement of the level of consciousness. It has been emphasised that this may cause the prolongation of the post-traumatic amnesia phase. The symptoms appear after a variable interval of 2-8 weeks after the injury and tend to be less pronounced than in a subdural haematoma. They are usually those of a space occupying lesion but the condition may present itself as a post-concussive syndrome with less definite complaints of headache, dizziness and nervous irritability.

In the second variety of subdural hygroma, the symptoms appear a considerable time after the head injury.

The presence of a well developed membrane in some of these cases has led to the suggestion that probably the process is the endstage of dilution of a small subdural haemorrhage which was too small to produce any symptoms at the time of injury.

In the acute case, exploratory burrhole and drainage gives good results. In the chronic variety it may be necessary to turn a flap and remove any subdural membrane that may be present.

Philips has pointed out that negative exploratory cranial burr holes may be misleading. In a study of 34 cases he often noticed that fluid not found with parietal burr holes with the patient supine, was present in the frontal region. In these cases, the fluid was present in that part of the cranium which was upper-most.

Summary

A case of subdural hygroma is presented. The literature on the subject has been reviewed. It is emphasised that, due to the close similarity in symptoms and the clinical picture, it is often difficult to differentiate between a subdural hygroma and haematoma preoperatively.

Acknowledgement

We wish to acknowledge the help and valuable advice given by Dr. B. Ramamurthy, Professor of Neurosurgery, Madras Medical College. Our thanks are also due to the Superintendent, Medical College Hospital, Trivandrum for permission to publish this case.

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CROSSED RENAL ECTOPIA WITHOUT FUSION

(A Case Report)

BY

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Crossed renal ectopia is a condition in which one kidney is congenitally transposed to the opposite side. Of the two varieties namely with or without fusion, the latter is one of the rarest of anomalies of the urinary tract.

Case Report

Mr. J. K. aged 40 years, Hindu, Male was admitted on 24-2-60, in the Hamidia Hospital, Bhopal with the complaints of pain in abdomen, haemetemesis and bleeding per rectum of six months duration. There were no complaints pertaining to genitourinary system. On examination the patient was a well built young adult. Pulse 80 per minute, respiration 20 per minute, blood pressure 130/80 mms. of Hg. Heart and lungs normal. Abdomen was slightly protouberant, with spleen palpable three fingers below the costal margin, liver not palpable, and with free fluid in abdomen. Pile masses were present in all the primary positions. On investigation, haemogram was within normal limits, E. S. R. 20 mms./1st hours. Urine and stools normal. Gastric analysis was within normal limits. On oesophagoscopy, spleno-venography and barium swallow examinations oesophageal varices were visualised. He was diagnosed as a case of portal hypertension secondary to cirrhosis of liver and was being prepared for splenectomy and leino-renal shunt, for which excretory pyelography was done. To our surprise we found that both the kidneys were situated on the right side. Both kidneys showed good excretion and concentration of the dye. The calyces, pelvis and ureter of the upper kidney were normal. The lower kidney was slightly malrotated but otherwise normal (Fig. 1). The ureter of the lower kidney was running a very oblique course crossing that of the upper one at the pelvic brim to reach the bladder on the left side. In view of the crossed ectopia only splenectomy was feasible which was carried out through a left paramedian incision. During the operation no kidney was found on the left side. On the right side one kidney was palpated at its normal position and the other in the right iliac fossa. Both were of normal size and were entirely separate from each other. The lower kidney was deriving its blood supply from the lower aorta.

Discussion

Caine (1956) in his article mentions that so far only thirty one proved cases of crossed renal ectopia without fusion have been reported including his own case. Out of these thirty one cases thirteen were found at autopsy and eighteen during life, diagnosed by pyelography, surgery or both.

Misra (1956) reported one case of left ectopic kidney situated in the right iliac fossa retroperitoneally and deriving its blood supply from the right iliac artery. Sharma (1957) reported yet another case of left ectopic kidney again situated in the right iliac fossa the blood supply coming from the lower aorta. The kidney was found to be bilobed. These were the only two additions to the Caine's review we could trace.

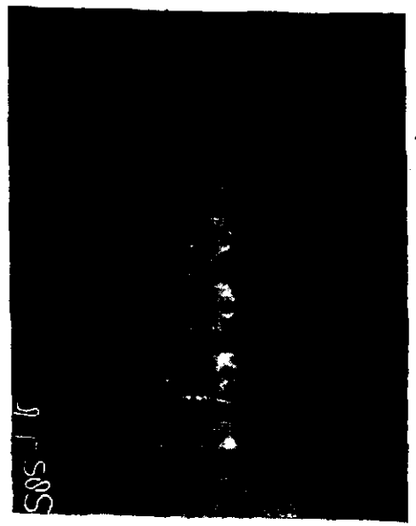

Fig. 1

Excretory pyelogram showing both the kidneys on the right side and none on the left. The upper kidney is normal. The ectopic lower kidney is slightly malrotated.

It is noteworthy that in the majority of cases it is the left kidney which is ectopic and is usually situated in the right iliac fossa.

Summary

A rare case of crossed renal ectopia without fusion, diagnosed by pyelography while being investigated for portal hypertension and confirmed at opearation, is reported. We are thankful to Dr. R. P. Singh, Principal Gandhi Medical College, Bhopal for allowing us to publish this case.

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ADRENO-GENITAL SYNDROME

(With reports of 2 successfully treated tumours)

BY

S. S. ANAND and S. S. MANCHANDA, Amritsar.

Primary neoplasms of the adrenal cortex are not very common. Most of the reports in the literature refer to a single case and hence the clinical features, the life history and histopathology of such tumours is not so well known. The tumours of adrenal cortex produce variable clinical symptoms depending on the type of cortical hormones produced by the tumour, the virilising syndrome produced by excess of androgens and the Cushing's syndrome produced by excess of cortisone-like substances. Cortical overaction in infancy may be responsible for "Infant Hercules". In girls, there may be alteration to masculine type with overgrowth of pubic hair and clitoris. Thus, a child patient who is fundamentally a female, becomes muscular and masculine in appearance and the appearance of the external genitalia may be so intriguingly similar to pseudohermaphrodite of genetic origin. In boys, on the other hand, it may be associated with muscular hypertrophy, rapid increase in stature, precocious dentition and precocious puberty. The following two cases, a girl aged 7 years and the other, a boy of 2 years belonged to these two types respectively.

Case Report

S, — 7 year old, female child was admitted in the East Surgical Ward of the V. J. Hospital, Amritsar on 28-3-1956 with the diagnosis of adreno-genital syndrome. The child was noted to have well marked pubic hair, enlarged clitoris and multiple boil-like lesions on the face-all of a progressive nature, for the last five months.

On physical *examination*, she appeared to be well nourished and of a somewhat stoutish build. She weighed 58 lbs. and measured 45 inches. Her face was rounded and chubby, "moon-shaped" with a well-marked acniform lesion over the forehead and cheeks. There was no hirsutism over the face but there was a profuse growth of pubic hair with a feminine distribution measuring an inch to 1½ inches in length and covering the whole of external genitalia.

The clitoris was markedly enlarged and penile looking. (Fig. 1-a, 1-b). The breasts were not developed and there was no history of menstruation. The abdomen was slightly protuberant and a vague sort of a lump was palpable in the right lumbar region. There was no linea dystrophica over the abdomen, thigh or the back. Auscultation of the heart revealed a grade II systolic murmur in the left third intercostal space. Blood pressure was 120/74 mm. Hg. No abnormality was noticed in the respiratory, nervous or locomotor systems. Spinal column presented no abnormality.

Investigations.—(Before operation).

Blood: Haemoglobin 7 Gms. Total erythrocyte count 3 million per c.m.m. Haemogram showed normocytic hypochromic anaemia (M. C. V. 93·3 cu. M. C. H. C. 28%). Total leucocyte count was 7400 per c.mm. with a differential of polymorph neutrophil 42%, Lymphocytes 52%, large mono nuclear 1%, and eosinophils 5%. Bleeding and clotting times, normal. Blood urea-24 mgms%. Blood sugar (fasting) 100 mgm. %. Serum cholesterol 144 mgm. %. Serum sodium 300 mgms. %. Serum potassium 20·8 mgm. %. 17-ketosteroids in urine were persistently raised.

Particulars	Preoperative—Dates				Post Operative
	3—2—56	17—2—56	23—3—56	9—4—56	15—9—56
17 Ketosteroids in urine mgm. per 24 hours ...	83·2	97·6	101·2	70·4	5·1

Roentenogen studies.—Plain X-Ray abdomen no abnormality. On Intravenous pyelography both kidneys showed normal function but the right collecting system was displaced from above. On retroperitoneal insufflation, a rounded soft mass was seen on the upper part of right kidney which appeared to have displaced the right kidney down. Fig. 2).

X-Rays of the skull and forearms (for bone age and osteoporosis) were normal. Basal metabolic rate was minus 5%. Electro-cardiogram showed a normal tracing. Routine examination of urine and stools showed no abnormality.

Operation.—She was operated on 17th April, 1956 by one of us (S. S. A.) A transverse kidney incision with prolongation posteriorly end vertically over the right 11th and 12th ribs was made. The 12th rib was resected sub-periosteally and divided at its vertebral end. On opening the extra peritoneal space, a large suprarenal tumour about the size of a tennis ball was seen, pushing the right kidney down. The tumour was warm to touch and several blood vessels were seen covering its surface. When the tumour was being handled, the anaesthetist reported a sharp rise of blood pressure from the original systolic reading of 116 to 160 mm. Hg. The tumour was removed after tying the three vessels in its pedicle and after this the blood pressure gradually dropped from 160 to 130 mm. Hg. A rubber drain was put in the retroperitoneal space and the wound was closed.

The histological report of the tumour was 'adenoma' (Fig. 3).

During the post-operative period, apart from the antibiotics and the intravenous blood and glucose drip, the steroids given were ACTH/20 units 8 hourly and Cortisone intra muscularly 50 mgms. 8 hourly. Sodium and potassium estimations were done daily during this treatment. ACTH and Cortisone therapy was gradually decreased after 4 days; the total doses of ACTH were 300 units, cortisone 750 mgms. and Deltacortril 50 mgm.

The patient made an uneventful recovery and was discharged on the 28th April, 1956—13 days after the operation. She was seen 6 months later when she looked so different the facies had lost its roundness and was totally free of the acne. Her weight was 48 pounds and standing height 48 inches. There was no evidence of pubic or axillary hair. Clitoris was, however, still big (Fig. 4).

Fig. 1-a

Fig. 1-b

Fig. 1-a & b - Pre-operative (12-4-56) Note: Acne, pubic hair and big clitoris.

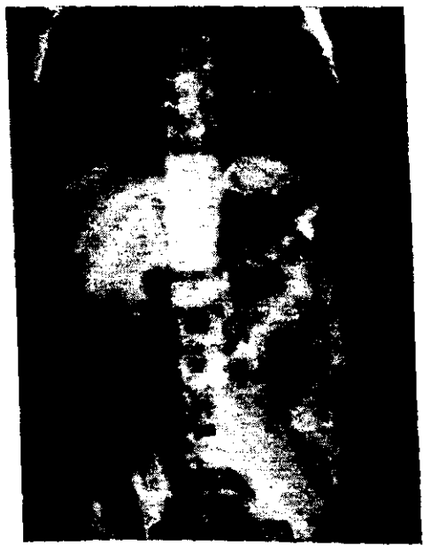

Fig. 2

X-Rays of case (I), S, after retroperitoneal air insufflation, showing a roundish soft tissue mass at the upper pole of the right kidney which appears to have displaced the kidney downwards.

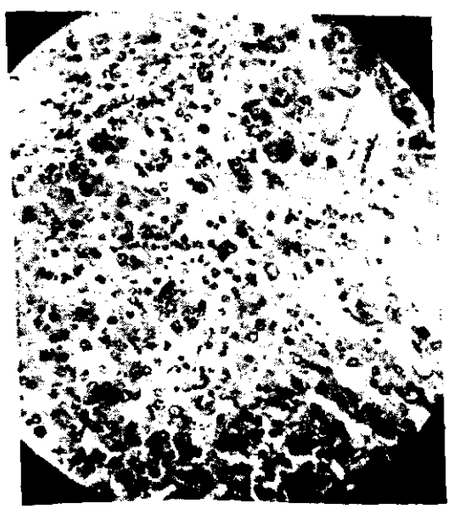

Fig. 3

Shows groups and masses of cells separated by thick and thin bands of fibrous tissue. The cells are polyhydral with indistinct cell margins. The nuclei are small and vesicular.

Case 2.—N, 2 years, sikh male child (18-6-1959) was brought for consultation of progressive increase in the size of his penis and growth of pubic hair of one years' duration. The parents had paid no heed to it till 3 days ago when the patient developed slight swelling of the left testicle and was taken to a local doctor for the first time. On inquiry there was no history of polyuria or any other urinary complaint, sleep disturbances, vomiting or any other abdominal upsets. The child was, however, stated to be developing rather rapidly and was becoming aggressive.

Other relevant details in the history were that he was a full term, child, third birth order and had a normal delivery. There was no adrenogenital crisis in the neonatal period nor any other illnesses. His younger brother was suffering from 'cerebral palsy'. The parents were unrelated before marriage. The child passed through the various milestones of development relatively early—and learnt to stand and walk without support at 7-8 months but acquired single word speech with meaning at about 18-20 months.

Physical examination revealed a well built and somewhat overgrown child, weighing 31 pounds and measuring 31·5 inches while standing, and 20 inches sitting (crown rump). Span was 34 inches. He had cut 19 teeth. There were no abnormalities in the respiratory, cardiovascular, nervous and alimentary systems. No definite mass could be felt in the abdomen. Blood pressure was 95/60 mm. of Hg. His

Fig. 4

Post-operative (12-10-56)
Note: Disappearance of pubic hair.

genitalia revealed along penis (Fig. 5-a, 5-b) measuring about 8 cm., semistiff, which was stated to undergo erection in the morning. There was, however, no seminal discharge. There was also a thick growth of course pubic hair. There was a small hydrocele on the left side.

Laboratory investigations carried out revealed urinary 17-Ketosteroids levels of 24 and 28 mgm. on 28-5-1959 and 27-10-1959 respectively.

Skiagrams of the skull, pelvis, hips, knees and plain abdomen revealed no abnormality. The bone age approximated 5-6-years.

Intravenous pyelography indicated downward displacement of right kidney. Retroperitoneal air insufflation was done on 27-10-59 and revealed a suspicion of increase in the size of right supra-renal gland, which was confirmed on tomography when a large round supra renal tumour with a small round projection from its lower outer border pointing to 7-30' was seen at 5 cm. cut, with the patient lying in A-P' supine position.

Total and differential leucocyte counts were 12500/c. mm. with 34% polymorphs, 50% lymphocytes, 1% large-mono and 15% eosinophil, (with 1875 as the absolute eosinophil count). Other investigations, showed no abnormality.

