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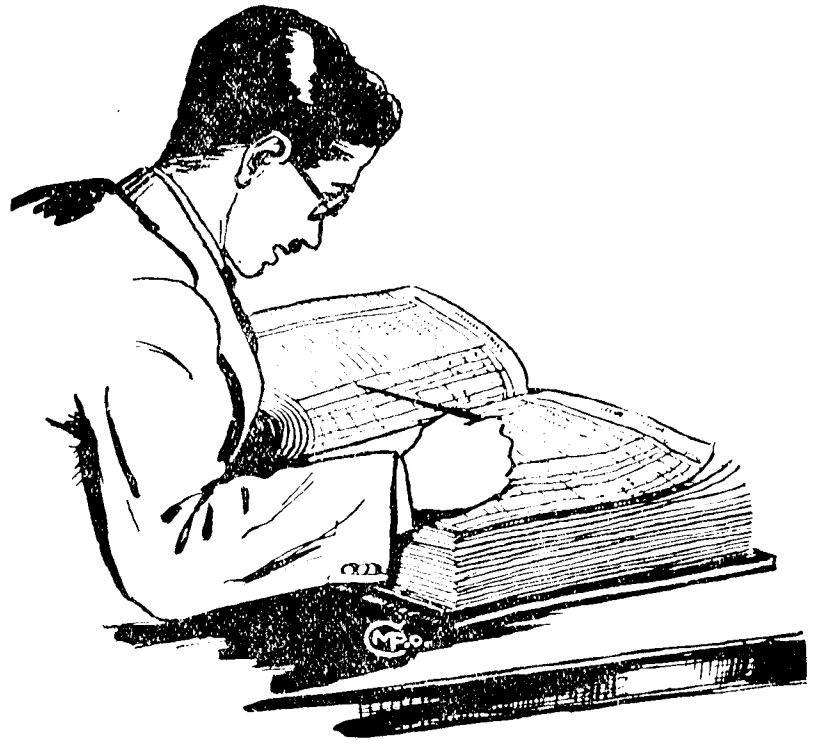

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MEDICO-SURGICAL SUGGESTIONS

VOL. IX JUNE 1940 NO. 6

Original Articles.

LIVING PATHOLOGY OF DISEASED GALL-BLADDER*

K. S. NIGAM, M.D., F.R.C.S.

Professor of Surgery, K. G. Medical, College, Lucknow.

It is now universally believed that the diseased gall-bladder is one of the most frequent organic causes of chronic dyspepsia.

Of the pathological states of the gall-bladder that which mostly concerns the practitioner is cholecystitis and that too chronic. It is a slow smouldering chronic inflammatory change affecting the wall of the gall-bladder. The cause is infection, through systemic circulation in the vast majority of cases. The prevailing belief is that B. coli from intestinal lesions or streptococci from the throat gain entrance into circulation, pass from lymphatics, veins, heart and then *via* the hepatic and cystic arteries get implanted into the deeper layers of the gall-bladder wall. There they set up chronic fibroblastic response ultimately damaging the structure to such an extent that it loses its physiological function of concentrating bile to one tenth of its volume and add mucus to it and aid in the absorption of cholesterol from bile and perhaps excrete it on occasions. A further effect is reflex gastric symptoms of vague distention, pains in the upper abdomen specially after dinner and flatulence. This is explained by the fact that both gall-bladder and stomach are supplied by the nerves partly from the vagus and partly from sympathetic derived from the ninth dorsal segment of the cord Proceeding further the focus of internal sepsis established in the gall-bladder reacts injuriously by toxic absorptions on the cardiac muscle and the body generally. Very frequently this disease is associated with a recurrent or chronic appendicitis and inflammation or ulceration of pyloroduodenal region. The vascular and lymphatic connections of these three regions are closely associated.

Patients with cholecystitis usually present a characteristic picture clinically. Those that have acute infective cholecystitis

* Read at the Scientific Section of the VI U. P. Medical Conference, held at Lucknow, October, 1939.

(only 4 out of our 20 operated cases during the last two sessions at our surgical unit in K. G. Hospital) are noted by rapid onset of abdominal pain with nausea and repeated vomiting. There is pain, tenderness and guarding of muscles under the right subcostal margin; the temperature rises up to 101° or 102° F and there is polymorphonuclear leucocytosis. A distended and tender gall-bladder can at times be felt.

In chronic cholecystitis with or without gall-stones they present in a large majority of cases a most characteristic history: They complain commonly that they experience a ball of wind rising up in the upper abdomen producing distress in the heart, palpitation and at times a sense of great depression and fainting. These are experienced principally after the evening meal. But the night sleep is rarely disturbed. When pain of a mild nature is present it is located firstly immediately below the right subcostal margin and sometimes it goes through to the back. These symptoms wax and wane but are progressive though with slight intermissions causing ultimately constant flatulent dyspepsia and ill-health and the enjoyment of food is lost.

Severe recurrent colicky attacks with aggravation of tenderness, vomiting and confinement to bed and at times icterus strongly indicate the presence of gall stones.

A thorough clinical history and local and general physical examinations are sufficient for the purpose of diagnosing cholecystitis in 85 per cent of cases.

The following aids, laboratory and radiological, may be of great help in diagnosis :—

(1) Microscopic and cultural test of the fluid obtained by duodenal intubation. If pus cells and organisms present or broken cholesterol crystals found it helps to confirm the diagnosis.

(2) Straight skiagraphy by demonstrating radio-opaque calculi and specially cholecystography in non-jaundiced cases afford invaluable help in diagnosis as well as in assessing the functional efficiency of the gall-bladder.

(3) Special biochemical investigations, *e g.*, plasma cholesterol if raised above 200 mgm. per 100 c.c. of blood. Van den Bergh and Icteric index help in determining the obstructive effect on the flow of bile by gall-stones blocking the hepatic and bile duct passages.

The experience gained by clinical histories and follow up records have induced us to believe that the right course of treatment in all cases where acute cholecystitis with obstruction occurs or in persistent chronic cholecystitis consist in removing the gall-bladder. At the same time the extrahepatic biliary passages must be explored any obstruction removed, constrictions dilated and if evidence of infection or inflammation in these passages be found drainage to the exterior or internally should be instituted.

After discussing the pathology of the gall-bladder as envisaged by external examination of the intact human body and visualised by clinical features or radiological or biochemical investigations of duodenal contents there comes the problem of judging at the operation whether a gall-bladder should be excised or incised and drained only. Next one has to decide whether the rest of extra-hepatic biliary passages should be considered diseased enough to interfere with them.

On occasions the surgeon finds it difficult to decide one way or another without exploration of these parts by incising them or aspirating their contents.

Broad visual pathology, microscopic appearances and environmental conditions are as follows :

(1) Preliminary skiagraphy might have visualised a deformed duodenal cap or gastric analysis may have shown hyper or hypochlorhydria indicating disease of the biliary tract.

(2) Broad pathological concept of disease is derived from antecedent history of chronic gastritis, gastro-duodenal ulcer, recurrent appendicitis, typhoid fever, biliary colic or history of jaundice.