The patient was put on Deltacortril tablets (5 mg. three times daily) from July to October, 1959 with a total dosage of approximately 415 mgm. There were no ill effects of this therapy, but the only improvement noticed was slight flaccidity of the penis. The pubic hair persisted and the child continued to be un-manageable as before. He also gained 4 pounds in weight and 2 inches in height. The absolute

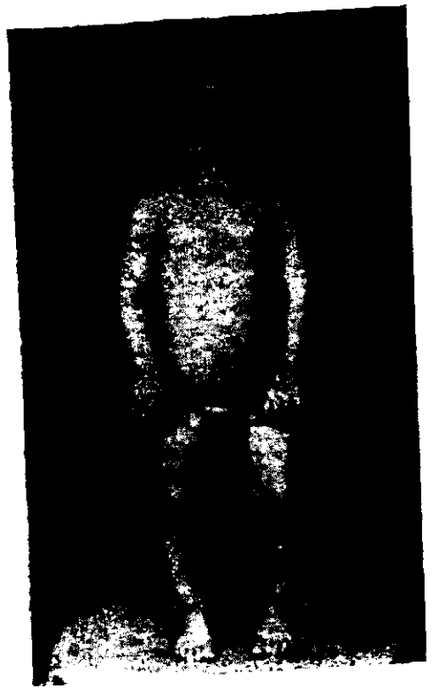

Fig. 5-a

Fig. 5-b

Fig. 5-a & b. Before operation (June, 1959) Note big penis and thick growth of pubic hair.

eosinophil count, however, dropped from 1875 to 594, per c. mm. Feeling dissatisfied with this form of treatment and having got a clue of a round mass in connection with right supra renal gland on tomography after retroperitoneal insufflation of air, he was operated by one of us (S. S. A.) when a round soft fluctuating dark tumour weighing 4·1 ounces was removed. This tumour also showed a small rounded knuckle as seen on the skiagram after retroperitoneal insufflation. There was no hypertensive crisis during the operation and the post-operative progress was uneventful. The histological report of the tumour was 'adeno-carcinoma' adrenal cortex (Fig. 7).

Fig. 6

X-Ray of case (2) N. (on Tomography) (after retroperitoneal insufflation, with patient in A. P. supine position, showing a large rounded right suprarenal tumour with a small round projection from its lower outer borders pointing to 7-30 O'clock, at 5 cm. cut.

Since then the patient has been periodically followed. On 7-7-60 he weighed 34 pounds and measured 37·5 inches. The penis though still big, had shown definite shrinkage measuring 6-cm. The child was also according to the parents, becoming more adjusted socially. Urinary 17-Keto-steroids were 3·5 mgm. %.

Fig. 7-a

Fig. 7-b

Fig. 7 a & b. Shows sheets and groups of large cells showing quite a variation in shape and size. Nuclei are prominent, rounded, elongated or irregular in shape. Some of the cells are multinucleated.

Fig. 8-a

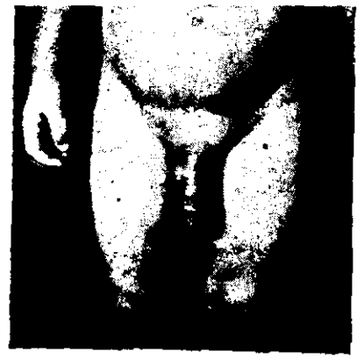

Fig. 8-b

Fig. 8-a & b. After operation (July, 1960) No pubic hair. Penis though still big is smaller than before and as flaccid.

The above two cases of adrenogenital syndrome are due to an adenoma and the other adenocarcinoma, showed definite improvement after surgical treatment. Steroid therapy failed to alter the clinical picture in the male child with adenocarcinoma. It had not been possible to treat the other patient with adenoma of the adrenal cortex with the cortico steroid.

Discussion

Though the terms 'adrenal virilism and adrenogenital syndrome' as originally coined by Apart in 1910 and Gallais[6] in 1912 respectively are in popular usage, the terminology used for the various clinical syndromes resulting from disorders of adrenal cortex is rather confusing. The association of virilising changes from lesions of adrenal cortex was first established by Bullock and Segurira[4] in 1905 and since then there have been excellent studies and reviews. The term adrenogenital syndrome as commonly used includes cases of virilism of all types and degree, arising before or after puberty. Cushing's Syndrome, on the other hand, represents disorder of the gluco corticoid fraction of the adrenal harmones and is more of hyper adreno-cortism than adrenogenitalism. The adreno-genital syndrome may arise from :—

1. Congenital adrenal hyperplasia, resulting in female pseudo hermaphroditism in girls and precocious puberty (macrogenitosomia) in boys.

2. Post natal adrenal virilism-arising pre or post pubertally from neoplasms (adeno-carcinoma or adenoma) or from hyperplasia of the adrenal cortex. The congenital or pre natal cases may rarely be complicated by adreno-cortical crisis which is relatively more common in females. In the female pseudo-hermaphroditism, the clinical picture differs from genetic pseudo-hermaphroditism in which hirsutism, masculinization and rise in the urinary 17-keto steroid occurs only towards puberty.

It is in early life and during the pre pubertal period that the females show virilism and males sexual precocity. After puberty, disorders of hirsutism, infertility, oligomenorrhoea or amenorrhoea (with normal or elevated 17-keto steroids) may follow. Clinical diagnosis of the fully established adrenogenital syndrome is not

difficult provided the external genitalia are closely examined. Estimation of urinary 17-keto-steroids is helpful and fortunately, the diagnosis of the syndrome can be made long before the appearance of hirsutism and progressive virlisation by studying the urinary 17-ketosteroids. Other biochemical estimations[2], such as 17-ketogenic steroids, pregnandiol, 11 Oxy-pregnanediol tetrahydrocortisone and hydrocortisol though difficult and laborious are also helpful. These biochemical changes result from the inability or impaired ability of the adrenals to synthesize cortisol from deficiency of 21 or 11 hydroxylation of the steroid nucleus resulting in the excretion of metabolites of accumulated 21 carbon intermediates such as pregnanediol and excess of 17-keto steroids including metabolites of and-rogens. Wilkins considers these biochemical lesions as apparently inborn errors of metabolism thought to be inherited as recessive characters.

Differentiation of hyperplasia from neoplasm is not always easy pre-operatively. Values of 17-Ketosteroid over 50 mgms. per day is a presumptive but not an absolute evidence of tumour[2]. Clinically, though there are no selective feature, the onset of virilism in a pre pubertal girl, who had previously been entirely normal, is strongly suggestive of adrenal tumour. Cortisone administration causes marked suppression of 17-keto-steroid in hyperplasia but has little or no effect due to tumour.

The treatment of adreno-genital syndrome varies with the cause-whether hyperplasia or tumour. Surgery is largely unsuccessful when hyperplasia is responsible for the condition. "Medical adrenalectomy" as advocated by Wilkins[7] relieves many of the distressing features of adrenogenital syndrome, reconverting a virilized sterile girl into more or less a normal one. Wilkin[7] demonstrated that the administration of cortisone to the young female with the adrenogenital syndrome had a definite inhibiting effect on this condition. The acne disappeared, the hirsulism diminished and breast development resulted. There was an increase in fat deposits over the breasts and buttocks. Some of the patients menstruated. Cortisone therapy should be maintained over a long period of time with occasional checking of 17-keto-steroids in the urine. Bigg[6] et al successfully treated a one year old child suffering from this condition with Wilkins scheme of cortisone therapy. Brooks[4] et al reported 3 cases of post-pubertal adrenal virilism responding satisfactorily to hormone therapy. The beneficial effect of cortisone is due to its inhibiting adreno-cortico-trophin (ACTH) production. Normally, there is reciprocity between ACTH and Cortisone-ACTH stimulating adrenal cortex to produce cortisone which is turn suppresses ACTH production—thus causing medical ablation of adreno cortical activity by taking off the pituitary stimulation of the adrenal cortex, causing medical adrenelectomy by partial "self-burning out" of adrenal cortex. Cortisone treatment is, however, not permanent and its discontinuance results in the re-appearance of symptoms. It is also an expensive form of treatment. Besides the cost of the therapy, there are hazards of the drug therapy—mainly electrolyte imbalance and osteoporosis. However, as excision of part of the adrenal cortex (sub total adrenalectomy) in case of adrenocortical hyperplasia is followed by compensatory hypertrophy of the remaining portion of cortex, this form of medical treatment is advocated in cases due to hyperplasia. The problem is, essentially different with regards to neoplasms whether adenoma or carcinoma, when the only treatment of choice is surgery and is indeed a definite and quick method of dealing with the condition. The tumour, when benign and unilateral and if removed early promises good prognosis. Acne and hirsutism disappear and the appearances and functions of sexual organs revert to normal.

Summary

Two successfully operated cases of typical adreno genital syndrome one due to an adenoma of the adrenal cortex in a seven year girl and the other adenocarcinoma in a boy aged two years are reported.

Medical treatment as advocated by Wilkin did not benefit the case of adenocarcinoma in which it was given a four month's trial before surgery.

Acknowledgement

Our thanks are due to Prof. M. L. Aggarwal, Head of the department of Radiology who very kindly carried out radiological investigations and helped us in pre-operative diagnosis of both the cases. Prof. N. L. Chitkara, Head of the department of Pathology, very kindly performed the histopathology and 17-ketosteroids estimation of both the cases. Thanks are also due to Prof. Amarjit Singh of Patiala for having referred one of the cases for operation.

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LANE'S ILEAL KINK*

BY

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Introduction

Paul and Fernando (1958) have recently asked a pertinant question, "Could Lane have described a non-existent lesion?" In a review of the subject they have brought out the following points :—

1. Lane (1908, 1910, 1911), postulated that a caecum heavy with fluid and prolapsing into the pelvis would drag on the mesentery of the terminal ileum and determine the formation of a band of fibrosis in the inferior leaf of the mesentery in the line of strain. This band of fibrosis would extend downwards till it reached the ileum at a point about 2" from the ileo-caecal valve and it would then draw the ileum upwards at this place and cause a kink in the bowel.

2. Mayo(1911),Martin(1911)Connel(1911) and Bainbridge (1913) published their experiences giving description of the lesion as it was observed at their operations. These descriptions were significantly different from the lesion described by Lane, but, it appears, they were not aware of the discripancy, and, Lane himself had thought Mayo's description as admirable.

3. Jordan's (1911) description of the lesion exposed by Lane at two of his operations was at variance with Lane's concept of the lesion and accorded with the description of the lesion as observed by Mayo and other surgeons.

4. The descriptions of these different writers are so similar that they afford evidence for existence of a lesion of the terminal ileum with well defined characteristics. This lesion is not one which was conceived by Lane. Lane himself had been describing and dealing with this lesion without realising that it was different from the lesion he had postulated.

5. This essential feature of this lesion is a fibrotic thickening of the peritoneal attachment of the terminal ileum to the posterior abdominal wall. This peritoneal thickening extends from the ante-mesenteric border of the bowel about 2' from the ileo-caecal valve to the posterior abdominal wall just lateral to the brim of the pelvis. The peritoneal thickening tethers the ileum so firmly that it cannot be lifted off the posterior abdominal wall.

This paper presents two cases which came under the observation of the author during the last year. Anatomical features demonstrated at the operations were identical in both cases, and also agreed with the description of the Lane's ileal lesion as given by Paul and Fernando.

Case Reports

Case 1.—R. B. 50 years Hindu female was admitted in Victoria Hospital Jabalpur on 17-1-59 at 11-30 a.m. with pain in abdomen, absolute constipation and vomiting since one day. The pain started round about the umbilicus and later become generalised. There was no history of any such attack previously. At the time of admission she was dehydrated, her pulse was 104 per minute, temperature 98·4 and B. P. 110/80. She was a poorly nourished old woman of thin build. General condition was fair. Examination of abdomen revealed nothing abnormal except *slight distension*. Auscultation revealed the presence of intestinal sounds. She was put on conservative line of treatment which gave no relief. As the abdominal distension increased and became marked, laparotomy was performed through a right paramedian incision on 19-1-59.

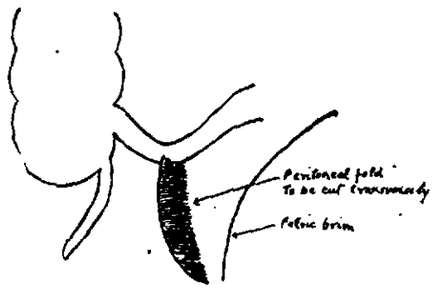

FIG I

Operative findings.—The small intestines were found grossly distended and congested and had to be deflated before the cause of obstruction could be explored. The distension of bowel was found to terminate abruptly at the ileo-caecal region, the caecum and rest of the large bowels were collapsed and empty. The ileo-caecal region was firmly tethered to the posterior abdominal wall. An attempt to lift the tethered segment raised a fold of peritoneum stretching from the terminal ileum to the posterior abdominal wall just lateral to the pelvic brim. It was

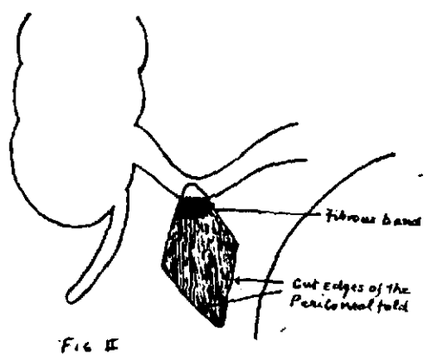

FIG II

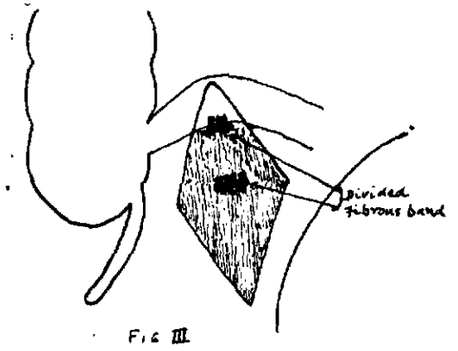

FIG III

divided transversely with scissors exposing the surface of the ileo-psoas muscle. A blunt dissection brought in view a fibrotic band which was keeping the terminal ileum fixed to the posterior abdominal wall. This band was completely divided and immediately the ileocaecal region could be easily lifted away from the posterior abdominal wall, and at the same time with a gurgling sound the caecum became distended. An examination of the terminal ileum showed that the fibrotic band had tethered the ileum at a point about 2" proximal to the ileo-caecal junction. The transverse opening in the posterior peritoneum was now stitched vertically, and abdomen closed.

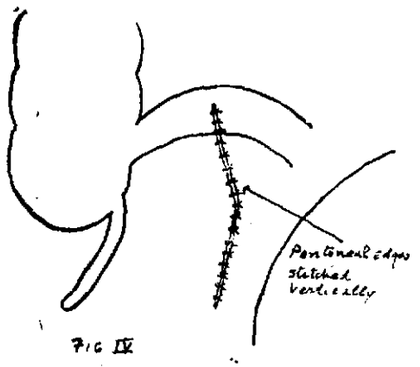

FIG IV

The patient had an uneventful recovery and was discharged cured on 4-2-59.

Case 2.—R. C. 25 years Hindu male was admitted in Victoria Hospital, Jabalpur on 25-8-59 with attacks of mild pain round about the umbilicus

*This paper was read at the 10th M. P. State Medical Conference held at Jabalpur, M. P., India, in November, 1959.

for the last three months which had recently become more severe. He did not give any history of vomiting or distension of abdomen at the time of such attacks which lasted only for a few minutes. The patient was a poorly nourished youngman of thin build and looked anxious and worried. No abnormality could be detected either on clinical examination or in routine investigations, and ultimately an exploratory laparotomy was decided upon.