(3) Sudden upper abdominal pain, catch in breath, involuntary guarding of muscles, rapid pulse and pyrexia direct attention to the localisation of the disease. Two hourly record of pulse rate, character of vomit, extent of constipation, local peritonitis and leucocytosis aid further in differential diagnosis of acute cholecystitis. We had five of such cases in the present series of twenty—only in one was operation necessitated by rising pulse rate, a tender palpable mass, and signs of unabating peritonitis. On opening the abdomen the first thing that attracted attention was the swollen and hyperæmic omentum, drawn up to the under surface of the liver and held there by recent adhesions which slightly bled on separation; underneath was revealed a gall-bladder which was pinkish white with external surface speckled with plastic lymph; cholecystostomy was done—no gangrene being present—and the biopsy material removed brought the following report from the pathologist: No gall stones, mucopurulent bile, bile culture yielded growth of B. coli, acute inflammatory changes in the wall of the gall-bladder. Patient was operated in August, 1937 quite healthy since then. This experience was unique in so far as laparotomy in acute cholecystitis is rarely done except for gangrene or perforation. In chronic cholecystitis the histories were of prolonged aflatulent dyspepsia of from 3 to 30 years' duration with recurrent acute attacks of pain in or about the right hypochondrium except in one who gave only 6 months' history; Murphy's sign was present cent per cent: tenderness and involuntary guarding of muscles were present in 44 per cent., Ligat's picking up test in 22 per cent., palpable gall-bladder in 33 per cent.. tender right 8th or 9th

rib in the mammary line, right shoulder pain and Boa's sign in 10 per cent of our cases and icterus in 22 per cent.

Serum cholesterol averaged 200 mgm. or above in 75 per cent. of chronic cholecystitis cases confirmed by operation and 66 per cent. of acute cholecystitis. Icteric index should be done along with Van den Bergh test. In certain cases V.D.B. is completely negative yet icteric index is high. It is due then to some other yellow pigment most probably derived from food. (Normally among our population the cholesterol rarely ranges above 150 mgm. per 100 c.c. of blood. Sources of cholesterol are food and tissue katabolism. Articles of diet rich is cholesterol as fats, eggs and meat are proverbially deficient in our dietetics.)

Hepatic efficiency test by galactose or lævulose tolerance test is helpful in the management of such cases.

Cholecystography may indicate presence of gall stone by negative shadows and provided the dye is absorbed from bowel after ingestion it is a certain indicator of the physiological efficiency of the gall-bladder unless stricture or obstruction at the cystic duct prevents bile entry into the gall bladder.

When long continued and porsistent dyspepsia due to gall bladder disease exist resisting medicinal treatment, or gall-stones are visualised by skiagraphy operative treatment is decided upon. Even acute cholecystitis with obstruction requires removal of the gall-bladder within a reasonable time provided shock, infection and hæmorrhage are controlled by suitable prooperative treatment with glucose, urotropine and calcium or blood transfusion, adequate post-operative management

Nothing gives the patient a new lease of life than a colecystectomy well designed and carried out with perfect technique to prevent postcholecystectomy syndrome of complications.

At the operation omental adhesions round the liver bed, may be present and duodenum or stomach may be drawn to and fixed to the gall-bladder region (an actual internal biliary fistula connecting the gall-bladder to the stomach was present in one of these 20 cases of our series).

The gall bladder when exposed usually prosents a reddish white or grey appearance as distinct from translucent bluish hue of the normal organ. Its walls are considerably thickened—offering resistance and feeling tough in the grasp of palpating fingers. Stones when present are felt as characteristic hard calculi through the wall of the gall-bladder or the bile passages. An enlarged cystic gland is usually present. The walls of ducts have a translucent white colour and they are thin on exposure when normal. When diseased these are dilated considerably. Hartmann's pouch is frequently well developed and overlies the cystic duct to which it may be firmly adherent. Stones retroduodenally can be easily felt by the

finger introduced through the foramen of Winslow. Yet in presence of preoperative signs of biliary obstruction with sepsis—the surgeon should open and explore and catheterise the common bile duct to prevent risk of acute post operative biliary obstruction after operation. On occasions the gall-bladder may not show any gross abnormality while clinically and radiologically dysfunction of the organ was evident. In such cases one usually finds on adequate exposure of the region of the neck of the gall-bladder and the cystic duct that opaque fatty tissue lies subperitoneally which is abnormal and distinctly indicates disease warranting cholecystectomy. An incision into the gall-bladder may show cholesterosis. The diagnosis confirmed by mucopurulent bile content, red and thickened mucosa and the lining showing reticulations. Presence of white bile indicates serious degree of hepatic failure or else a mucocele.

No cholecystectomy should be done without the surgeon demonstrating by neat dissection the relations of extra-hepatic biliary passages to avoid the catastrophe of ligature, tear or bruising of the bile passages as they transmit bile from the liver to the ampulla of Vater. The line clear for transit of the bile should be established before closure of the abdomen keeping in mind that the variability of mutual relations of drainage bile ducts is very frequent.

ASSOCIATION OF TUBERCULOSIS AND PREGNANCY*

BY B. B. NANAVATTY,
Ahmedabad.

I have chosen this subject because of its paramount importance both from the patients' point of view and that of the country as a whole; the doctors and social workers being most concerned, the subject should be considered as doubly important when tuberculosis is complicated by pregnancy for, here two lives are involved.

In spite of the heavy mortality, from this disease, few people exert themselves to ameliorate the suffering of those who are the unfortunate victims of this disease. A few sanatoria exist and carry on beneficent work, but after all these are only a drop in the ocean. Still compared to a decade ago, we have made notable advance and few more clinics and centres have sprung up chiefly due to the funds obtained, following the Vicereine's nationwide appeal. It was mainly due to her that public conscience was really and truly aroused to the necessity of eradicating this aweful scourge.

* Lecture delivered at a monthly Clinical Meeting of the Ahmedabad Obstetric and Gynecological Society.

It was then that people realised that tuberculosis is a curable disease, if taken in hand early, and treatment continued for long. No doubts sanatorium treatment is not within the reach of the poor, but in all big institutions there is always a reserve fund from which the poor, and indigent could be treated, and be it said to the credit of such institutions that a certain number of patients is treated free.

Pregnancy is definitely harmful to a patient suffering from active tuberculosis whatever the situation and this is specially true in tubercular disease of the spine, for it leads to a sudden onset of generalised tuberculosis or acute tubercular disease of the lungs or larynx. The pregnancy should therefore be terminated unless the patient insists on its continuance after the risks are explained to her.

Taking the pulmonary form which is commoner and more often encountered-research workers in this field have found that 85 per cent of tuberculous patients become definitely worse by pregnancy, and although formerly in every case thus complicated abortion was induced, a more optimistic view now can be taken, due to the advance in knowledge and better facilities that exist for the treatment. Although most cases of tuberculosis are aggravated, in quite a few there is a temporary improvement during pregnancy due to immobilisation of the lungs and diaphragm by the bulky uterus. The latter as it enlarges restricts the movement of the lungs and thus acts as an artificial pneumothorax. During labour and after delivery, the extensive excursions of the lungs leads to inspiration of tuberculous material into healthy portions of the lung tissue and thus causes rapid advance which so often follows.

PROGNOSIS :—This depends on the type of disease, her environment, and her finances. In every case complicated by pregnancy there occurs a flare up; latent disease gets activated and quiescent disease becomes re-activated and already active disease gets advanced.

TREATMENT :—Interference is justified *i.e.* abortion should be induced :—

1. In early active disease, provided the pregnancy has not advanced beyond the 3rd month.

2. In case where the disease has only recently become quiescent, provided again that the pregnancy has not advanced beyond the 3rd month.