Operative findings.—On 7-9-59 abdomen was opened through a right paramedian incision, and a thorough examination of viscera done which revealed no abnormality. A lesion structurally identical to the one described in the previous case was present. The same operative steps were taken to release the ileum, and the abdomen was closed. The appendix, removed at the same time, was reported normal histologically.

The patient had an uneventful recovery and was discharged cured on 17-9-59. He was looking bright and cheerful when he left the hospital, and had no attacks of pain since then.

Conclusions

In both these cases a fold of peritoneum, not described in earlier publications, was found stretching from the tethered segment of the terminal ileum to the posterior abdominal wall just lateral to the pelvic brim. The actual fibrotic band was much smaller in extent. Whether this fold of posterior peritoneum is a true fold of an anomalous developmental origin, or a false one, artificially raised on lifting up the tethered ileum, is difficult to say with certainty from a study of only two cases. Yet from what was found at these two operations, the author is inclined to believe it to be a true fold.

Could it be, that this abnormal peritoneal fold may keep the terminal ileum tugged down and that to a certain extent restricting its free movement to start with ultimately determines the development of a fibrous thickening which in due course completely tethers the ileum to the posterior abdominal wall? It would be worthwhile to study these lesions when exposed, keeping this suggestion in mind and to record further evidence in this direction.

Acknowledgements

The author is grateful to the Dean, Medical College and Superintendent, Victoria Hospital, Jabalpur, for permission to publish these cases.

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FIBROSARCOMA OF THE KIDNEY SHOWING CHONDROMATOUS METAPLASIA ASSOCIATED WITH HYPERTENSION

BY

D. J. REDDY, A. SHOWRAMMA and P. VENKATESWARA RAO, Guntur.

Tumours of the kidney continue to interest the pathologist because of their variable structure, controversial histogenesis and unpredictable behaviour. In recent years there has been an attempt at their rational classification and the nomenclature of many of them has now been adopted. Epithelial tumours of the kidney are better understood. The mesenchymal growths of the kidney offer several problems to the pathologist and have not received equal attention in the further elucidation of their histogenesis and histological variants. Most tumours of this group have been dumped together under nephroblastomata, especially when they were met within children or young adults. Sarcoma in the adult is comparatively rare and only 20 cases are on record in the Mayo Clinic[2] for a period of 30 years. Usually sarcomas of the kidney comprise 3 to 4 per cent of the malignant renal neoplasms. In the 93 cases of sarcoma of the kidney reviewed by Mintz[3] 50 per cent were observed in the age groups between 40 and 60 years. Pre-operative diagnosis of sarcoma of the kidney is not possible. Most often, the sarcomatous nature of the tumour is disclosed only at the time of microscopic study of the neoplasm.

Unilateral lesions of the kidney not infrequently cause raised blood pressure. Reports of such cases are not wanting. Tumours pressing on the renal artery or tumours arising in the kidney are known to cause persistent elevation of blood pressure. Most often the blood pressure returns to normal on excision of the tumour. The rarity of published case reports of sarcoma of the kidney showing chondromatous metaplasia and hypertension has induced the authors to record the findings in one such case.

Case Report

S. B., Muslim female, was admitted under the care of one of us (P. V. R.) for a swelling in the loin and painless haematuria of one year's duration. She had experienced pain in the loin since 6 months. Physical examination disclosed fullness of the renal angle and a growth in the left hypochondrium, moving with respiration and distinct from the spleen.

Investigations.—Blood Pressure: 164/112 mm. of Hg., Total W.B.C. Count : 6,800 per cmm., Differential W.B.C. Count : Polymorph 68%, Lymphocyte 27%, Eosinophyl 5%, Erythrocyte Sedimentation Rate : 8 mm. first hour, Blood Group : "O", Serum Proteins: 8·2 grammes per cent, Blood Urea : 30 mgms per cent, Urine Albumin + + +, R. B. C,, +, Pus cells + granular casts +, Plain X-ray of the abdomen : Calcified mass seen in the region of the left kidney (Fig. 1), Intravenous Pyelography: No excretion of the dye by the left kidney (Fig. 2), X-ray chest : No tumour deposits were noticed in the lungs, Clinically hypernephroma or nephroblastoma was suspected.

Details of Operation.—P. V. R., approached the left kidney through an oblique incision extraperitoneally. The tumour was seen to occupy the left hypogastrium, left loin and the epigastrium and crossed over to the right of the midline of the abdomen. It was adherent to the descending colon. Nephrectomy was done, the tumour having been delivered through a horizontal incision, made as an extension to the original incision. The wound was closed in layers,

Fig. 1

Photograph shows plain x-ray of the abdomen, the calcified mass extending above the iliac crest is seen.

leaving behind a corrugated rubber drain. The post-operative period was uneventful. The blood pressure came down to 120/80 mm. of Hg. The patient was discharged on 30-5-1960 and was advised to meet the surgeon one month later.

The patient was readmitted into the hospital on 2-6-1960 for fever and pain over the loin, shooting down the right lower limb. Blood pressure now was 130/90 mm. of Hg. Blood urea was 39 mgms. per cent. Plain x-ray of the abdomen showed nothing and x-ray of the chest revealed no secondary deposits. Peri-nephric abscess was suspected (Fig. 3). Temperature and pain subsided with drainage and antibiotic therapy. Patient was referred to the radiologist for deep x-ray therapy.

Morbid Anatomy and Histology of the tmuour excised.—The tumour measured 5 cm. × 8 cm. × 6 cm. and weighed 715 grammes. The tumour occupied the entire kidney substance. It was nodular and stony hard. The renal pelvis was dilated and nodular extrusion of the tumour mass into it was

Fig. 2

Photograph illustrates absence of visualisation of the kidney on one side on intravenous pyelography.

Fig. 3

Photograph of the patient at the time perinephric abscess was suspected.

seen (Fig. 4). The cut surface of the growth presented well defined calcified area of about 6 inches in diameter. In the upper pole of the kidney the tumour mass of soft consistency and of yellow colour with haemorrhage and mucoid change was observed (Fig. 5).

Several sections from multiple blocks covering the entire tumour mass and remnants of the kidney inclusive of decalcified tissue were studied. Sections from the soft tumour mass showed compressed renal parenchyma, beneath which were seen tumour cells of ovoid and spindle shape. These cells had little or no cytoplasm (Fig. 6). Mitotic figures were frequently noticed (Fig. 7). Hyalinisation of the stroma, mucoid change of the tumour cells and cartilaginous transformation of the tumour cells and stroma, in places in sheets was a prominent feature (Figs. 8 & 9). The entire tumour showed monotonously the same cellular features. Special search was made to spot epithelial elements in the nature of abortive renal glomeruli, smooth or striated muscle cells, which usually characterise the picture of nephroblastoma. No where could they be spotted.

The kidney tissue bordering the tumour mass showed marked thickening of the intertubular blood vessels, thickening of Bowman's capsule and dilated renal tubules enclosing albuminoid material (Fig. 10).

Fig. 4

Photograph illustrates the gross appearance of the excised renal tumour.

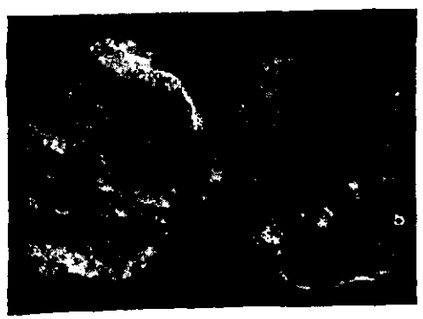

Fig. 5

Photograph illustrates cut surface of the renal sarcoma.

Fig. 6

Photomicrograph illustrates compressed renal parenchyma, beneath which is seen the sarcomatous tissue (H. & E. × 100).

Fig. 7

Photomicrograph illustrates the true sarcomatous nature of the tumour (H. & E. × 270).

Fig. 8

Photomicrograph shows chondromatous metaplasia in another field of section of the tumour. (H. & E. × 100).

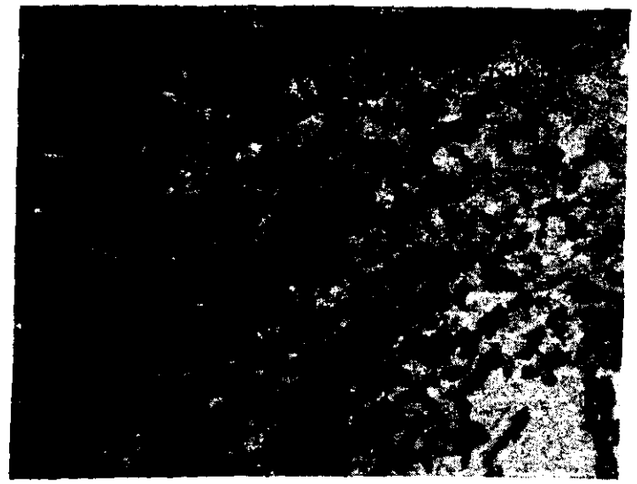

Fig. 9

Photomicrograph shows chondral cells in the sarcoma (H. & E. × 420).

Photomicrograph illustrates thickening of the arterioles and Bowman's capsule and dialatation of the tubules of the kidney substance adjacent to the tumour.

(H. & E. × 100).

Comment

In view of the unusual histological picture of the tumour, photographs of the tumour and sections of the tumour were referred to Drs. G. W. Gault and M. V. Sirsat for opinion. Extract of the opinion expressed by Dr. G. W. Gault is recorded below. "This is an interesting tumour showing primitive type of mesenchyme which at first glance suggests the possibility of the mesenchyme in Wilm's tumour. However no tubular structures can be seen and these tumours are extremely rare in adults. The cells are spindle shaped and there are frequent mitosis and in some areas well formed abundant cartilage. In the absence of epithelial structures in the tumour I loathe to diagnose Wilm's tumour without some more evidence. It is a malignant mesenchymal tumour." Dr. Sirsat while commenting on the tumour opined as "Nephroblastoma". In the light of these views we studied a large number of sections to detect structural evidence of nephroblastoma. Apart from the monotonously single cell type of sarcoma with chondromatous metaplasia, no epithelial elements were observed. We concluded the tumour to be a sarcoma of the kidney.

Sarcoma of the kidney is known to present a varied histological picture. They may be round celled, mixed celled, myxomatous, fibromyxomatous, spindle celled, liposarcoma, leiomyosarcoma etc. We have noncommitally labelled the neoplasm as sarcoma.

Chondromatous metaplasia in a sarcoma of the kidney has so far not been recorded. Perusal of the literature[4] on metaplasia, has convinced us that the stroma of the tumour has undergone cartilaginous metaplasia in the tumour described by us. This is rare. The multipotency of the mesenchymal tissue to differentiate into osteoblasts, chondroblasts, fibroblasts, lipoblasts etc., is not strange to pathologists. The calcific mass observed on plain x-ray of the abdomen could suggest teratoma.

We believe the tumour apparently arose from the supporting tissue of the kidney substance and not from the renal capsule.

The interesting observation in the case recorded is the reversal to normal of the elevated blood pressure on excision of the renal neoplasm. Peart[5] reviewing the literature on hypertension and kidney made a pointed reference to the association of nephroblastoma in some cases of hypertension. He had also stressed on the fact that the elevated blood pressure in these cases is not due to interference with the blood supply to the kidney. This is substantiated by the case reported by Bradley's and Pincoffs, where hypertension disappeared on removal of the tumour, only to return with the growth of metatases six months later. We feel that sarcoma of the kidney may also produce some pressor chemical substance. The patient unfortunately could not avail herself of the benefit of post-operative deep x-ray therapy and is being watched fortnightly for the occurrence of secondary deposits and consequent elevation of blood pressure.

Summary

1. The Literature regarding mesenchymal tumours of the kidney is briefly reviewed.

2. Clinico-pathological findings in a case of sarcoma of the kidney showing chondromatous metaplasia and hypertension are recorded. Sarcoma of the kidney as a possible causal association for the elevated blood pressure is suggested.

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CONGENITAL ANOMALIES OF THE GALL BLADDER

(A review of literature with report of three rare cases)

BY

AKHILESHA CHANDRA, Patiala.

Congenital anomalies of the gall bladder interfere with its normal function in a great majority of cases and are therefore of definite clinical significance. Lockwood[9] observed evidence of congenital deformity in 2·8% of cholecystographic studies on 1464 patients and in about 70% of this group there was suggestive evidence of disease of the gall bladder. The review of literature reveals that there exists some confusion and discrepancies in classifying the various types of anomalies of the gall bladder observed by different authors. To minimise this confusion, a classification modified from the data of Boyden,[2] Lockwood[9] and Ingegno and D'Albora[7] is suggested (Table I). In addition, three rare cases of congenital anomalies of the gall bladder, besides few common ones, observed in the dissecting room are reported.

Table I

I. Anomalies of the form of the gall bladder.

1. Folded fundus type (Phrygian cap or liberty cap)
2. Fish hook type
3. Divided gall bladder (Vesica fellea divisa)
   (*a*) septate or partitioned
   (*b*) cleft type (bifid, lobate or V-shaped)
   (*c*) diverticular type (subordinate lobes)

II. Anomalies of the number.

4. Absent
5. Rudimentary, vestigial
6. Double gall bladder (Vesica fellea-duplex
   (*a*) Y-shaped
   (*b*) H-type (ductular)
   (*c*) Diverticular (distinct gall bladder)
   (*d*) trabecular
7. Multiple gall bladders (vesica fellea multiplex)
   (*a*) Pseudomultiplex
   (*b*) True multiplex

III. Anomalies of the position of gall bladder.

8. Intrahepatic (partial or complete)
9. Floating or ptotic
10. Left sided
    (*a*) Under surface of the lef lobe
    (*b*) Situs Inversus

The following types from the above table are included under the heading of accessory gall bladder :—

1. Divided gall bladder.
2. Double gall bladder.
3. Multiple gall bladder.

Some observers like Guyton[4], Skielboe[14], Stokind[15] etc. have used the term "Double gall bladder" for true double gall bladder and as well as for divided and bilobed types. To minimize confusion this practice should be abandoned and the term "Accessory Gall Bladder" should be used.

The anomalies concerning duplication of the gall bladder were described by Boyden[2] under this term of "Accessory gall bladder". Ingegno and D'Albora[7] also stressed the use of this term. Boyden[2] reported 449 instances of congenital duplication of the gall bladder of various types amongst 10,000 mammals (Cats, Calves, sheep and pigs). Besides reporting 20 human cases

from the literature, he also reported 5 cases from the data collected on 19,000 cadavers and patients. He recorded the highest incidence of duplication of gall bladder in cats. Gross[3] reported 30 cases of duplication of the gall bladder while Meyer et al[10] reported 48 cases. According to Meyer et al[10] the incidence was 1 per 4000 to 5000.

Divided Gall Bladder

The various types which have been described under this heading are septate, cleft and diverticular types. The term "bilobed gall bladder" has been used for the septate and cleft types of divided gall bladder. Boyden[2] reported 3 such instances amongst 20 cases of duplications. Hudock and O'Grady[6] have reported 10 cases of bilobed gall bladders including one of their own. The bilobed type in human gall bladder is therefore a rare condition.

In septate type, a septum divides the cavity of the gall bladder longitudinally, more or less completely. (The septum may be transverse also but no gall bladder with transverse septum seems to have been reported so far). In these cases, the cavities of the gall bladder communicate with each other and drain into a common duct. The external appearance of the gall bladder is normal or there may be a faint groove near the fundus at the site of septum. The incomplete resolution of the solid stage of the development of the gall bladder is a cause of this condition. Hudock and O'Grady[6] reported 4 cases of septal type including one of their own. Robinovitch J. et al[11] reported two cases of this type but each chamber had its own cystic duct. In one of these two cases, the two ducts united before ending into the common bile duct.

Case Report

In a gall bladder of a seven months foetus, a transverse septum in its cavity was observed (Fig. 1 & 2). This foetus also had congenital anomalies like spina-bifida and anencephaly. The external surface of the gall bladder presented a well marked notch on the left margin and just opposite to this notch a pointed bulging on the right margin. The interior of the gall bladder had a transverse septum at the site of the notch and bulge. The septum was present at the junction of the distal two thirds and proximal one third of the cavity of the gall bladder. A small hole was present in the septum at its right extremity as an only communication between the two compartments. The cystic duct was single and ended normally. The fundus of the gall bladder was partially buried within the liver. This case of a transverse septum appears to be the only one reported so far, although its possible occurrence was reported by Ingegno and D'Albora.[7]

Cleft type is called differently such as bifid, V-shaped or lobate types. They may be bilobed or trilobed. There is division and separation of the fundic portion of the gall bladder extending to a variable degree down the body. The division may be equal or unequal. The fundus has a lobed or

Fig. 1

Photograph of a Divided Gall-Bladder (Septate type) opened up to show the septum (12), pin passing through the hole (13), Cystic duct (15) and fundus partially buried and not reaching to the anterior liver margin (14).

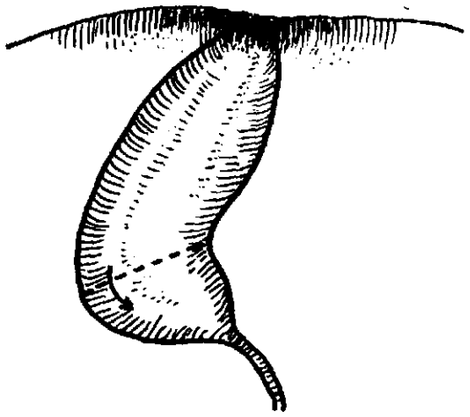

Fig. 2

Outline drawing of the same Gall Bladder as in Fig. 1 showing the position of the septum and the site of the hole (marked with arrow) the only communication between the chambers.

bifid appearance. The cavities of the lobes communicate with the main cavity of the gall bladder. A false septum due to the fusion of adjoining walls of the cleft and confined to this region may be present as described by Boyden[2]. The cause of this condition is the partial splitting of the gall bladder primordium during the solid stage of development. Boyden[2] observed that this type was prevailing in cats. In them, the instances of three-lobes and even of four lobes were met with. In human material lobes more than two have not been reported so far. Guyton[4] reviewed five instances of cleft gall bladders amongst 40 cases of double gall bladder. Hudock and O'Grady[6] reported six cases of this type under the term V-shaped types amongst 10 cases of bilobed gall bladder.

Diverticular Types

This includes distinct vesicles and subordinate lobe types which commonly arise from the neck region of the gall bladder but may also develop on fundus and body regions. The subordinate lobe communicates with the larger cavity of the main gall bladder while the true diverticular type arises as a distinct vesicle from the neck region and it communicates by a small narrow duct. They are derived from epithelial buds scattered over all parts of the embryonic gall bladder or from persistence of the cysto-hepatic ducts which normally regress; or from incomplete resolution of the solid stage specially near the fundus. Boyden[2] found that in lambs and sheep the anomalies simulating vesica divisa (consisting of gall bladder with accessory lobes) were the commonest. In calves, diverticula of the neck of the gall bladder showing the distinct gall bladders were predominant. In pigs, both sub-groups of diverticular type occurred. Thus in ungulates (calves, sheep and pigs) the outstanding characteristic of this group was not the bilateral development of the gall bladder as in cats but the development of the vesicle forming diverticulae in the wall of the gall bladder especially the neck portion and these arise subsequent to the initial appearance of the gall bladder primordium. According to Gross[3] only a few cases of diverticula of the gall bladder in human material have been reported. Hartmann's pouch may be a diverticulum of this type as it is present as a bulging mainly from the right wall of the neck region of the gall bladder. Two cases of well defined Hartmann's pouch were observed in the specimens studied (one of them seen in Fig. 5 & 6 for comparison with Fig. 3 & 4). The presence of a gall bladder as diverticulum of the common bile duct due to the absence of cystic duct has been reported by Rabinovitch J. et al[11] but such cases are excluded from this heading.

Case Reports

A gall bladder with a diverticulum from the left wall of the neck region mainly and close to the point of exit of the cystic duct was observed (Fig. 3 & 4). The cystic duct was single. It originated from the right side of the diverticulum and terminated normally. The cavity of this diverticulum (subordinate lobe) communicated with the main cavity of

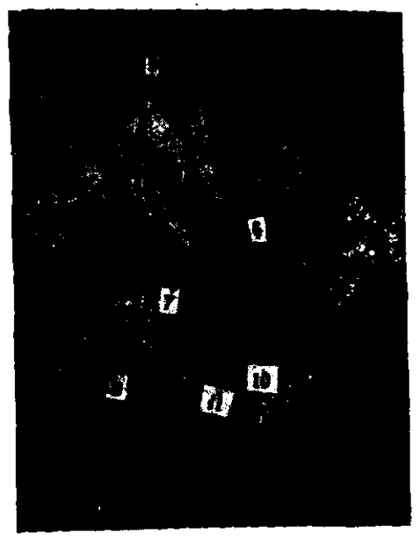

Fig. 3

Photograph of a Divided Gall-Bladder (Diverticular type) showing diverticulum (6) with origin of cystic duct (7) and its course and union (8), and fundus (9) not reaching anterior liver margin with hepatic artery (11) and its branches to liver (10).

the gall bladder. This diverticulum was related to the hepatic and common bile ducts and thus it may be a source of trouble in the event of adhesions between them during the cholecystectomy. In addition, this gall bladder was smaller than normal.

Double Gall Bladder

Under this type only those with distinct doubling of gall bladders should be described. These may be Y-type, H-type (ductular) trabecular type or diverticular type with distinct vesicle. The various types were observed by Boyden[2] in the domestic animals. But this condition was found by him to be more prevailing in human material (specially two gall bladders with distinct cystic ducts). Boyden[2] reported 2 cases of this type in 8221 cadavers besides a review of 17 such cases out of 20 cases of accessory vesicles. Guyton[4] reviewed 24 cases of true vesica duplex amongst 40 cases of double gall bladder including bilobed types. In Y-type two gall bladders are usually close together or are adherent and occupy the same fossa. Two cystic ducts are present which unite to form a common cystic duct. The latter then joins the hepatic duct to form the common bile duct. The gall bladders may be equal or unequal in size. It probably occurs as an out pocketing of the cystic duct subsequent to the formation of the definite gall bladder. Skielboe[14] reviewed 11 such cases out of 101 cases of double gall bladders, while Robinovitch et al[11] observed one case out of 12 congenital gall bladders. Ingegno and D'Albora[7] and Ross J. A.[13] have reported one case each of this type. In H-type, the two gall bladders are completely separate and sometimes lie in the different lobes of the liver. Two cystic ducts are present which drain independently into a hepatic or common bile duct. The accessory vesicle may by smaller and

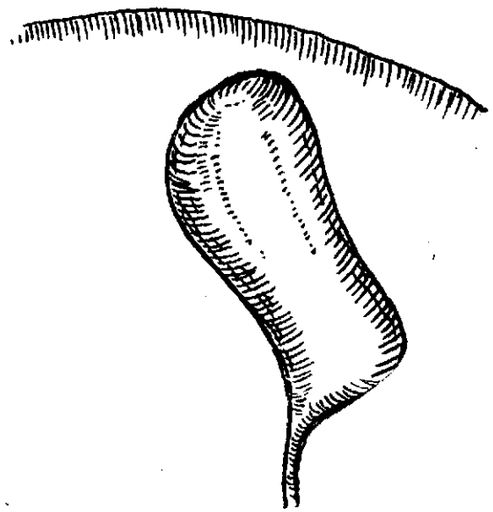

Fig. 4

Outline drawing of the same gall bladder as seen in Fig. 3.

Fig. 5

Photograph of a Hartmann's Pouch-seen at (1) with origin and termination of cystic duct (2 & 4), a short mesentary (3) and fundus (5).

larger than the true gall bladder. The origin of this type is also the same as that of Y-type except that the accessory outpouching occurs in an embryo from the common bile or hepatic duct. Skielboe[14] reviewed 33 definite cases of this type out of 101 cases of double gall bladder. Robinovitch et al[11] observed two cases of this type amongt 12 cases of congenital gall bladders. One case similar to this type was reported by Meyer et al[10] but it was distinct from others as the walls of two adjacent gall bladders were adherent simulating a septum. Whittenberger[16] reported a case which was described as a combination of Y and H type. Some cases reported in the literature have not been clearly classified as mentioned by Guyton[4] and Skielboe[14].

In a trabecular type, there are two gall bladders in the gall bladder fossa. Out of the two cystic ducts, one of them plunges directly into adjacent liver substance. Only one case has been reported by Croudace (Ingegno and D'Albora[7]). The accessory gall bladder arises as an outpocketing of liver cords or trabeculae bridging the gall bladder fossa and thus communicating with the smaller bile capillaries. Boyden[3] observed this type in calves and sheep.

Multiple Gall Bladders

In this group there may be 3 or more distinct gall bladders or two gall bladders with variation of the divisa type. Accordingly, it may be classified as true multiplex or pseudo-multiplex types and their origin may be explained. Until the report of a case in human material by Skielboe[14] in 1958, this type was only recorded in cats and ungulates by Boyden.[3] Skielboe[14] observed 3 distinct gall bladders with 3 separate cystic ducts, which terminated independently into the common bile duct. Two gall

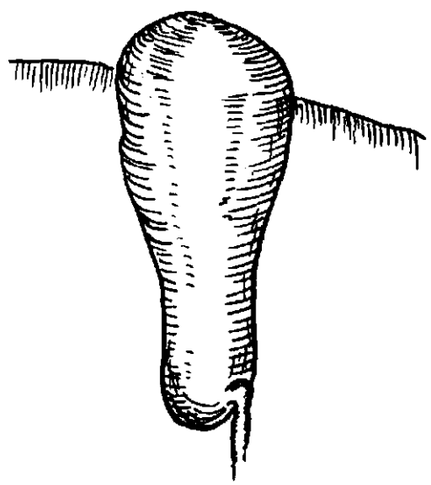

Fig. 6

Outline drawing of the same gall bladder as seen in Fig. 5.

bladders were equal in size but the third one was small.

There are other forms of abnormal development of the gall bladder as shown in Table I. Folded fundus type anomaly of gall bladder is the most common one. This condition is due to a defect in the vacuolisation of the solid gall bladder bud in which a partial septum or septums remain in the lumen. According to some, it is due to a disproportion between the size of the gall bladder and size of the gall bladder fossa in the liver. Its clinical significance is disputed. The incidence has been reported as varying from 3% to 7·5% by Lichtenstein[8]. Fish hook type has been mentioned by Lockwood[9] but no other reference is found in the literature. The total absence of the gall bladder is rare, like rudimentary gall bladder and its incidence at autopsy being about 0·03% to 0·78%. The anomaly may be associated with the absence or presence of the cystic duct and also with the atresia of some parts of the extrahepatic duct system. The gall bladder fossa may or may not be present. A failure of development of the outpocketing, from the hepatic diverticulum or failure of the gall bladder and cystic duct portions to recanalise would cause this condition.

The condition of vestigial gall bladder is explained as being due to the partial interruption in the continuity of the gall bladder during early embryonic life. As a result, it gives rise to a small blind vesicle. The latter is frequently associated with the bile duct. Robinovitch J. et al[11] reported one such case amongst 12 cases of congenital gall bladders. Complete intrahepatic gall bladder is rare although a gall bladder with a fundus partially buried in the hepatic structure is occasionally encountered. An instance of this type has been reported by Lockwood[9] amongst 41 congenital gall bladders. Two instances of fundus partially buried in the liver substance were observed in our series. Low pelvic or ptotic gall bladders are common. A huge gall bladder extending much beyond the liver margin and possessing a mesentery may be encountered and may be present in 6% of individuals. Two instances of short mesentery in average sized gall bladders were observed in our series. The gall bladder may not extend to the liver margin and it is present in 7% of individuals. The mesentery may or may not be present in these cases. One such case was observed in our series also.

Left sided Gall Bladders

These may be situated on the under surface of the left lobe of the liver or associated with situs inversus. Cases of gall bladder situated on the under surface of the left lobe of the liver (though rare), have been reported by several observers. The cystic duct in these cases may join the left hepatic duct or common bile duct. The development of two outpocketings of gall bladder right and left and suppression of one of these is a probable cause of this type. The situs inversus may be complete or incomplete types. The incidence of this condition is not known and reports concerning this vary widely. Blegan[1] found that its incidence has been variously stated as from 0·002 to 0·01%. By others,[5] it has been reported as 1 in 10,000 or about 1 in 20,000. Complete situs inversus is more common than incomplete form. A typical case of complete situs inversus was reported in a cadaver by Rahman[12].

Case Report

One such case in a case of complete situs inversus was observed (Fig. 7 & 8). The situs inversus involved the thoracic as well as the abdominal viscera. It essentially presented a mirror image of the usual arrangement of viscera including the liver and gall bladder.

Fig. 7

Photograph of a left sided Gall Bladder in a case of complete sitrus inversus, seen at 22. (The rest of the thoracic and abdominal viscera have also been numbered but their description is excluded in this report).

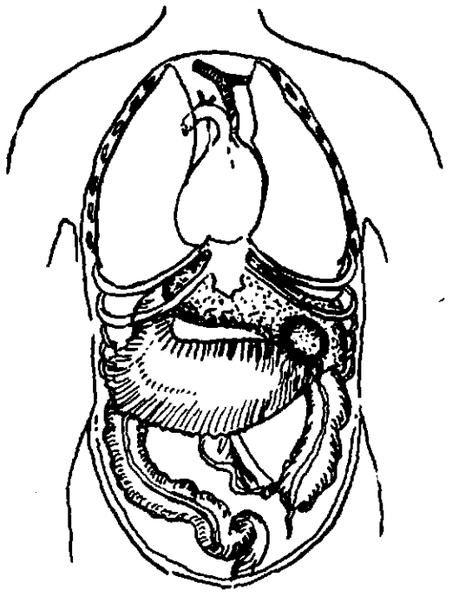

Fig. 8

Outline drawing of the Fig. 7 showing the reversed position of the gall bladder and liver along with other major organs.

Summary

1. A review of the available literature on the congenital anomalies of the gall bladder has been made.

2. A classification modified from the data of Boyden[2] Ingegno and D'Albora[7] and Lockwood,[9] of the anomalies of the gall bladder is suggested.

3. Three rare cases of congenital gall bladders—two of divisa type and one of left sided gall blader in a case of situs inversus (besides few common anomalies encountered in the dissecting room) have been included.

Acknowledgement

My thanks are due to Mr. H.S. Virdi of this department for the drawings included in this report.