3. Active disease later in pregnancy is a contraindication for interference, for labour at this stage, and at full term makes very little difference to the patient. Only in advanced tuberculous disese, where the expectation of the mother's life is but a question of few weeks, premature labour is induced in the interest of the child. The mother thereby also has the satisfaction of seeing her child come into the world. If all goes on well, *i.e.* the disease is in

abeyance till the time for delivery draws near, then the 2nd stage of labour should be shortened as much as possible to save the mother from exhaustion. Forceps may be applied as soon as the os is fully or nearly fully dilated.

The next question to be considered is its effect on the child—on no account should the child be suckled and preferably the child should be separated from its unhealthy surroundings. The mortality of infants thus separated is only ¼ of those who are allowed to remain in close proximity to the mother; in the latter it being 25 per cent and in the former only 6-7. The effect of nursing in such mothers produces a very deleterious effect owing to calcium depletion; it only hastens the end.

TUBERCULOSIS AND MARRIAGE :—This is a very vexed question, but the obstetrician and the physician should shoulder the responsibility jointly and advise according to the condition of each patient, each one presenting a special problem.

A. In healed gland and bone disease marriage may be allowed with impunity and such couples, beget healthy children—only in such families there is a slightly increased tendency towards caries, scrofula, and even pulmonary tuberculosis, but the risks are such as may be safely taken.

B. Pulmonary tuberculosis presents a different proposition; permission may be given if the disease is arrested or cured. In man the risk is not so great; but in a woman pregnancy increases the risks enormously.

The following points may be taken as a rough guide:—if there be good physique, healthy surroundings, and good family history, marriage might be sanctioned; conversely with bad family history and poor chest expansion veto marriage.

In advanced cases, of course there can be no question of marriage—neither the contracting parties would think of it nor their guardians, thus, simplifying the doctors' problem.

Pregnancy in a tuberculous patient means the beginning of the end for her. It is true there is a lull for a time; but it is a deceptive lull, for after parturition the disease advances rapidly.

It would be well to bear in mind the words of the French Physician Dubois who said that the 1st accouchment may be borne well and easily; the 2nd with difficulty; and the 3rd, never.

It is therefore the doctor's duty to forbid pregnancy, if the disease is active; equally is it his responsibility to allow pregnancy, provided the disease has been quiescent for 2 years, and the sputum on more than one examination is negative. Thus we see that, the burden of deciding this very vital point falls on the obstetrician, but the latter should always seek a second opinion and work in conjunction with a physician, and even a—radiologist, if need be—thus strengthening one's view point.

RADIUM TREATMENT OF CANCER OF THE CERVIX UTERI

FRANK E. SIMPSON, M.D.
Collaborators
J. EARNEST BREED, M.D.
JAMES S. THOMPSON, PH.D.
Chicago.

In the treatment of cancer of the cervix uteri irradiation has practically taken the place of surgery except perhaps in very early adenocarcinoma. While x-rays are used by some, Graves states "that radium is at the present the chief resource in the treatment of cancer of the cervix uteri," an opinion shared, we believe, by most surgeons.

Three topics will be briefly discussed —I Technic of radium treatment, II Prognosis, III Results.

Technic. The technic, which must be varied to suit the conditions, will be described briefly as it has been discussed fully in previous papers.

In a typical case our plan of treatment consists of the following procedures.

1. *Irradiation from the outer aspect of the cervix.*

The external os is often obscured by the growth It is then impossible to enter the cervical canal without a good deal of traumatism to the tumor. Even if the external os can be seen, the cervical canal *may be choked* by the growth. We believe it is *important* therefore to irradiate first the outer *aspect of the cervix* in order to reduce the tumor so *that the* external os can be easily identified. Later the cervical canal can be entered without traumatism or dilatation.

The cervix is very gently exposed with a bivalve speculum the blades of which are 12 cm. and 14 cm, long respectively.

After insertion, the distal ends of the speculum are separated as widely as possible without traumatism in order to push away the rectum and bladder.

The open position of the speculum is maintained by the usual set-screw.

A gold plate, 4 mm. thick, fitted to the inner surface of the posterior blade of the speculum is inserted to protect further the rectum which is one of the most radiosensitive of all organs.

Three parts of entry are used—the 2 lateral fornices, and the end of the cervix.

The edges rather than the center of the growth should be irradiated. An applicator containing from 500 to 1000 mc. of radon, screened with 2 mm. of silver plus 5 mm. of rubber or gauze is grasped with an 8 inch forceps and placed carefully in one lateral fornix or against the end of the cervix.

In some cases, 10 mm. instead of 5 mm. of rubber or gauze is placed around the metallic screens holding the radon.

Normal tissues are packed off with gauze, which is very gently inserted around the radon applicator.

The speculum and forceps holding the radon applicator are *left in the vagina* during the irradiation which lasts from 15 to 30 minutes. In some cases, a treatment lasting 15 minutes may be given.

A double T. binder, dependent from the patient's shoulders, holds the speculum and the forceps carrying the radon securely in the vagina.

Treatments are given as office procedures daily, on alternate days or less often depending on the case.

In a few days or weeks, depending upon the lesion, the external os if obscured comes into view and the cervical canal becomes patent.

Intrauterine irradiation is then given but only as a rule after irradiation from the outer aspect of the cervix has been completed

2. *Intrauterine irradiation.*

The length and shape of the curve of the uterine canal are first determined with a uterine sound. As the carcinoma may extend above the internal os the whole uterine canal should be irradiated.

The radon, varying in amount from 500 to 600 mc., is contained in from 2 to 5 enameled silver radon tubes.

These silver tubes are inserted tandem into a moderately flexible lead tube of the following dimensions: length, 4 or more cm. depending on the length of the uterine canal; outside diameter, 4 mm ; wall thickness 1 mm.

A nickel cap, containing a hole for a ligature, screws into each end of the lead tube. The advantage of the lead tube is that it can be readily bent to conform to the curve of the uterine canal and can then be inserted into the uterus as easily as a sound.

A single treatment lasting from 3 to 4 hours is given.

Dosage. Dosage must be varied to suit the conditions present. The microscopic appearance of biopsied tissue is not a reliable guide to dosage We give the dose which we believe the normal tissue will tolerate without seriously impairing its integrity.

In the lateral fornices and to the end of the cervix, a total dose of from 3000 to 6000 mc hrs. may be given, depending chiefly on the distance of the radon from the tissues.

Treatments ordinarily extend over a period of 2 or 3 weeks.

In the cervico-uterine canal, a total dose of 1800 mc. hrs. may be given in one seance with a lead tube 7 cm. long, containing 600 mc. in 3 enameled silver tubes tandem. This dose should seldom if ever exceeded. If the intrauterine lead applicator is shorter than 7 cm. the dose should be decreased.

Some of the advantages of the technic just described are:

1. *Infection* and discharge are rapidly lessened.

2. *Bleeding* is stopped or at least markedly diminished in the course of a few days. Sometimes slight bleeding persists until after the intrauterine treatment.

3. *The tumor is reduced* largely by the selective rather than the caustic action of radium so that inflammatory reaction in the cervix is not severe.

4. *Pain or distress* from the treatment is negligible or absent.

5. *Hospitalization is unnecessary*, patients as a rule remaining ambulatory and continuing their daily occupation.

6. *No mortality* is caused by procedures incident to treatment.

3. *Radium treatment of pelvic metastases*

The pelvic girdle is practically always irradiated with the radium "bomb" to influence, if possible, metastases in the lymph nodes or elsewhere in the pelvis which may be present but undetected.

It is difficult to determine how much external surface irradiation with radium (or x-rays) improves the final result.

Some authors appear to have a good deal of confidence in transcutaneous irradiation.