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PRIMARY MUCOID ADENOCARCINOMA OF THE URINARY BLADDER SHOWING SIGNET RING CELLS

BY

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Tumours of the Urinary Bladder vary in their histological appearance and different varieties bear different prognostic significance. Adenocarcinoma of the urinary bladder is a rare tumour. Its incidence varies from 0·4 percent to 1·3 percent as reported by various authors[2, 3]. Wheeler and Hill[9] in a review of literature encountered 14 primary adenocarcinoma in normally placed bladders, 12 in exstrophic bladder and 36 of urachal origin.

Some adenocarcinomas of the urinary bladder produce mucin. Saphir[8] reported a series of mucinous adenocarcinomas, some of which consisted of signet ring tumour cells. Among 271 carcinomas of the urinary bladder surgically removed between 1949 and 1953 he found 10 adenocarcinomas. Of these 4 proved to be metastatic tumours–two of which were from primary in the fundus of the uterus and 2 from the sigmoid colon. Of the remaining 6–one mucin-secreting adenocarcinoma with only a few signet ring tumour cells arose at the done of the bladder and was considered to be of urachal origin. In the other 5 cases 3 were non-mucin secreting adenocarcinomas and 2 were mucin-secreting. Of all these cases only 2 were signet ring cell carcinomas. Thus though a fair number of adenocarcinomas of the urinary bladder are reported in the literature hardly more than 2 cases of signet ring cell carcinoma have so far been reported[7]. Such a rarity of primary signet ring cell mucoid carcinoma of the bladder justifies the report of the present case.

Case Report

The patient, a 30 years Hindu male school teacher, was admitted to the Sarojini Naidu Medical College Hospital, Agra in January, 1960 with the complaints of occasional dysuria since 1954, when cystolithotomy was performed. On suprapubic cystostomy in January, 1960 there was found a pedunculated growth 7 cm. × 7 cm. at the base of the bladder. Clinically the case was thought to be either a papilloma of bladder or a chronic inflammatory granuloma. Biopsy from the growth revealed chronic inflammatory vascularised granulation tissue. Cytological examination of the urinary sediment by Papanicolaou's technique did not show any malignant cells. The patient was again admitted to the Hospital in March, 1960 for retention of urine. This time again a cytological examination of overnight collection of urinary sediment was made by Papanicolaou's method. The smear was positive for malignant cells. Some of the cells were signet ring type with vacuolated cytoplasm and large hyperchromatic nuclei pushed at the periphery of the cell as seen in Fig. 1. During surgical removal of the tumour it broke into several pieces and was soft and friable.

Grossly the tumour consisted of multiple irregular pieces of tissue varying in size from 0·5 × 0·4 × 0·4 to 5 × 2 × 2 cms. Their external surfaces showed papilliferous appearance, the papillae varying in size from 0·1 to 0·3 cm. in length. The cut surface was mostly greyish white, homogeneous and firm, while some areas were soft and slimy. Several pieces from different areas were processed for histological examination.

Microscopically the sections stained with Haematoxylin and Eosin showed groups of malignant cells irregularly dispersed in a bizzare fashion. At places there were alveoli formation bounded by thin connective tissue bands as seen in Fig. 2. Few areas showed papillary projections into the alveoli.

Fig. 1

Signet-ring carcinoma cells. Hematoxylin and Eosin Stain × 270.

Fig. 2

Alveoli bounded by thin connective tissue bands and lined by Signet-ring carcinoma cells. Hematoxylin and Eosin Stain × 430.

The malignant cells were mostly rounded or polygonal with abundant cytoplasm stained lightly basophilic. The majority of the cells showed large vacuolated spaces in the cytoplasm with large hyperchromatic nuclei pushed to the periphery. The nuclei were mostly vesicular with irregular dispersion of chromatin while others were flattened by pressure of the mucinous secretion. Special stain (by McManus Periodic Acid Schiffs reagent counterstained by iron haematoxylin and saturated aqueous solution of picric acid) showed the presence of intracellular and extracellular mucin. There were many areas of degeneration and necrosis. The stroma was comparatively scanty. Histologically the tumour was diagnosed as papillary adenocarcinoma with cells showing mucoid secretion and signet ring appearance. On thorough clinical examination no growth was detected in the colon or rectum; neither did the patient ever show any symptom of gastrointestinal disease.

Discussion

Though there is considerable variation in the histological appearance of tumours of the urinary bladder, adenocarcinoma of the bladder is a relatively rare entity. As to the histogenesis of adenocarcinoma of the urinary bladder it may be attributed to (i) mucous secretory glands lined by columnar epithelium normally present in small numbers chiefly at the base of the bladder, (ii) rammants of the urachus which are often present in the submucous and muscle coats of the dome of the bladder, (iii) metaplasia of the bladder mucosa to columnar mucous secreting epithelium, which is a common occurrence in extraversion of the bladder and occasionally in B. Coli cystitis, and (iv) the secondary direct invasion of the bladder by the mucoid carcinoma of the colon or the rectum.

Microscopic examination of the biopsy tissue or even the surgically-removed growth may not distinguish between a primary adenocarcinoma or secondary invasion from the colon or rectum. Therefore it is always advisable on the part of the pathologist to suggest to the surgeon a search for a primary focus in the lower intestinal tract whenever a mucous secreting adenocarcinoma is diagnosed in a growth removed from the bladder. Even in case of the primary adenocarcinoma of the bladder, it is often impossible to decide whether a particular tumour originated in the bladder mucosa itself or in the urethra or in the prostatic ducts[5,6]. Tumours arising from the urachus are of many types, but most commonly they are adenocarcinomata secreting large amount of mucous. These tumours also occur at an early age. Mucoid adenocarcinomas of the bladder are usually diffuse and infiltrating type involving the whole wall of the bladder. The case reported here was a solitary pedunculated growth at the base of the bladder without any clinical evidence of infiltration or any metastasis.

In the present case first biopsy revealed only chronic inflammatory tissue probably because of extensive superficial necrosis of the tumour. However, repeated cytological examination of urinary sediment by Papanicolaou's method revealed malignant cells. This emphasises the necessity and value of repeated cytological examination. The interpretation of cytological findings however requires a great deal of experience for a correct appraisal of this recently developed procedure in cancer detection.

As to the origin of this particular tumour, thorough search in many pieces from the growth did not reveal any transitional cells. This shows that this mucoid adenocarcinoma is not a secondary degenerative as indicated by Hurwitz and others[4].

Summary

A primary mucoid adenocarcinoma of the bladder showing signet ring tumour cells is reported. Mucoid adenocarcinoma is a common tumour in the colon, rectum, stomach, gall bladder and the breast but is extremely rare in the urinary bladder. The value of repeated cytological examination of the urinary sediment in the diagnosis of bladder cancer is emphasised.

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CHOLEDOCHODUODENAL FISTULA SECONDARY TO DUODENAL ULCER

BY

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Even though duodenal ulcer is very common in South India, the occurrence of choledochoduodenal fistula due to duodenal ulcer is rare. So far, this rare complication has not been reported in the Indian Literature. A perusal of the Literature elsewhere, shows that only 38 cases due to this cause has been reported in the literature.

Incidence

6% of all spontaneous duodeno-biliary fistulae are due to duodenal ulcer (Maingot). This statement holds good in places, where gallstones are common. In South India, where cholelithiasis is not so common, the relative incidence of choledochoduodenal fistulae due to ulcer as compared with other internal biliary fistulae must be higher. The other cause of choledochoduodenal fistula is an infected calculus in the common bile duct eroding its way to the duodenum.

Anatomy

The common bile duct passes close behind the first part of the duodenum with the gastroduodenal artery on its left side and then runs in a groove, on the upper and lateral part of the posterior surface of the head of the pancreas. Most duodenal ulcers are situated on the posterior or posterio-superior aspect of the first part of the duodenum. So it is no wonder that the ulcer penetrates into the common bile duct, thus forming a fistula. But the rarity of its incidence is stated to be due to the superior edge of the pancreas projecting between the duodenum and the common bile duct and thus preventing penetration of the common bile duct. It is well known that the duodenum gets shortened due to the scarring due to the ulcer. As a result, the common bile duct lies near the ulcer, which penetrates it during the next exacerbation. This also accounts for the gross adhesions, usually met with at operation in this area.

The fistulous opening is usually small, 3-4 mm. in diameter. It is very difficult to demonstrate this at operation as the whole area is plastered with adhesions. It is not advisable to dissect the adhesions, and to demonstrate the fistula, as it contributes to postoperative morbidity.

The complication to be expected is ascending infection of the biliary tree, due to contamination by the gastric contents, leading to cholangitis. Fortunately, the incidence of cholangitis have been low in the series reported. All our three cases did not have any evidence of cholangitis.

As a result of the ulcer bed being bathed by alkaline bile due to the fistula, the ulcer may heal later. This has been reported in a few cases, but in most of the cases, this evidently did not occur, as shown the progressive worsening symptoms of peptic ulcer.

Clinical features

The symptoms are usually those of a peptic ulcer. There is no one clinical feature diagnostic of this condition. In cases complicated by Cholangitis, mild jaundice, fever with chills, vague pains in the right hypochondrium and a distaste for fatty

meals may occur. In cases due to cholelithiasis, the symptoms may be those of cholelithiasis. In a few cases, sudden disappearance of symptoms of peptic ulcer had occurred after an acute episode due to the formation of a fistula.

The diagnosis is usually made by a barium meal when the biliary tree is visualised by the barium entering it. (Skiagram 1, 2 and 3).

Plain x-ray of the abdomen may be diagnostic, if gas is found entering the biliary apparatus.

Treatment

The aims of treatment are (i) to treat the cause *i.e.* the duodenal ulcer and (ii) to treat the fistula to prevent ascending infection.

Most surgeons believe in doing a subtotal gastrectomy of the polya type only. Provided the dissection of stomach is adequate, the ulcer will not recur. In addition, the duodenal stump is isolated, thereby preventing ascending infection. In a few cases, Bancroft's procedure is advocated, because of the dense adhesions in this area.

Maingot advocates subtotal gastrectomy, followed by T-tube drainage of common bile duct and cholecystectomy in view of the cholangitis. In our view, this procedure is likely to increase the morbidity rate, due to the gross adhesions in this area. A mere subtotal gastrectomy is likely to give equally good results, as ascending infection is rare and as the duodenal stump is defunctioned after the operation. This procedure is justified in those fistulae associated with cholelithiasis. In two of our cases, subtotal gastrectomy with Bancroft's procedure was done. One patient refused surgery.

Case Reports

Case I.—Mr. G. Hindu male, aged 50 years, was admitted in Govt. General Hospital on 16-5-56, for treatment of severe colicky pain with vomiting of two days duration. For the past one year, he was having periodical attacks of pain in the epigastric region, which was aggrevated by food and relieved by vomiting. He had a sensation of a 'ball-rolling' in the epigastric region, which was relieved by vomiting. There was history of cough, fever or dysentery. The patient was an emaciated, poorly nourished person, not jaundiced. His tongue was dry and coated. Respiratory and cardiovascular systems were normal.

Abdomen was scaphoid, visible peristalsis was present in the epigastric region, moving from left to right. No masses were palpable. There was tenderness on deep pressure in the epigastric region. Liver and spleen were not palpable, there was no free fluid in the abdomen.

Investigations.—Urine and motion nil abnormal, Hb. 70%, Blood group 'O', Blood pressure 124/84 mm. Fractional test meal. The free acid was increased in the last three specimens. Barium meal revealed choledochoduodenal fistula (Skiagram 1).

Fig. 1

Treatment.—The patient was put on sedatives, antacids and antispasmodics on admission. When Barium meal revealed the presence of cholydochoduodenum fistula, patient was prepared for elective surgery. On 4-6-56 at laparotomy a cicatrizing duodenal ulcer was seen and on the first part of duodenum very much adherent to liver. The stomach was dilated. The other organs were normal and the gall bladder was normal. A prepyloric antecolic partial gastrectomy (polya) was done and abdomen closed with drainage. The postoperative period was uneventful and patient was discharged on 26-6-56 completely free from symptoms.

Case II.—Mr. V, Hindu male, 52 years old was admitted on 1-10-56 for treatment of severe epigastric pain of 2 months duration. For the past twelve years, he was having periodical pain in the epigastric region, increased by food. The pain was pricking in nature and radiated to the back, along the right side. The attacks of pain were intermittent initially. For the past ten months the pain was constant throughout the day and was agonising at times. He had changed his diet habits due to the pain. There was no history of haematemesis or malena, cough, fever or dysentery. Vomiting partly relieves the pain and is bilious in character.

The patient was a moderately nourished person and not jaundiced; cardiovascular and respiratory systems were normal. There was no visible peristalsis nor was there any mass. Hb. 75% B. P. 105/85 mm. fractional test meal, high free acid. Barium meal revealed—choledochoduodenal fistula (skiagram 2). Patient refused surgical treatment and was discharged.

Case III.—Mr. C, Hindu male, aged 30 years was admitted on 3-9-60 for treatment of pain in the epigastric region of 2 years duration. The pain, colicky in type, was aggravated by food and relieved by vomiting. There was no history of dysentery or fever. The patient was a poorly nourished person, not jaundiced. The cardiovascular and respiratory systems were normal. Examination of the abdomen revealed on tenderness in the epigastric region.

Investigations.—Urine—no sugar, no albumen, motion—no ova or amoeba, Hb. 70%, B. P. 108/78 mm. Blood group 'O' Blood urea 30 mg. F. T. M. ascending type of free acid curve. Barium meal. Duodenal ulcer with stenosis and choledochoduodenal fistula (skiagram 3). In view of the diagnosis, patient was prepared for elective surgery and on 27-9-60 under endotracheal anaesthesia, abdomen was opened by right paramedian incision. A cicatricing duodenal ulcer was found grossly adherent to the undersurface of the liver. The gall bladder wall was partially opaque and thickened; no gall stones were palpable and the gall bladder emptied normally. The other organs were normal. Antecolic partial gastrectomy (polya) was done. No attempt was made to demonstrate the fistula, even though the common bile duct was very near the ulcer area. Abdomen was closed in layers with drainage. Patient was discharged on 5-10-60.

Fig. 2

Fig. 3

Summary

Three cases of choledochoduodenal fistula secondary to duodenal ulcer are presented and their management discussed.

My thanks are due to the Dean, Govt. General Hospital, Madras for permission to use the case records of the hospital.

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ORTHOPAEDIC SECTION

NEUROFIBROMATOSIS : " CLINICAL AND ROENTGEN MANIFESTATIONS "

BY

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Though cases of generalised Neurofibromatosis were described before, it was Von Recklinghausen in 1882, who coined and introduced the term Neurofibromatosis and presented the first authentic description of the histological changes and suggested its nerve sheath origin. According to Von Recklinghausen, Tilesius in 1793 described the first clinical manifestations of fibroma molluscum. Smith in 1849, published a monograph on this disease, reporting two cases with histopathological findings.

Neurofibromatosis, neurinomatosis and Von Recklinghausen's disease are the terms used to designate a multiple and generalised systemic disease, congenital and often familial in nature, presenting abnormalities of the skin, nervous system, bones and the soft tissues. A typical case demonstrates :—

(*i*) Multiple, soft, elevated cutaneous tumours.

(*ii*) Cutaneous pigmentation (taches de cafe au lait).

(*iii*) Neurofibromas of the peripheral nerves, frequently palpable in the sub-cutaneous tissues.

This is the " cardinal triad " of diagnostic findings. In addition to these, elephantoid soft-tissue masses on the body and fan-like enlargement of peripheral nerves may be seen (Hunt and Pugh, 1961). Incomplete varieties of the disease have been described, showing only pigmentation of the skin. These frequently progress to complete the picture later on in life. Some observers consider pseudo-arthrosis, when seen alone in early life, as an incomplete form of the disease, because cutaneous lesions characteristic of the disease have developed in such patients in later years (Holt & Wright, 1948).

Recently, great deal of attention has been focussed on the skeletal abnormalities associated with neurofibromatosis. Certain types of changes are characteristic of the disease, while others are most suggestive. The associated abnormalities include scoliosis, defects of the orbital wall, erosive defects caused by the adjacent neurogenic tumours, bowing and pseudoarthrosis of the lower leg and disorders of bone growth associated with elephantoid hypertrophy of soft tissues.

Case Reports

Case I.—K. K., 13 F, presented herself at the orthopaedic out-patients department of the All India Institute of Medical Sciences on 9-5-61 with lump in the left buttock since birth, gradually increasing in size and deformity of the left leg, increase in the size of the left buttock lump and attacks of sharp shooting pain radiating from this lump down to the left leg since the last two years. She also gave the history of instability of the left knee and occasional falls while walking. On physical examination, she was a moderately nourished young girl with several small soft nodules, some of which showed definite "button holing" on digital compression and numerous 'cafe au lait' spots scattered all over the trunk and extremities. There was a large, pendulous, plexiform swelling in the left buttock, with areas of firm, tender nodules and elephantoid. Hypertrophy of the soft tissues of the left leg, together with thickening and forward bowing of the left tibia. The left patella could be easily dislocated laterally. Marked antero-posterior and rotational hypermobility of the left knee was present without any pain.

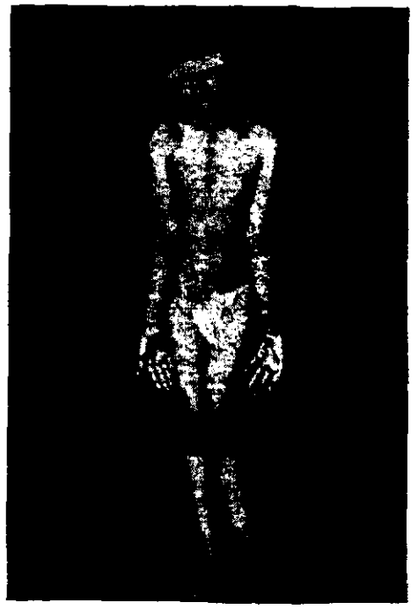

Fig. 1

Case-1, showing hypertrophy, lengthening and anterior bowing of the left leg.

Measurements.—Anterior superior Iliac spine to the medial malleolus. Right–29 inches. Left–30·5 inches. Knee to the medial malleolus : Right-13·5 inches, Left-14·5 inches. Plum line of Bryant : Right–2·5 inches, Left–3·5 inches. Circumference : Right-leg-9·5 inches. Left leg-11·5 inches. Both thighs-13 inches.

There was scoliosis with primary curve to the right at the mid-dorsal region, with compensatory curves above and below. The primary curve diminished on forward bending and was associated with mild rotation of the ribs and consequent prominent angle of the ribs on the right side. There was hyperaesthesia of the left lower limb and marked painless hypermobility at the left knee joint. Biopsy of two skin nodules was taken and confirmed the diagnosis of Neurofibromatosis.

Case II.—P. S., 16 M, reported to the Orthopaedic O. P. D. of the All-India Institute of Medical Sciences on 1-6-61 with complaints of swelling over the right occipital region and a gap in the underlying bone of which the patient was unduly conscious. He also had multiple pigmented spots all over the body and numerous cutaneous nodules. According to the father, the spots were present since birth but the nodules appeared three years ago along with bilateral enlargement of the breasts, at the age of 13 years.

On physical examination, he was fairly well nourished adolescent boy of normal intelligence with multiple 'cafe au lait' spots all over the body, mainly over the trunk and small cutaneous and subcutaneous nodules over the trunk and the extremities except the hands and feet. Few of the subcutaneous nodules demonstrated "button holing".

There was a large lump with a stalk over the medial aspect of the right thigh, which was soft and typical of neurofibroma. Both the breasts showed painless hypertrophy. There was gentle scoliosis with convexity to the right in the dorsal region. The scalp showed a soft tissue swelling over the right occipital region with defect in the underlying bone. Secondary sex characters were normal.

Biopsy of a cutaneous nodule revealed neurofibroma. Repair of the bony defect in the skull was suggested but so far the father is refusing.

Fig. 2

Fig. 3

Fig. 2 & 3. Showing histopathology ofthe lesion in Case-I in low power and high power respectively.

Discussion

Age.—Evidence of neurofibromatosis is usually noticed early in life. Puberty and pregnancy may make the condition manifest or may be accompanied by the development of new neurofibromas (Wilson, 1955). In both our cases the pigmented spots were present since birth but it was only near puberty *i.e.* at the age of 11 years in case-I and at the age of 13 years in Case-II that the swellings started increasing in size and number, causing disfigurement and pain and thus inducing the patients to seek medical aid.

Sex.—Fair Banks (1951) noted that males are more commonly affected with neurofibromatosis than females. 8 out of the 11 cases collected by Bertram Levin (1958) were males. Out of our 2 cases, one was male and the other female.

Familial.—A familial incidence has often been noticed and appears to be well established ; 5 out of the 11 cases of Bertram Levin gave definite family history of the disease. Garland (1941) described four brothers showing various manifestations of neurofibromatosis. In case II, inspite of detailed questioning and examination of the entire family no familial predilection could be found. The father of case I had multiple cafe au'lait spots and soft nodules all over the body since birth. No other sibling showed a similar lesion.

Mental deficiency.—It is not an uncommon co-existing condition ; one of the patients of Levin was an obvious mental defective. Both our cases were persons of normal intelligence.

Genetics.—According to Preiser and Davenport (1918) the familial form of the disease is transmitted as a mendelian dominant without sex-linkage, but the details of the genetic abnormalities are still obscure. The nature of the transmitted dominant gene, whether true or conditional, requires further research to unravel the mystery.

Error of development.—In neurofibromatosis there is congenital error of development affecting neuroectodermal and mesodermal elements. The time of onset of this error of development in the intrauterine life, has not as yet been determined. Formerly, it was believed that mesodermal dysplasia was secondary to and result of the neuro-ectodermal dysplasia, but now it is increasingly recognised that the mesodermal dysplasia is in itself a basic component of the disease and most of the skeletal abnormalities are expressions of this mesodermal dysplasia.

Soft Tissue Lesions

Pigmentation characteristic of neurofibromatosis 'cafe au lait' spots are generally noticed soon after birth, but may develop later, in the first or second decade of life (Crowe and Schull, 1953).

The pigmentation is tan, macular and melanotic in origin with smooth edges. The presence of multiple cutaneous nodules is the most frequent and constant diagnostic feature of neurofibromatosis. These soft tumours may grow under, be flush with or be raised above the level of the skin. These occur predominantly on the trunk, back, face and extremities, being seen only rarely on the palms and the plantar surfaces of the feet (Preston, Walsh and Clarke, 1952). But our first case had pigmented patches, though very few in number on palms and soles also.

The second patient had lesions only on the trunk and extremities.

Elephantoid overgrowth.—Frequently, large soft-tissue masses are seen in neurofibromatosis. These lesions which may hang

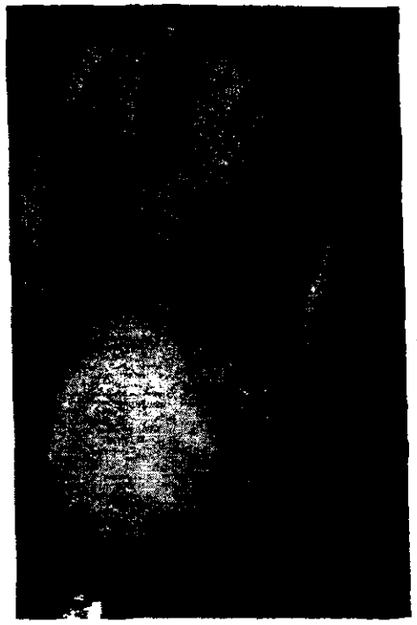

Fig. 4

Case-1 showing scoliosis and multiple cafe au' lait spots with a large, dark pigmented area over the elephantoid overgrowth of the left buttock.

Fig. 5

Case-1 elephantoid overgrowth over the left buttock and the left leg. also showing anterior bowing of the left leg.

down in thickened, pigmented folds have been variously described as pachydermatocele or Elephantiasis neuromatosa (Wilson, 1955). Such tumours have the consistency of lax skin and sub-cutaneous fat and they may become extremely disfiguring as in case-I.

The pendulous masses hang down like "relaxed and emaciated mammae". The skin over these pendulous masses is hard, thick, coarse and uneven like "morocco leather or the hobnail surface of a cirrhotic liver". Elephantoid overgrowth of the soft tissue is commonly unilateral, involving the lower extremities, the head and neck. Not uncommonly, they are accompanied by a disorder in growth of the underlying bone.

Skeletal Changes

Holt and Wright in 1948, listed the skeletal abnormalities as follows:

(*i*) Erosive defects owing to the presence of neurofibromas contiguous to bone.

(*ii*) *Scoliosis.*

(*iii*) Disorders of growth including both overgrowth and under-development.

(*iv*) Bowing and psuedo-arthrosis of the lower leg.

(*v*) Intra-osseous cystic lesions.

(*vi*) Congenital anomalies.

Hunt and Pugh (1961) have classified the skeletal changes in neurofibromatosis into two groups.

1. Abnormalities characteristic of neurofibromatosis:

(*i*) Severe angular kypho-scoliosis with dysplasia of the vertebral bodies.

(*ii*) Defects of postero-superior wall of the orbit.

(*iii*) Disorders of bone growth associated with elephantoid hypertrophy of overlying soft tissue.

(*iv*) Congenital bowing and pseudo-arthrosis.

(*v*) Erosive defects of bone from contiguous neurogenic tumours.

(*vi*) Intrathoracic meningocele.

2. Abnormalities associated with, but not characteristic of neurofibromatosis.

(*i*) Congenital abnormalities *viz.*-anomalies of lumbar segmentation, spina bifida occulta, interrib fusion or articulation, small defects of calvaria without neurofibromas, spondylolisthesis, pes cavus asymmetry of the skull, cranium bifidum, intrasacral meningocele, basilar impression and separation of the symphysis pubis.

(*ii*) Mild scoliosis without dysplasia of the vertebral bodies. The abnormalities in group I are characteristic and should arouse suspicion of neurofibromatosis to the radiologist.

Erosive defects of bone from contiguous soft tissue tumour is due to pressure erosion by the overlying soft tissue tumour and may be seen in the calvarium, ribs, vertebrae and bones of the extremity. Sometimes periosteal proliferation may form a thin shell of bone over the tumour giving the radiological appearance of subperiosteal bone cysts. Intra-osseous cystic lesions described by Holt and Wright probably represent such cysts, giving roentgenographic picture of intrinsic bone lesion in certain projections.

Disorders of bone growth

When elephantoid overgrowth of the soft tissue involves the lower extremity, sinuous elongation of the underlying long bones is frequently seen with a wavy irregularity of the cortex which may be thickened. Dysplasia in the form of atrophy or hypertrophy can occur (*Hunt & Pugh, 1961*). In case-I, the large overgrowth of soft tissue over the left buttock was associated with under developed and atrophic left ilium, erosive defects of the left ilium and left half of the sacrum.

Fig. 6

Case-showing under development of the left ilium with erosive defects of the left ilium and sacrum. Enlargement of the head, neck and greater trochanter of the left femur and shadow of the soft tissue overgrowth is also seen.

The head, neck and greater trochanter of the left femur were enlarged. The skiagram of the left leg, which showed soft tissue hypertrophy revealed lengthening of the tibia and the fibula as compared to the right. The bones were longer, broader with

a wavy irregularity of the cortex and show erosive defects due to contiguous lobulated, soft tissue enlargement as seen in figure-7.

Case-II showed marked erosion of both the tables of the skull in the right occipital region as seen in figure-8.

Since no direct involvement of the bone or periosteum by the neurofibromatous tissue has been noticed on histological examination in most cases reported in the literature (Hunt et al, 1961) increased blood supply furnished by the commonly found haemogiomatous and lymphagiomatous soft tissue masses offers the most plausible explanation for the increase in the length of the bones. Hunt and Pugh (1961) reported disorders of bone growth associated with elephantoid hypertrophy of the overlying soft tissue in 18 out of their 192 cases of neurofibromatosis collected at the Mayo Clinic. So it is not a very common finding in neurofibromatosis.

Scoliosis

Both our cases showed mild scoliosis in the dorsal region, with convexity to the right without vertebral dysplasia as shown in figure-9, skiagram of case-II.

Hunt et al, found mild scoliosis in only 14 out of their 192 cases. It was most common in the dorsal region in their cases too. No abnormality of the vertebral bodies, intervertebral foramina or pedicular erosion was found in their cases as well as in our cases. 19 of their cases showed gross

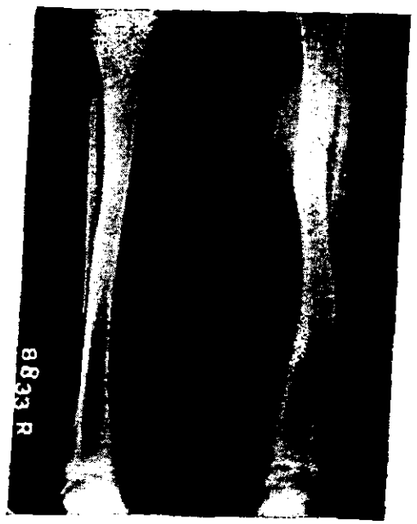

Fig. 7

Case-I, left tibia and fibula are longer than the right with wavy, sinuous elongation of the cortex and erosive defects of the bones underlying the lobulated soft tissue swelling.

Fig. 8

Case-II, lateral, postero-anterior and tangential views of the skull showing erosive defects involving both the tables of the skull in right occipital region.

kyphoscoliotic type of deformity with profound dysplasia of vertebral bodies. In these severe cases of kyphoscoliosis, the kyphotic element predominates over the scoliotic element with acute angulation at the gibbus. In majority of such cases the primary curve involves the dorsal region and the deformity is relentlessly progressive and presents a formidable challenge to the surgeon in stablising the spine. It is often accompanied by erosion of the pedicles and intervertebral formina and the ribs arising from the involved segment of the spine, are often attenuated and show "twisted ribbon" appearance. In all, 17% of Hunt and Pugh's cases with neurofibromatosis and 33% of those showing skeletal abnormalities, showed scoliosis. Schinz and associates (1951) give the frequency of scoliosis in this condition as 7% whereas Miller (1936) gave a figure of 43% in his series.

Fig. 9

Case-II, showing scoliosis with convexity to the right in the mid-dorsal region without vertebral dysplasia.

These figures vary depending on whether all the patients showing evidence of scoliosis are included or only the severe cases.