Palliation may be achieved in radiosensitive cancer but the cure of deep-seated pelvic metastases by external surface irradiation has not been satisfactorily demonstrated.

Radium "puncture" of adjacent organs, the parametria or lymph nodes is futile and dangerous.

2. PROGNOSIS.

The prognosis of cervical cancer under radium is influenced by a number of factors.

1. *Extent of the disease.* This is one of the most important factors affecting the prognosis.

Carcinoma that has extended widely when treatment is begun is naturally more difficult to eradicate.

A survey of all cases treated with radium throughout the world shows a rate of 20 to 30 per cent of 3 years cures.

The percentage of 5 year cures rises rapidly if the cervix only is involved; falls rapidly if the cancer has left the boundaries of the cervix when treatment is begun.

2. *Clinical type.* The everting (papillomatous) type while more formidable in appearance is more amenable to radium than the inverting (ulcerated) or the sclerosing type.

3. *Histologic type* Epidermoid carcinoma furnishes the greatest number of clinical cures. Cancers composed of transitional cells come next in frequency of cures.

Adenocarcinomas, which form, however, only 2 or 3 per cent of the cases are the least amenable to irradiation. Anaplastic type

of carcinoma are the most radiosensitive but unfortunately metastasize the most readily. Radiosensitivity is not therefore synonymous with curability

4. *Infection.* The cancerous cervix is practically always infected Procedure that dam up the discharge such as "plugging" the cervix with a string of radium tubes or packing the vagina with gauze for a period of many hours at the beginning of treatment may aid the spread of infection.

Proponents of the method of starting the treatment by dilating the cervix and inserting radium tubes which are withdrawn and reinserted daily admit a 2 per cent primary mortality from infection. Radium "puncture" of infected cervical cancer has resulted in death in a number of instances. We believe therefore both of the foregoing methods of treatment are contraindicated.

Vaginal douches for "cleaning up" infection are futile and unnecessary, the short powerful irradiations against the cervix just described being immeasurably more efficient.

5. *Metastases.* If carcinoma has metastasized when treatment is begun or if it is made to metastasize by injudicious examinations or treatment, clinical cure is unlikely.

We are opposed therefore to (*a*) traumatic examinations for determining the extent of the disease, (*b*) "pulling down" the cervix with the tenaculum forceps for biopsy or to test the mobility of the uterus (*c*) partial operations. curettage, cauterizations, electrocoagulation, (*d*) dilation of the cervix for biopsy or the introduction of radium tubes. Any of the foregoing procedures may easily add to the dangers of metastasis by setting free carcinoma cells in the lymph or blood stream.

6. *Hysterectomy.* Should hysterectomy be performed in apparently favourable cases with the idea of subsequent radium treatment?

If the cervix has been excised, the lack of muscular and connective tissue forming the tumor bed impairs the effectiveness of radium.

Hysterectomy itself has a certain mortality and there is a possibility that it may cause metastasis. Our experience with radium treatment after hysterectomy is not favorable

Should hysterectomy be performed after apparent clinical cure under radium?

Surgeons appear to be opposed to this method. Graves states that his "experience with this procedure is distinctly unsatisfactory."

7. *Dosage.* Dosage must be carefully adjusted to the conditions present.

The carcinomatous area may receive too little or too much radium treatment either by the application of radium tubes or by radium "puncture."

If too little treatment has been given at the outset a reapplication of radium may not be effective.

If too much treatment has been given so that radium necrosis has been produced, further treatment is made difficult or impossible even though carcinoma may persist at the edges of the necrotic area.

8. *Anatomical conditions* Anatomical peculiarities such as vaginal stricture prevent free access to the cervix thus rendering the application of radium more difficult.

General conditions. Syphilitic patients do not as a rule respond well to radium treatment We have not found that valvular heart disease with decompensation is an unfavorable factor so far as the effects of radium are concerned.

3 RESULTS.

Few things in medicine are more dramatic than the healing of the average cervical carcinoma under conservative radium treatment.

Usually the symptoms and signs disappear and patients gain remarkably in strength and weight If fatalities occur from carcinoma they are due as a rule to metastasis: more rarely to the local disease Death may be caused by uremia from pressure of metastatic deposits on the ureters.

In our series of 60 consecutive unselected cases (clinical and microscopic diagnosis) treated by the method outlined between June 1927 and June 1934, 24 (40 per cent) have remained clinically free of carcinoma for periods of from 5 to 9 years.

In our series of 88 consecutive unselected cases (clinical and microscopic diagnosis), treated by the method outlined between June 1927 and June 1936, 40 (45 per cent) have remained clinically free of carcinoma for periods of from 3 to 9 years. A more detailed report of these cases is now being prepared.

(*Illinois Medical Journal Jan. 1939*).

THE PRINCIPLES OF THE TREATMENT OF INJURIES.

T. T. Stamm, Assistant Orthopaedic Surgeon at Guy's Hospital, and Assistant Surgeon, Royal National Orthopaedic Hospital, writes an article for the *Journal of Massage*, October, 1939, on the very simple fundamental principles which should form the basis of the treatment of all injuries, whether of bones, joints, or muscles.

It is interesting and instructive to trace the development of the treatment of injuries and allied conditions of the limbs from the

nineteenth contury to the present day. During the last century tuberculosis of joints was a very prevalent condition and the disasters which followed its active treatment, and the difficulties of accurate diagnosis led physicians to treat all joint conditions by rest and splintage. This form of treatment was further encouraged by a too literal interpretation of Hilton's famous and classical work on rest and pain. As a result, stiffness and loss of function were regarded as almost an inevitable result of the treatment of any painful condition affecting a limb.

Later, in an attempt to prevent this stiffness of the joints, the cult of early movement arose, and while the injured part was still rested as far as active use was concerned, passive movement of the joints was instituted early in the treatment. Unfortunately, although this line of treatment ensured relief from pain as long as it was continued, great stiffness of the affected limb was the inevitable result, and on account of the wasting of the muscles from disuse, function was slowly, if ever, completely regained.

Thus the two schools of "rest" on the one hand and "early movements" on the other arose, and though they alternated in popularity, no advance was made and stiffness of the joints remained the common sequel of any injury to the limbs. At the same time the legions of the bonesetters multiplied and prospered on our bad results. In recent years, however, largely as a result of the interest aroused by Lorenz Bohler's work on fractures, our attitude towards these conditions has been revolutionized and at last put on a sound basis.

In order to understand the rationale of the modern treatment of injuries' it is necessary to consider the various changes that occur in a limb after it has sustained an injury. The injury, whether it be a fracture, sprain, or dislocation, results in discontinuity of tissue with rupturing of blood-vessels. As a result, haemorrhage occurs into the substance of the limb, and the damaged parts and the surrounding tissues both become infiltrated with the effused blood and lymph. This blood and lymph is either gradually absorbed back into the circulation, or else is organised in situ and gradually transformed into fibrous tissue or, in certain situations and under certain conditions, into bone. Where the blood lies actually between the two ends of the torn or broken structures, this organization is beneficial for it is the means by which healing takes place, cementing together again the two ends oI the damaged structures: of bones by the gradual formation of new leaves but of all other structures by the formation of fibrous tissue. Elsewhere in the limb organization of the effused blood into fibrous tissue is clearly harmful, for it will bind together the various structures in the limb and prevent free play between them. It is, in fact, the cause of the subsequent stiffness of the limb. Lastly, as a result of the inability to use the

limb after an injury, there will be a gradual wasting of the muscles with subsequent loss of function when healing has taken place.

Thus, in the treatment of injuries, there are three problems to be considered:

1. To ensure proper healing of the damaged parts;
2. To prevent subsequent stiffness of the limb; and
3. To prevent wasting of the muscles with resulting weakness and loss of function.

The Conditions of Proper Healing.

The process of healing after an injury consists in the gradual transformation of the blood clot lying between the torn or broken ends into fibrous tissue or bone, so that they are joined together again and continuity of the tissues is regained. This process of organization begins by the formation of minute new blood-vessels, which grow out from the torn surfaces and eventually unite with one another across the gap. Young fibrous or granulation tissue is then formed around them, and this gradually matures to form dense white scar-tissue, though in the healing of fractures the granulation tissue is converted into callus and finally bone. The essential step is the meeting and linking-up of the two sets of blood vessels from the opposite sides of the break. Once this has occurred, the tissues are joined, though not yet healed. If any movements between the broken surfaces are allowed at this stage, these minute new blood-vessels will be continually torn and prevented from meeting across the gap, and they may eventually give up the attempt. A no-man's-land will then be formed across the gap and the fracture will fail to unite. Further, the closer and more perfect the apposition between the broken ends, the less the amount of new tissue required to unite them again, and therefore the sooner will the process be completed.

To ensure satisfactory healing therefore the essentials are to ensure first that the torn or broken surfaces are brought into as close and perfect apposition as possible, and secondly that they are maintained in this position without any movement until healing is complete. The answer to our first problem then, is perfect reduction followed by complete rest to the damaged part with adequate splinting.

The Prevention of Stiffness.

The stiffness in a limb, which is such a common sequel to the treatment of all injuries, is due to the transformation of effused blood into scar-tissue. This change is bound to take place unless the blood is rapidly absorbed back into the circulation. Whether this occurs or not depends entirely upon the state of the circulation in the part, for the better the circulation the sooner will all exudates be absorbed. The state of the circulation in a limb depends in turn almost entirely upon muscular activity—granted of course that the heart is normal. Thus, in order to accelerate the local circulation and ensure that effused blood and lymph is rapidly absorbed before it can become organized, the muscles of the limb must be constantly and actively exercised; and the best form of exercise is functional use.

Thus, the answer to the second problem is to ensure that the damaged part is splinted in such a way as to allow the maximum amount of functional use of the limb without endangering the immobilization of the damaged part itself: and then to ensure that the limb is activity used. In special situations where the difficulties of immobilization render functional use impossible, special active exercises, designed to bring as many muscles as possible into play, must be employed. If even this is impossible, faradism to the muscles must be used, but this is a very poor substitute for active exercise. Natural functional use is the most efficient means of stimulating the circulation, because most of the natural uses of a limb are rhythmical, and the alternating contraction, and relaxation of the muscles achieves a powerful pumping effect.

The last problem, that of preventing weakness and loss of function, has now solved itself, for if the muscles are actively used throughout the healing period, wasting will not occur. Further, the oedema which so often persists for a long time after an injury will also be prevented if the efficiency of the circulation has been maintained.

The fallacies in the two beliefs of "rest" on the one hand and "early movements" on the other now become clear. With complete rest to the limb, although healing of the damaged part may proceed satisfactorily, the effused blood and lymph will not be reabsorbed but will remain in situ until organised into fibrous tissue, which inevitably causes subsequent stiffness. Passive movements can only cause further trauma to the damaged part and further bleeding, while doing nothing to promote absorption of the exudate, and they will therefore also lead to ultimate stiffness in the limb. Thus those who believed in complete rest were correct as far as the injured part was concerned, but they appreciated only half of the story. The cult of early movements was wrong in all respects, for while hindering the healing of the injured part it could in no way help in the reabsorption of the exudates.

The fundamental principles, then, for the treatment of all injuries, whether of bones, muscles, or tendons, may be summarized as follows:—

1. To immobilize the damaged part with the torn or broken surfaces in close and accurate apposition.
2. To effect this immobilization in such a way that the maximum amount of use is permitted to the whole limb.
3. To ensure that the limb is in fact actively used during the period of healing.

We can now consider examples of the practical application of these principles to some common types of injury.

THE COLLES FRACTURE.

Fracture of the lower end of the radius affords an excellent example of the ideal application of these principles. After proper reduction of the fracture a plaster cast is applied, extending distally to the metacarpal heads but leaving the thumb and fingers free. Proximally it extends up to, but does not as a rule include, the elbow-joint. The fracture is thus effectively immobilized. The patient is now taught to use the limb for all ordinary activities As the fingers and thumb have been left free, he is able to exercise all the muscles of the forearm with the exception of those acting on the wrist-joint. In actual fact these muscles also will be exercised, owing to the phenomenon of reciprocal action: when the fingers are actively flexed the extensor muscles of the wrist contract at the same time in order to steady it. This reciprocal action will continue even though the wrist itself is fixed in plaster. Thus by active use of the fingers and thumb and by active movements of the elbow, all the muscles in the limb are effectively exercised. If the patient will then persist in using the limb during the whole period of immobilization there need be no fear of subsequent stiffness of the wrist. In fractures of the carpal scaphoid it is often necessary to immobilize the wrist for months on end; yet if the patient uses the limb during this period, movements of the wrist joint are found to be almost normal when the plaster is finally removed. On the other hand, if for some reason the fingers and thumb also have to be immobilized, marked stiffness of all the joints may supervene in a few weeks, as there is then no chance of the effused blood being absorbed and it is therefore organised in situ into fibrous tissue.

It is absolutely essential for the patient to attend a masseuse daily for the first few days after application of the plaster, in order to be taught how to use the limb. No patient will have the confidence to do so unless encouraged and instructed, as the patient knows he has broken a bone and will not dare to move it of his own accord. It is quite useless to tell a patient to go home and use the limb—he never will. It is regrettable that so many masseuses now say that, owing to plaster technique, they do not see recent fractures. It is even more necessary to provide adequate supervision with plaster than with the old methods of using splints; otherwise our third principle of treatment is not observed and the ultimate stiffness and disability may be as great as with any of the older methods.

SPRAIN OF THE ANKLE.

The common so-called sprain of the ankle is really of course a sprain of the subastragalar joint. In this injury the ligaments on the outer side of the ankle are torn, and there is often a considerable amount of swelling due to the effusion of blood and lymph. The

damaged ligaments must be immobilized and protected from strain until healing has occurred. This object can usually be effected with strapping, the subastragalar joint being fixed in the position of rest—that is, with the foot square to the leg, neither everted nor inverted. Movements of the ankle-joint are left free. The whole leg must now be actively used and exercised. This purpose is best served by encouraging the patient to walk as soon as possible. In this way the circulation will be maintained and the exudate absorbed; stiffness will not supervene, and the all-too-common condition known as "chronic sprain" will be prevented.

It is rather humiliating to remember that these principles, the importance of which we are only just realizing to-day, were fully realized a century ago by a well-known bonesetter who summed up the treatment of sprains in three words: rub, strap, and use.

POST-OPERATIVE TREATMENT.

The intentional injuries which are produced by operations upon joints should be treated in the same way as accidental injuries. Operations upon the knee for the removal of a semilunar cartilage, afford a good example of this type of injury. In this operation apart from anything that is done inside the joint, an incision is made in the capsule. This must therefore be immobilized until it has healed, and movements of the knee should not be allowed until it has had time to do so. On the other hand, in order to prevent subsequent stiffness, active exercises for the whole leg should be instituted from the first day after the operation. These should include active straight leg raising to exercise the quadriceps muscles. As lack of tone in this group of muscles is common after operations on the knee, the patient should not be allowed to walk until normal tone has been regained so that the muscles are capable of controlling the joint. The patient may be allowed to walk as soon as he can actively raise his leg against the resistance of the loose bed-clothes. He can usually do this on about the fifth day after the operation. He may then be allowed to get up and walk, but he must be warned only to move the knee as far as feels comfortable. Full movements will be rapidly regained as soon as healing has occurred, and function is usually complete in three weeks.