Defects of the postero-superior wall of the orbit

Lewald in 1933 was the first to report this abnormality with pulsating exophthalmos in association with neurofibromatosis in two cases. There is a gap in the postero-superior portion, of the orbital wall comprised of wings of sphenoid and orbital plate of the frontal bone. This leads to progressive and often pulsating exophthalmos due to direct transmission of vascular pulsations of the brain. The orbit has a "blank" appearance with loss of landmarks, increased diameter, absent temporal line and greatly elevated sphenoidal ridges. The anterior and middle clinoid processes may be absent or deformed on the side of the anomalous orbit, the anterior ethmoidal cells and the maxillary antrum may be small and often there is anterior displacement of the anterior fossa. In some cases neurofibromatous tissue has been found behind the eye ball (Hunt and Pugh, 1961). Both our cases had normal orbits radiologically and clinically.

Congenital bowing and pseudo-arthrosis

Ducroquet in 1937 was the first one to point out this anomaly in association with neurofibromatosis. In his series of 11 cases of pseudo-arthrosis may develop spontaneously, after fracture or following osteotomy to correct the deformity. None of our two cases showed pseudo-arthrosis though there was anterior bowing of the tibia in case-I.

Intra-thoracic Meningocele

Pohl (1933) reported the first case of this anomaly in association with neurofibromatosis. On x-ray, a soft tissue mass is

seen in relation with the spine in the posterior mediastinum with defects of pedicles, enlargement of the inter-vertebral foramina and dysplasia of the vertebral bodies. The diagnosis can only be established pre-operatively by myelography. It is considered that both the weakness of the dura and softening of the bone cause this anomaly. A combination of dural and bone abnormality is probably necessary since bone defects may occur without meningocele (Lavielle and Campbell, 1958).

The other congenital anomalies listed in the Hunt and Pugh classification probably represent the expression of only mesodermal dysplasia and their occurrence is not sufficient enough to warrant them to be considered characteristic of the disease. Some authors have reported Melorheostosis (Mc Carrol, 1950), Osteomalacia and congenital glaucoma in association with neurofibromatosis.

Since sarcomatous degeneration is neurofibromatosis is not uncommon and its reported incidence varies from 5% to 16% figures given by various authors, it will be interesting to follow up these cases and look for malignant change. It is alleged that partial excision of the lesions predilects sarcomatous degeneration.

Fig. 10

Case-I, left knee joint showing 30° abduction and external rotation of the tibia over the femur.

The unusual feature of case-I, is the presence of painless hypermobility of the left knee. All the ligaments of this knee were very lax, so that the tibia could be moved backwards and forwards over the femur and also the knee could be abducted to about 35°. 22° hyperextension over the fully extended position was also possible in the left knee. These abnormal movements are shown in figures 10, 11 and 12.

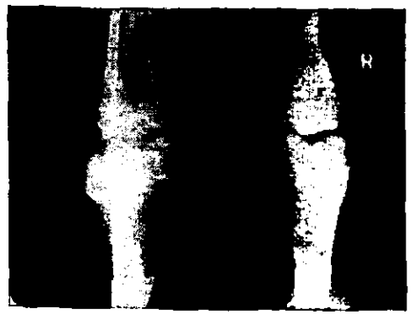

Fig. 11

Case-I, showing lateral patellar dislocation of the left knee joint. Right is normal.

Fig. 12

Case-I, left knee joint showing 20° hyperextension. Right knee is normal.

The absence of pain suggests very strongly the onset of neuropathy in this knee, though the skiagrams do not reveal any evidence of this condition as yet. Further follow up both clinical and radiological will be required to see the evolution of this lesion and whether she ends up with a typical Charcot's joint. To our knowledge, this particular association of generalised neurofibromatosis with neuropathic joint has not been described before.

Summary

Neurofibromatosis is a congenital and often familial condition presenting abnormalities of the skin, bones, nervous system and other soft tissues. In the familial cases the disease is transmitted through mandelian dominant gene without sex-linkage though the disease is more common in males than in females. It is caused by error in the stage of development producing dysplasia of neuro-ectodermal and mesodermal elements.

A radiological classification of the skeletal abnormalities as suggested by Hunt and Pugh, is discussed, as it serves to differentiate the radiologically characteristic defects from other associated defects. An effort has been made to emphasize the increasing recognition of osseous involvement in neurofibromatosis and its growing importance in diagnostic radiology.

The two cases reported in this paper showed the following changes in the skeleton :—

(*i*) Disorders of bone growth associated with elephantoid hypertrophy of overlying soft tissues in case-I.

(*ii*) Erosive defects of bone from contiguous neurogenic tumours in both the cases in this series.

(*iii*) Mild scoliosis without vertebral bodies dysplasia seen in the dorsal region in both the cases.

(*iv*) Congenital bowing of the lower third of left tibia seen in case-I.

(*v*) Lateral patellar dislocation and hyper-mobility of the left knee joint.

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—★—

THE ROLE OF SYNOVECTOMY IN TUBERCULOUS AFFECTION OF JOINTS*

BY

R. CHAKRABARTY, New Delhi.

The concept of surgical treatment of tuberculosis has been rationalised. It is based on excision of the affected organ or a part of it provided the organ is dispensable and the lesion is isolated. The introduction of the potent antituberculous drugs in the last decade has strengthened the hands of the surgeons and they are more confidently looking forward to the eradication of the tuberculous affection with surgery aided by antituberculous drugs. This mode of treatment caught the imagination of the orthopaedic surgeons who soon extended this principle of treatment with a view to preserving the movement of the Joint. This swing towards conserving the function of the Joint in tuberculous affection ushers in a new era which is hailed as a milestone in the surgical management of the tuberculous affection of Joints. The day has dawned when we pause to ponder before starting the treatment whether we can give the patient a mobile Joint or we should persist with relentless immobilisation in plaster to make it safe for an arthrodesis. In evaluating the merit of surgery, the attendant role of the antituberculous drugs cannot be ignored. They have contributed immensely not only in dispelling the bogey that tuberculous Joints are inviolable in active stage but also in promoting rapid healing of the operated area and preventing complication due to general dissemination through surgical intervention. There is no unanimity regarding the dosage and combination of the antituberculous drugs. We prefer to administer Streptomycin and I. N. H. for at least three months in the initial stage, starting the treatment about a fortnight prior to the operation. Later we prescribe a combination of I. N. H. and P. A. S. for about six to nine months. For the success of this treatment early detection and operation is necessary. But in most cases when the patients report to the doctor the lesion is already pretty advanced. Unless the X-ray films are of very high quality, the concomitant cartilaginous and bony lesions are often not seen and the extent of the lesion is only revealed on the operating table. However, a moderately advanced lesion does not contra-indicate synovectomy, though the procedure may have to be modified according to the extent of the lesion. When only the synovial membrane is involved the operation consists of synovectomy ; enucleation of bony and cartilaginous lesion in addition when they are involved and 'Joint Clearance' when the Joint is mucky. It may be stressed that for the successful results surgery should be adequate but it need not be radical as it is in cancer surgery. This principle of treatment can be employed in almost all Joints of the limbs but the results are encouraging with tuberculosis of hips and knees and they will be described here.

History of Synovectomy of Knee

Knee Joint.—Synovectomy of knee was first described by MIGNON in 1900 but it

*This paper was read at the 22nd Annual Conference of the Association of Surgeons of India in Poona in December 1960.

did not gain recognition until 1923 when SWETT reported the results of indications for synovectomy in cases of chronic infective arthritis. With the introduction of antituberculous drugs in the last decade attempts were made to preserve the function of the knee Joint only with the conservative treatment. MORTEN in 1948 published his series of cases when he showed that out of 62 children treated with antibiotic 27 had a useful range of movement but in adults recovery with useful range of movement was rare. It was at this period WILKINSON and others attempted to preserve the function of the knee by employing surgery under the protective parasol of antituberculous drugs.

Tuberculosis of knee is by far the commonest tuberculous affection of the limb joints. In adults the disease remains as a chronic synovitis for a long time. The discomfort and pain sometimes in adults is minimum even with the affection of cartilage and bone. This group of patients show the best result of synovectomy. It may also be due to the fact that the adults follow the post-operative programme of active exercise more religiously than the children.

Operation.—A high tourniquet is applied and the knee is exposed through FISHER's para-patellar incision. After the incision is made it is deepened into the upper part over the quadriceps tendon up to the synovial membrane and then the incision is gradually deepened into the lower part over the medial patellar retinacula down to the level of tibial tubercle. Dissection of synovial membrane starts in the upper part from the inner surface of quadriceps femoris. Soon the upper limit of the synovial suprapatellar pouch is reached and is detached from its attachment with articularis genu muscle. At the sides the pouch is easily separated from both the inner and outer vasti. The pouch is then gently pulled down with occasional snips of scissors from the front of the lower part of femur. Particular care is taken not to remove the fatty cushion between the synovial pouch and the front of lower end of femur over-enthusiastically. This will prevent future adhesion between the quadriceps tendon and the bone. This pad of fat is seldom involved unless concomitant foci exist in the bone. As the upper part of the articular margin of femur in front is reached, the synovial membrane is freed from this part of the articular margin. Next the synovial membrane is freed from its attachment to patella. When the top part is thus dissected out the knee is flexed and the extension of the synovial membrane is removed as far back medially between medial ligament and semimembranosus tendon and laterally upto margin of popliteus. Below, alar pad of fat and the synovial membrane in the intercondyler areas over the cruciate ligaments are removed. Both the medial and lateral semilunar cartilages are as a rule removed. When the main clearance is over, any left over areas are dealt with. Subsequently, if there exist any cartilaginous or bony foci they are enucleated. The joint is extended and is closed in layers. As early mobilisation of the joint remains the sheet anchor in the post-operative management, I prefer to use very closely placed No. 2 chromocized catgut to oppose the qurdriceps tendon and patellar retinacula. The tourniquet is released after a firm pressure bandage incorporating plenty of cotton wool, is applied over the occlusive dressing of adhesive plaster on Tinc. Benzoin Seal. No Plaster Cast is applied (Fig. 1).

Post-operative Period.—Routine antituberculous treatment continues and the pressure bandage is removed on the tenth day leaving only the occlusive dressing of adhesive plaster on Benzoin Seal. A below knee

Fig. 1

Showing the interior of a moderately advanced lesion and knee joint.

adhesive plaster traction with only 10 lbs. weight is fixed with a pulley and the patient is encouraged to bend the knee from the same day. As a routine, manipulation is necessary at this period to initiate the movement. No anaesthesia is necessary for it. If the knee refuses to bend on moderate force, particularly in a case where the lesion was well advanced and joint clearance operation was performed, further force should be withheld as it may lead to fracture of bone. In about 3 to 6 weeks' time full range of movements is achieved and quadriceps develop quickly so that no lag persists. The knee bending exercise in traction continues for about three months in bed and weight bearing is allowed after it depending on the progress. To start with partial weight-bearing with the help of crutches is allowed followed by full weight-bearing. The criterion of assessment for weight-bearing are (a) painless range of movement, (b) absence of tenderness in the knee, (c) no pain on standing and (d) low B. S. R.

Hip Joint

Operation is in fact synovectomy plus capsulectomy. The hip joint is approached through an anterior incision starting from the anterior superior iliac spine vertically down below to about 5 inches. The anterior capsule is reached between tensor fascia femoris and gluteii laterally, and sartorius and rectus femoris medially. The capsular fibres and part of the reflected head of rectus femoris is erased off to lay the anterior capsule covered by the iliofemoral ligament thoroughly bare. The branches of the lateral circumflex femoral artery require ligation to ensure a bloodless field. A self retaining retractor to separate the medial and lateral group of muscles is of immense help at this stage. Capsule is now made bare in the medial and lateral side by gauze dissection from the gluteii laterally and iliopsoas and obturator externus medially with occasional rotation of the limb. A vertical incision is then made over the anterior capsule from the acetabular rim down to the trochanteric line and the capsule with synovial membrane is dissected and removed in two parts from its acetabular and femoral attachments. Though removal of capsule with synovial membrane is effected as far back as possible both medially and laterally, ligamentum teres and the synovial membrane in relation to it is not disturbed. Next any bony or cartilaginous foci are liquidated and the joint is closed in layers. Firm pressure bandage is applied on occlusive dressing of adhesive plaster on Tinc. Benzoin Seal.

Post operative Management is same as in the case of knee and weight-bearing is avoided at least for 3 to 4 months according to the progress. Sometimes walking caliper is advised before full weight-bearing is allowed.

TABLE OF STATISTICS

I. Results of Synovectomy Knee

No.	Full movement can squat	Flexion 90° or less	No movement	Follow-up cases with mobile joint	Remark
Below 10 Years 9	3 (33·3%)	3 (33·3%)	3	1 year	No complication
Between 10–20 Years 15	8 (53·3%)	3 (20%)	4	1—4 years 3—3 years 3—2 years 4–Not traceable	No complication
Between 20–30 Years 55	36 (65·4%)	11 (20%)	8	2—4 years 13—3 years 10—4 years 4—1 year 18–Not traceable	2 Recrudescence; Arthrodesis
Above 30 Years 17	9 (52·9%)	4 (23·5%)	4	3—4 years 5—3 years 2—2 years 3–Not traceable	No complication
Total 96	56 (58·3%)	21 (21·8%)	19	—	—

II. Results of Synovectomy Hip.

No.	Full movement can squat	Flexion 90° or less	No movement	Follow-up cases with mobile joint	Remark
Below 10 Years 3	2	—	1	1—1 year 1—3 months	Recrudescence 1
Between 10–15 Years 12	5	3	4	1—5 years 2—3 years 1—4 years 8–Not traceable	Recrudescence nil
Between 20–30 Years 3	—	1	2	Not traceable	—
Total 18	7 (38·8%)	4 (22·2%)	7	—	—

Discussion

Knee Joint.—Tuberculosis of knee is by far the commonest tuberculous affection of the limb joints. In adults the disease remains as a chronic synovitis for a long time. The discomfort and pain sometimes is minimum in adults even with the affection of bone and cartilage. As the best result of Synovectomy is achieved if the lesion is early it is imperative to clinch the diagnosis early and subject the patient to the surgical treatment of synovectomy. When the diagnosis is hanging fire, it would be certainly judicious to submit the patient for synovial biopsy followed by a synovectomy in positive cases. As the result of synovectomy even in moderately advanced cases is also encouraging, surgeons should be cautious against the indiscriminate destruction of the joints by performing an arthrodesis. Synovectomy in no way contra-indicates arthrodesis and even if a synovectomy fails after some time there is nothing to lose from the point of view of patient; on the contrary he gets a chance to retain a mobile joint. Even if the joint can retain the movement for a few years before any recrudescence of the disease, it is far more preferable to the price we pay for a stiff knee in a country where we squat several times in course of our daily routine.

Fig. 2

Followed up for 4 years (full extension)

any hesitation the joint should be subjected to exploration and on the basis of the findings on the operating table a synovectomy should be done or a biopsy taken. Even when the true information cannot be available on exploration as to the nature of the lesion, synovectomy will not be a contra-indication. Even if it ceases to be tuberculous in origin, the results of synovectomy is universally satisfactory for other common arthritis as well.

Results of synovectomy of hip in the present series shows full range of movement in 38% of cases and partial but useful range of movement in 22% cases (Figs. 4, 5, 6, 7).

Fig. 4
Followed up for 5 years.

Fig. 5
The same case as in Fig. 4 (can squat fully).