Here again the old controversy of "early movements or no early movements" is quite beside the point. Of course there must be no movements of the damaged part until it has healed; but this does not mean that the whole limb must be rested. The question: "Do you believe in early movement?" is still too often asked. The answer is "No, but I do believe in early use."

ELECTROSURGERY AND RADIOTHERAPY FOR BREAST CANCER.

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Cancer appears to be the most important single disease attacking the human race today. While the death rate from disturbances of the heart and circulatory system leads all other diseases, cancer is a close second. Furthermore, if we eliminate those cases where vascular disturbances are terminal manifestations of other diseases, then cancer becomes first.

The number who die annually from cancer is appalling. It has been stated that for every death from cancer there are two persons living who possess cancer. This would indicate that there are more than a quarter of a million people living, with cancer, in the United States. It has also been estimated that there are living an equal number of persons with benign tumors; therefore, there are approximately one-half million people in the United States with a tumor of some sort.

What course can the medical profession best pursue in offering aid to this great group of patients?

The mortality rate from tuberculosis 20 years ago stood next to that of the circulatory diseases. In the meantime, through public education, early symptoms have been pointed out and the scientific developments in hygiene, general care and medical treatment of the tubercular patient has reduced it from the second to the seventh place. I am inclined to agree with McCarty, who states "There are enough known facts, if properly and extensively applied, to solve the cancer problem." We may, therefore, be encouraged in our approach to the solution of the problem of cancer by the example of the accomplishments in the control of the "Great White Plague."

BREAST CANCER.

Progress has been made in the control of carcinoma of the breast, but the results of our efforts as a whole are far from satisfactory. In the treatment of malignant conditions in general, we find breast cancer one of the most difficult to handle. As pointed out by Pfahler, speaking before the Fifth International Congress of Radiology, "The operative mortality as reported from the Bilroth Clinic 50 years ago was 23 per cent and the 3 year cures were only 4.3 per cent while today operative mortality varies from less than 1 per cent to 5 per cent and the 5-year cures vary from 70 per cent in Stage I to 23 per cent in Stage II (no longer encapsulated within the breast), and almost nil in Stage III." In his work on neoplastic disease, James Ewing says. "From clinical and pathological studies I have drawn the impression that, in dealing with mammary cancer, surgery meets with more peculiar difficulties and uncertainties than with

almost any other form of the disease. The anatomical types of the disease are so numerous, the variations in clinical course so wide, the paths of dissemination so free and diverse, the difficulties of determining the actual conditions so complex, and the sacrifice of tissue so great, as to render impossible in a majority of cases, a reasonably accurate adjustment of means to ends." The management of breast cancer is made increasingly difficult because a certain number of cases will develop metastasis while the primary tumor is yet exceedingly small. Furthermore, the primary site is accessible to accidental trauma and injuries by palpation, as well as damage through physiological phenomena, all of which contribute greatly to early metastasis.

A new era in the treatment of this disease was established in 1888 when those famous surgeons, Halsted and Willy Meyer, working independently, recorded their methods for radical amputation of the malignant breast. The advantage gained through electrosurgery has probably been our greatest contribution to the surgical technic they advocated. Another contribution was introduced when irradiation was proven to be a useful adjunct to surgery.

Radiotherapy is becoming increasingly useful because of technical refinements which have resulted from more perfectly designed equipment and years of clinical research in medical radiology.

Electrosurgery, while not new, has entered the field of surgery with great impetus because really skillful technic has become possible through the use of highly efficient surgical current generators.

With these advanced modalities at our command efficiency in the control of breast cancer has been materially increased.

DIAGNOSIS.

In the diagnosis we must use all available means in an effort to detect the true situation in the breast, and we must also include a general examination of the patient and such other special examinations as may seem consistent, after the clinical history and the general physic findings have been considered. Physicians who are making clinical examinations of patients should acquaint themselves thoroughly with the practical points in the diagnosis of breast conditions and then they should consider themselves morally bound to pursue further any clue that may be developed in their findings until a correct conclusion can be established.

In every discussion of the diagnosis of breast conditions, it is well to enumerate the principle symptoms to be found when cancer is present. I will give them in the order of what appears to be those of greatest frequency and significance:

1. A lumb in the breast.
2. A retracted nipple.
3. Diffuse enlargement and increased density.
4. Pain in the breast.

5. Bloody discharge from the nipple.
6. A lump in the axilla, supra-or infra clavicular region.
7. Erosion of the nipple.
8. Ulceration of the breast.
9. Nodules in the skin.
10. Pruritis of the areola and nipple.
11. Inflammation of the breast.
12. Dimpling of the skin at any point of the breast.
13. Swelling of the arm.
14. Deep, boring bone pains in any location.

There are many other symptoms more infrequently found that are related directly or indirectly to breast cancer. It is obvious that a lump in the breast is the most important finding in the diagnosis of the malignant breast. In three out of every four cases is the only symptom. In the examination of a large group of patients who have discovered a lumb in the breast, the responsibility assumed by the physican becomes very great. It is exceeedingly important, before special investigations have been completed, to give careful consideration to the general clinical and physical findings and they should also be properly correlated with the history.

In a very large portion of the cases the findings by palpation and inspection are of such a character that the diagnosis of cancer becomes almost certain, e. g., when a localized tumor mass is encountered, in which the skin has become involved or where it is undergoing fixation to the deeper tissues of the thorax, the suggestion of a malignant tumor becomes very strong. In addition to palpation and inspection, we must take into consideration the segment of the breast in which it is located, its relation to the other structures of the breast, the findings in the axilla, the supra- or infra-clavicular spaces, as well as the opposite breast.

Transillumination in the diagnosis of breast tumors, as first suggested by Ewing, has proven to be helpful in determining their location, size and relative light density. Blood is always dark in transillumination; therefore, hematomata and hemorrhagic cysts show very clearly. Hemorrhage created by aspiration biopsy or trauma of any character may be detected. Small dark shadows near the nipple often prove to be papillary cystadenoma, especially when found in conjunction with nipple dsichargo. It is not possible to differentiate carcinoma from fibrous mastitis and other benign lesions, consequently the evidence derived from transillumination must always be taken into consideraiion with other data.

Radiography of the breast has become an interesting and quite useful field of investigation in breast tumor diagnosis. Radiographic technic requires utmost care. It is not practicable to adopt a routine technic for all cases because the anatomical variations are so great.

When the findings are studied in the light of the information that has been so carefully recorded by Warren, Lockwood and others, they form a very important part of the general diagnostic data. Mammography and aeromammography indicate x ray examinations of the breast after introducing contrast material into the laciferous ducts or other tissues of the breast. The investigations in this field, as introduced by Hickens, constitute a new factor in the diagnosis of conditions of the breast. It would appear that this field may bear new and useful aids in diagnosis as research investigations are extended.

BIOPSY.

Of all the methods of investigation in the diagnosis of cancer of the breast, a biopsy is the most satisfactory. The object of a biopsy is to secure a suitable piece of tissue from which a satisfactory microscopical report can be obtained with the least possible harm to the patient. Admitting that there is much to be said against a biopsy of any form for the diagnosis of breast cancer we must all admit that it gives the physician who is responsible for the treatment and management of the case data which more than any other indicates the form of therapy best suited to the particular requirements of the individual, and it goes far to make better prognosis. In fairness to all methods it must be pointed out that a biopsy does not always yield conclusive evidence, and that, regardless, a certain number of lesions will remain undetermined, even after biopsy of any form. Quoting Ewing, "A lesion may be neither cancer nor not cancer. It may be in the process of becoming cancer, and in these intermediate phases it may be impossible to determine just where the lesions belong." It is not the purpose of this paper to go into the problem of microscopical diagnosis of tumors other than to say that it is indeed a very difficult field, even for the most experienced tumor pathologist.

The methods by which a biopsy may be performed become exceedingly important in breast diagnosis. The aspiration biopsy in use for many years, but applied with new impetus in tumor diagnosis by Martin, Stewart and Ellis of the Memorial Hospital in New York City, becomes of great value when applied with proper technic. The method is advocated almost routinely in these examinations by such men as Adair, Pack and others, who believe there is no essential danger, as it is performed in their work. It must be conceded, however, that there are some very definite limitations to aspiration biopsy in breast diagnosis. Large cellular tumors will yield an abundance of material, enabling the pathologist to make a positive diagnosis. The scirrhous form of cancer and small hard nodules are more difficult to aspirate without undue squeezing manipulations of the tumor, which obviously tend to push malignant emboli toward the axilla. As pointed out by Adair, the 18-gauge needle entering

the tumor does not tear the tumor capsule and is therefore less liable to distribute malignant cells than biopsis with instruments especially designed for the punch method, etc.

Surgical biopsy, in certain cases, is warranted. For this form of biopsy, electrosurgical tecnic seems almost imperative. The skin incision and the entire resection should be done with cutting currents and all hemorrhage controlled by electricity, not with ligatures. When it is decided to remove a portion of the breast which contains the entire tumor mass, utmost care should be taken in placing traction instruments on the part being removed in order to avoid crushing and the subsequent dissemination of malignant cells which may otherwise be held in situ. The margins of the incision must be protected with gauze throughout, as the operation progresses. This will aid in preventing the implantation of cancer cells into the incision before closure. The very great importance of these precautions is obvious when we consider the ease with which cancer cells may be expressed from the tissue during operative manipulation.

It is not desirable to cut into a tumor mass during a surgical biopsy. It may be undertaken, however, with electrosurgery more safely than with standard methods of surgery.

When the tumor has a marginal location in the breast, a V-shaped mass of breast tissue should be removed well beyond the margins of the tumor. In closing, a small, plain gauze or Penrose drain should be inserted and the skin coapted with metal clips. No attempt should be made to obliterate space beneath the skin with ligatures. The post-operative dressing should include moderate but adequate compression with fluffed gauze in order to approximate the skin and subcutaneous tissues with the underlying structures. Avoid the use of artery forceps or any crushing instrument on tissues not removed.

When the tumor has been removed, it should be incised with a sharp knife. If it is found to appear as dense cicatricial tissue with the characteristic chalky streaks on the cut surface of the tumor, the pathologist is justified in recommending complete enucleation of the breast without waiting for the confirmation of frozen sections and further microscopical diagnostic assistance.

TREATMENT OF BREAST CANCER.

Because there are so many conditions which produce wide variations in the character of the malignant breast, there can be very little uniformity in technic for therapy. In deriving a plan of management it is well to consider:

1. The patient's true state of general health and all measures for elevating and maintaining it at as high a level as possible.

2. Pre-operative irradiation of the breast and to the lines of lymph drainage from the part involved.

3. The removal of the breast, if it is considered operable, using the most advanced technic in the field of electrosurgery.

4. Post-operative radiotherapy following a technic that has been carefully planned to meet the requirements of the case. This will necessitate further consideration of the character of the pre-operative radiotherapy and a conference with the pathologist who has completed his study of the tissues removed and who has determined its malignant grading.

Pre-operative radiotherapy should begin as soon as a reliable diagnosis of cancer has been made, regardless of the stage of the disease. All doubtful cases should receive irradiation while diagnostic methods are being completed.

Any attempt to employ a standard routine technic for pre-operative radiotherapy seems impractical. The technic must be modified from case to case because of the variations in the stage of the disease, the anatomical variations (e. g., the flat or pendulous breast the age, the general health of the patient, the malignant grading, etc. The essential requirements are proper training and experience in radiotherapy and the availability of apparatus designed to meet the demands It appears that supervoltage or especially hard rays certainly are not being given serious consideration at this time in this field of therapy. So far as I am aware, no one has recommended the use of voltages above 200 k v. In general, the requirements are a beam of x-rays with a half value layer of approximately 0·5 mm of copper for the breast and 0.75 or 1.0 mm. of copper half value layer for the axilla and clavicular portals. A desirable plan is to aim to give 400 to 750 r into the breast each week for two weeks by the short method and four weeks by the longer method. In the full sized breast (15 centimeters) this may be given through two tangential breast portals, administering approximatety 200 r, measured in air, or 260 r, measured on the skin, per day for 5 or 6 days of each week. Through the axillary portal and the anterior and posterior clavicular portals the depth dosage must be brought up to at least 1,000 r also during the period of the treatment of the breast portals.

In some cases it appears well to establish an artificial climacterium. This requires the administration of approximately 750 r within the pelvis. One extra week is necessary for this treatment after the pre-operative breast irradiation and before the operation is done.

It will be observed that by the short method the operation may be done 21 days after the pre operative radiotherapy was started, except where the extra week is taken for producing an artificial climacterium, when it is advisable to delay the operation until 28 days after the pre-operative radiotherapy was started.

In cases where the longer pre-oparative radiothreapy is planned, the total dose into the breast will reach 75 or 100% more and consumes 4 weeks, and 5 weeks when the artificial climacterium is produced. With this amount of radiotherapy, operation should be withheld until 3 or as much as 6 weeks have elapsed following all radiotherapy.

Where the short method of pre-operative radiotherapy is employed, it is intended that the operation will be followed by post-operative radiotherapy. Where the long method of pre operative radiotherapy is employed, post operative radiotherapy may be withheld. In all treated cases, regardless of the plan of management, frequent observations must follow in order to detect early any development requiring further attention.

SUMMARY AND CONCLUSIONS.

Radiotherapy may be employed to an advantage in practically all cases of breast cancer. In Stage I it may be omitted since we can expect more than 70 % of 5-year good results with surgery alone. However, it is advisable to give post-operative radiotherapy in all cases with the possible exception of those cases where long pre-operative radiotherapy has been given. When all Stage I cases are carefully studied for those in which radiotherapy should be used, we can expect to improve the results of surgery alone by more than 10%.

Electrosurgery should be employed in all breast surgery.

From the statistics it appears that we can expect about 23% of 5-year cures in Stage II with surgery alone. With combined pre-operative radiotherpy, electrosurgery and post-operative radiotherapy the 5-year record will reach 40 to 50%.

In Stages III and IV the radiologist should exercise his best ingenuity in the effort to administer palliation. The frequency of treatment, the rate of administration and the total dosage must be directed with care along with such other treatments as may be helpful in maintaining the patient's general resistance and state of nutrition. Even in certain far advanced cases surgery may favorably supplement radiotherapy. It must also be remembered that in Stage III and IV cases radiotherapy alone does effect palliation in a large number and 5-year cures in a few cases.

(*Southwestern Medicine, Jan. 1940.*)

Extracts.