Fig. 6
Followed up for 1 year.

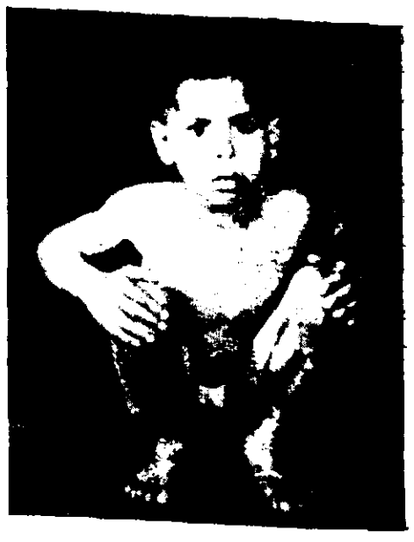

Fig. 7
The same case as in Fig. 6 (can squat fully).

Results of Synovectomy Knee

No.	Full movement can squat	Flexion 90° or less	No movement	Follow up cases with mobile joint	Remark
Below 10 years 9	3 (33·3%)	3 (33·3%)	3	1 year.	No complication.
Between 10–20 yrs. 15	8 (53·3%)	3 (20%)	4	1–4 yr., 3–3 yr., 3–2 yr., 4–Not traceable.	No complication.
Between 20–30 yrs. 55	36 (65·4%)	11 (20%)	8	2–4 yr., 13–3 yr., 10–4 yr., 4–1 yr. 18–Not traceable.	2–Recrudescence Arthrodesis.
Above 30 years 17	9 (52·9%)	4 (23·5%)	4	3–4 yrs., 5–3 yrs., 2–2 yrs. 3–Not traceable.	No complication.
Total 96	56 (58·3%)	21 (21·8%)	19	—	—

Results of Synovectomy Hip

No.	Full movement can squat	Flexion 90° or less	No movement	Follow up cases with mobile joint	Remark
Below 10 yrs. 3	2	—	1	1–1 year 1–3 months.	Recrudescence 1.
Between 10–15 yrs. 12	5	3	4	1–5 years 2–3 years 1–4 years 8–Not traceable.	Recrudescence nil.
Between 20–30 yrs. 3	—	1	2	Not traceable.	—
Total 18	7 (38·8%)	4 (22.2%)	7	—	—

Conclusion

1. Synovectomy is in fact a partial synovectomy and with the simultaneous exhibition of anti T. B. drug the results are encouraging.

2. X-rays do not reveal the true extent of lesion unless they are of high quality. Even if the extent of lesion is more than synovial involvement, operation of synovectomy is no contra-indication in conferring a mobile joint.

3. Manipulation to initiate the movement is the sheet anchor in the post-operative regime.

4. Weight-bearing to be considered depending on the progress of healing.

5. The statistical data evinces few information :

(*a*) The incidence of T. B. knee in our experience is highest in the

third decade in contra-distinction to what is found in English literature.

(*b*) The best result of synovectomy is seen in the age group of 20-30 years. As perhaps the lesion is very chronic at this age the general state of nutrition is at its peak and lastly this group of patients follows the post-operative regime of active exercise more ostensibly and religiously.

(*c*) Of course the follow-up is not very long, still the incidence of recrudescence in only 2 cases holds promise for this treatment in our country.

(*d*) There are 19 cases in the list where movement was not possible. These are the cases on whom I operated quite some time back and where manipulation as a routine was not performed.

(*e*) Though the details of the extent of involvement of the joint has not been included in the statistics, it may be stressed that almost all joints had some involvement of cartilage and bone. Hardly there was a case where only synovial membrane was only involved.

Summary

Rationale of Treatment.—The surgical principle for tuberculous lesion-excision of the organ if it is dispensable and the lesion is isolated—has been extended to tuberculous affection of the joints with favourable results. This has been amply helped by the simultaneous exhibition of antituberculous drugs which give a knockdown blow to the causative organism in promoting rapid healing of the operated area and preventing complications which used to be common as a result of general dissemination due to surgical interference.

Joint Operation.—The aim of the treatment is to confer a mobile joint concomitant with the eradication of the disease. For the success of the operation early detection and operation is necessary. Even if the disease is advanced sometimes dramatic results are achieved provided the surgery is adequate. In early lesion only synovectomy; enucleation of bony and cartilaginous foci in addition when they are involved, and 'joint clearance' when it is mucky, remain the sheet anchor of treatment. The operation can be employed for tuberculous lesions of nearly all the joints of the limbs but the results of the treatment is very encouraging for knee and hip lesion.

Author's Observation

A series of follow-up cases after operation are presented. Remarks on the technique of operation on knee and hip joints are mentioned. Early operation is advocated and a fallacy of x-ray in detecting the extent of the lesion has been pointed out. For functional recovery early mobilisation of the joint is strongly advocated. Simultaneous antituberculous treatment is recommended for at least 3 to 4 months.

My thanks are due to Colonel B. L. Taneja, Medical Superintendent, Irwin Hospital and Principal, Maulana Azad Medical College, for kindly allowing me to publish this paper.

REFERENCE

Personal communication to M. C. Wilkinson, Blacknotley Hospital, Essex (England).

—*Received for publication on 13-7-1961.*

GIANT CELL TUMOUR OF THE LOWER END OF ULNA

(*A case report*)

BY

D. A. JEJURIKAR and G. K. CHITALE, Aurangabad.

Benign giant-cell tumour of the bone is not a rare new growth of bone. However its occurrence at the lower end of ulna is a rare occurrence.

Case Report

An old lady (Mrs. G. K.) of about 60 yrs. came to our hospital in Oct. 1960 with a painless swelling on the ulnar side of lower end of the left forearm - with duration of over six months. The swelling was smaller in size but gradually increased to the present size over last six months. She did not give any history of trauma, fever, syphilis, guineaworm or any other disease. She had amenorrhoea for (menopause) 10 yrs. without any gynaecological complaints.

Examination showed an ovoid swelling about 3" × 4" on the medical aspect of lower third of Left forearm. Skin over the swelling showed marks of counterirritants applied some time back. It was not pulsating. Skin - otherwise normal - was not adherent to the swelling which was expanded lower end of ulna. It was not tender, has smooth surface and was firm in some places and cystic in others. Egg shell crackling was present. Transillumination test was negative. Regional lymphnodes were not enlarged. Left wrist was completely free. There were no other swellings in other parts of the body.

Besides this swelling she was otherwise healthy. X-ray: (31-10-60) showed expanding rarifying lesion of the lower end of left ulna involving head as well as styloid process. Cortical bone was thinned out without any periosteal reaction. Upper margin of the lesion was defined. Lesion did not show soap bubble appearance though some trabeculae can be seen in the upper.

Clinical diagnosis:

(1) Solitary Cyst of lower end of ulna.

(2) Giant cell tumour of lower end of ulna.

On 17th Nov. 1960 she was operated under general anaesthesia. Excision of the lower third of ulna was done. Except for some fatty, discharge through the wound which cleared in 4 days time, the post operative recovery was uneventful.

The excised growth was sent for pathological examination.

Pathology Report.—Specimen: Ovoid, expanded lower third of ulna removed at operation. Surface smooth, consistency firm at some places and cystic at others.

Cut Section.—Bone (normal) expanded into a tumour. Thinning out of cortex. Periosteum not involved. Cut surface shows a pearly grey tumour with an area of haemorrhage in the centre, homogenous, soft but not friable.

Fig. 1

Photograph of bisected specimen.

Fig. 2

Histological Slide (Photomicrograph).

Histologically.—The tumour is composed of two types of cells *viz*., the stromal cells and the giant cells.

The stromal cells are spindle shaped, round and polygonal. The nuclei are large, and single with a prominent nucleolus in some. The stroma is loose and the collagen fibres are not prominent. There are occasional cells with mitotic figures.

The giant cells are found comparatively sparsely. The number or nuclei in majority of cells is less than 15. The nuclei are similar to those of the stromal cells.

According to Jaffe's classification the tumour could be placed in grade I.

Comments

This case report is presented for two reasons :

(*i*) rare occurrence (of the tumour) at the lower end of ulna and

(*ii*) its occurrence in an old female of 60 years.

In 109 cases of giant cell tumours reported by Dahlin[1] in his analysis of 2,276 cases of bone tumours only six cases were at the lower end of ulna. Lichtenstein[3] did not come across a single case in ulna. Vyaghreswarudu and Sivamappa[5] reported 51 osteoclastomas of which only two occurred in distal end of ulna. Their patients were males of 22 and 40 years of age respectively. In the studies on osteoclastomas by Ellis, Murphy and Ackerman, (31 cases) Thomson and Turner Warwick, William (101 cases) and Gupta (24 cases) there was no case occurring in lower end of ulna (2).

Age incidence of giant cell tumour is variable. About 90% occurred beyond the age of 19 with a peak at 20 years of age. Saphir gives the incidence as occurring between 20 and 40 (4).

Oldest cases recorded by Johnson and Dahlin was 71 years old. Vyaghreswarudu and Sivamappa had only two cases beyond 50 years. D. G. Reddy also had only 2 cases beyond 50 years (5).

Summary

(1) A case report of giant cell tumour in the lower end of ulna in an old lady of 60 is reported.

(2) The site as well as the age for the tumour, as seen in this case, are very rare.

Acknowledgement

We are indebted to Dr. P. M. Bhandarkar, the Dean, Medical College, Aurangabad, for his kind permission to publish this case.

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—Received for publication on 18-7-1961.

ASSOCIATION NOTES

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THE XXIII ANNUAL CONFERENCE

The XXIII Annual Conference of the Association of Surgeons of India will be held on the 27th, 28th, 29th and 30th December 1961 at the Medical College, Baroda. The Annual General Body Meeting will be held on the 30th December 1961 at 11-45 a.m.

Details about accommodation etc. at Baroda can be had from the Local Secretary, Dr. A. B. Kothari, M.S., F.R.F.P. & S., F.I.C.S., Medical College, Baroda.

Members who have not yet intimated the Local Secretary of their intention to attend the Conference will kindly do so immediately stating the time and date of arrival and departure and whether accommodation and board have to be arranged for them.

The Inauguration of the Conference will take place at 9 a.m. on the 27th December 1961.

At the Conference the following subjects will be discussed :—

28-12-1961 (9 a.m. to 11 a.m.) :

1. *Injuries of the Hand*: by Dr. Subir K. Chatterjee, Calcutta.
2. *Early repair of Hand injuries :* by Dr. C. Balakrishnan, Nagpur.

29-12-1961 (9 a.m. to 11 a.m.) :

1. *Spinal Cord Tumours* : by Dr. R. Chatterjee, Calcutta.

Besides this, the following short papers will be presented :—

27-12-1961 :

1. ***Uncommon presentation of Hydatid disease*** : by Dr. S. Mukherjee, New Delhi.
2. ***Skin Grafting in Fistula Operation*** : by Dr. M. D. Patel, Baroda.
3. ***Ano-rectal Atresia*** : by Drs. A. S. Fenn, H. S. Bhatt and L. B. M. Joseph, Vellore.
4. ***Squamous Cell Carcinoma of Anal region*** : by Dr. R. N. Bindra and Dr. F. C. Eggleston, Ludhiana.
5. ***Treatment of Pilonidal Sinus*** : by Dr. R. K. Menda, Bombay.

28-12-1961 :

6. ***Problem of Adrenal Corticosteroids in Surgery*** : by Drs. A. Prakash, G. C. Tandon, M. Issac, S. C. Khatri.ar and S. K. Nair, New Delhi.
7. ***Surgical Treatment of Carcinoma of the Oesophagus*** : by Dr. E. J. Borges, Bombay.
8. ***An Analysis into the causes of accidental burns in the City of Bombay during the last 20 years with a view to their prevention*** : by Drs. P. K. Sen, S. V. Kini and Dr. K. Lotlikar, Bombay.

29-12-1961 :

9. ***Meckel's Diverticulum*** : by Dr. O. P. Taneja, New Delhi.
10. ***Middle Aortic Syndrome*** : by Drs. P. K. Sen, S. G. Kinare and S. D. Engineer, Bombay.
11. ***The so-called Isolated Ulcero-hyperplastic Intestinal Tuberculosis*** : by Drs. A. Prakash, S. K. Nair, H. D. Tandon, K. L. Sharma, New Delhi.
12. ***Technique of making an artificial vagina using sigmoid colon*** : by Dr. V. N. Shirodkar, Bombay.

30-12-1961 :

13. ***Acute Duodenal Perforation—Clinical Features and evaluation of 317 cases*** : by Dr. T. E. Udwadia, Bombay.
14. ***Intestinal Perforation*** : by Dr. Miss P. Virmani, New Delhi.
15. ***Crohn's Disease*** : by Dr. R. S. Gupta, Calcutta.
16. ***Wound Infections and Post-operative Dressings*** : by Dr. A. S. Fenn and Dr. Mohan Airon, Vellore.

In addition to the above, lectures by Foreign Surgeons have also been arranged.

Resolutions to be moved at the Annual General Meeting should be given due notice of and such notice should reach the Hony. Secretary not later than the 15th December 1961.

Nominations for the Presidential election should reach the Hony. Secretary, not later than 20th December 1961 (if sent by post) or if handed in person not later than the 26th December 1961.

* *

SUBJECTS FOR DISCUSSION AT FUTURE MEETINGS

24th Meeting (1962)

1. **Tumours of Urinary Bladder.**
   by Drs. K. K. Ghosh and H. K. Sarkar, Calcutta.

2. **Management of Burns.**
   by Dr. Anjali Mukherji, Calcutta.

3. **Experiences in the Use of Extracorporeal circulation for Cardiac Surgery.**
   by Dr. A. K. Basu, Calcutta, P. K. Sen, Bombay and Dr. S. N. B. Roy, Calcutta.

4. **Septic and Suppurative Arthritis of the Hip.**
   by Dr. B. Mukopadhaya, Patna,

   and

5. **A Paper on Anaesthesia (to be decided in due course).**

25th Meeting (1963)

1. **Hypothermia.**

2. **Experiences in Surgery for Chronic Pancreatitis.**
   by Dr. R. S. Gupta, Calcutta.

NOTICES

JOHNSON AND JOHNSON TRAVELLING FELLOWSHIP FOR ORTHOPAEDIC POSTGRADUATES FOR 1963

The Orthopaedic Section of the Association of Surgeons of India invites application from young Surgeons doing Orthopaedic work only for the above Fellowships. Only candidates with practical experience in orthopaedic work need apply. The tour will be of 6 weeks duration.

Candidates should apply to Dr. A. K. Talwalkar, 395 Lamington Road, Bombay-4. Five copies of the applications containing all relevant information about their career, qualifications, experiences, mentioning any distinctions which they obtained, their undergraduate and post-graduate work done and the posts held should be sent, Research work done by them should be mentioned. Names of two Referees should be given.

The Fellowship will enable a candidate to visit all the leading Orthopaedic Centres in India and a very lively programme will be arranged for them. The candidates if selected must be willing to proceed on the tour of visit by the 1st week of January 1963. There are four fellowships for this year but the Orthopaedic Section reserves the right to select as many as they consider suitable.

The last date for receiving applications is 30th April 1962.

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CONTRIBUTORS—DECEMBER, 1961

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2. Dr. S. K. S. Marya, M.S., Demonstrator in Anatomy,
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