THE "ABUSE OF PURGATIVES."

Hurst opines that one of the commonest disorders of the present day is that which results from the abuse of purgatives. It is twice as common in women as in men. The patients complain of what they call constipation, but when asked for details they admit that their stools are always unformed, being either soft or liquid—in other words, they are not suffering from constipation but from diarrhœa. Many have not passed a formed stool for years. Frequently they have been told that they had colitis because of the presence of mucus in the stools, whereas in truth the mucus is the response of a still healthy mucous membrane to the irritant action of the purgative, as it disappears directly the latter is discontinued. All have abdominal discomfort associated with flatulence and distension, and some have attacks of colicky pain. Many have had their appendix removed for these attacks, either with no result at all or with aggravation of their condition. In addition to the abdominal symptoms they always feel tired, have no appetite and are frequently subject to headache. Some have been taking a comparatively small amount of purgatives, other gigantic doses, such as 30, 40 or even 60 senna pods every night. Most of these patients begin to take purgatives on their own initiative because they think they are constipated. In many cases this is not because of any irregularity in the action of their bowels, but because their symptoms remind them of what they have read in advertisements for patent medicines.

Hurst had the opportunity of treating a great many of these patients, and it is remarkable how rapidly the majority can be cured. They are taken off their aperients and at first given liquid parafin or some non irritating vegetable mucilage. Many already know from past experience that both their abdominal and general symptoms will disappear at once, but they have been frightened to persevere because of the almost universal belief in the dangers of constipation. The symptoms disappear because they are a result of the toxæmia caused by the artificial diarrhœa produced by purgatives and not of constipation, which may cause local discomfort and much anxiety to the patient, but rarely gives risk to toxæmia, as hard dry fæces do not undergo bacterial decomposition. A purgative upsets the delicate mechanism of the ileocæcal sphincter, which normally results in the complete digestion of food in the almost sterile small intestine, in which the products are absorbed without undergoing bacterial decomposition. When a purgative is taken a good deal of semi-digested food passes through the ileo-cæcal sphincter and fills the entire colon, which is swarming with bacteria. These flourish

excessively as the faeces are fluid instead of semi solid or solid as they are under natural conditions. Putrefaction of proteins fermentation of carbohydrates and bacterial decomposition of fats occur, and the toxic products are absorbed. The liver is often able to render them inert and the kidneys to excrete what has escaped the liver, but if either of these organs is inefficient or if the purging is continued over long periods toxic symptoms occur. The treatment of constipation was revolutionised by the introduction of agar agar and liquid paraffin. In his opinion of the various vegetable mucilages agar agar, isogel, coreine and normacor are about equally effective. These mucilage are completely indigestible and swell in the presence of water to make a soft jelly. A teaspoonful taken once or twice a day is the most satisfactory means of making the faeces sufficiently soft and bulky to render defaecation easy and complete. Paraffin acts in the same way as the mucilages, but is less easy to take; it sometimes causes intestinal flatulence and may leak from the rectum apart from the fæces. It also tends to make defaecation fragmentary. Proctoscopy reveals a perfectly clean rectum when a vegetable mucilage is taken, but with paraffin sticky faeces are always seen adhering to the mucous membrane and sometimes a lake of oil is present just above the anal canal. There are some patients who are constipated and in whom the treatment of vegetable mucilage and liquid paraffin is ineffective. Many people are suffering from some more serious disorder, such as myocardial disease or hyperplesia, for whom it is desirable to make defaecation easy.

In spite of innumerable purgatives on the market Hurst recommends a *cold infusion* of senna pods. He believes it is unique in that it acts upon the colon only. It increases the rate of passage through the colon but not through the small intestine, so that the excessive fermentation and putrefaction in the colon which follow the use of other purgatives is not produced. One of the great advantages of senna is that the patient can easily regulate the dose from day to day according to his requirements. The required dose is found by experiment; beginning with six the number of pods is increased or diminished until the number is found which produces single formed stool the following morning. In many cases it is possible to re-educate the bowel by reducing the number of pods used by one every other day from an initial dose of perhaps eight or ten till the bowels act with none at all. Senna is sometimes said to produce colic; this can be prevented by using a *cold infusion* and, if the colic still occurs, adding 10 to 15 minims of tincture of belladonna. He concludes by saying that the abuses of purgatives are many and uses few.

(*The Clinical Journal*, June. 1939, Page 219).

TREATMENT OF DIPHTHERIA.

According to Faulkner the aim of employing antitoxin in diphtheria is to accomplish (1) neutralization of all free toxin circulating in the body fluids and that which has already united with the tissue cells (2) destruction of diphtheria bacilli and (3) supplying the patient with enough *excess* antitoxin to neutralize more toxin that may be produced. Since the severity of tne disease varies, no set rule can be given for the exact amount of antitoxin to be given. The physician must be guided by the clinical condition of the patient. However, he recommends in mild cases and in infants, only 5,000 units of antitoxin, though some authors maintain that a standard dose of 10,000 units is enough to begin with in any case and more if necessary. This dose of 10,000 units is an excess of antitoxin for mild cases but is not enough for severe cases. Some recommend 30,000 units for moderate cases and as much as 100,000 units in severe cases. The preferred site of administration is the outer aspect at the junction of the middle and upper third of the thigh. Here it is given intramuscularly. The relief following the intravenous injection of antitoxin starts three or four hours for the administration; while from eight to twelve hours are required for the action of antitoxin when it is given intramuscularly. In severe cases to obtain rapid effect and to save life the toxin has to be given intravenously. Delayed administration of the antitoxin is a serious matter and should never be practised unless the case is observed very closely. Far less harm is done by the administration of antitoxin than by unnecessary delay. Any patient with marked laryngeal symptoms should be hospitalized because in these patients a tracheotomy may become necessary. Though the dangerous shock from antitoxin therapy is very rare the patient showing signs of shock is given an injecion of adrenalin and the tourniquet is applied proximal to the site of injection and the antitoxin is allowed to be absorbed slowly. The injection of adrenalin at the sight of injection is also advantageous when symptoms of shock develop. Every child with mild laryngeal obstruction and a white membrane on the pharynx should be tested for sensitivity of serum without hesitation. One tenth cc of the antitoxin is injected intradermally after diluting it 1 : 10, and the action determined in 20 minutes. If the patient is not sensitive the whole amount is administered intramuscularly As a rapid method of desensitization he recommends the following :—At 20 minutes intervals 0·1 cc. (diluted 1 : 10) intradermally, 0 1 cc (diluted 1 : 10) subcutaneously, 0·5 cc. (diluted 1 : 10) subcutaneously, I cc. (diluted 1: 10) subcutaneously 0 5 cc. (undiluted) intradermally, 0 5 cc. (undiluted) subcutaneously, 0·5 cc. (undiluted), intramuscularly. and the remaining antitoxin in one cc. doses intramuscularly (each such

injection is given after an interval of 20 minutes). Technically speaking, the patient is not desensitized but the threshold for the antitoxin is merely altered so as to permit its safe injection. In very severe cases as much as 50,000 units may be given safely, some intravenously and the rest intramuscularly. In general treatment, he recommends that the patient be allowed to inhale aromatic vapours in a croup (steam) tent. Plenty of orange juice should be given because in the presence of ascorbic acid the toxin produced by B diphtheria is destroyed. The diphtheritic heart should be treated with glucose and small amounts of insulin. Morphine may be given for rest of the mind and body. Throughout, the rest for both is essential. Digitalis is both unnecessary and is contra-indicated and may be dangerous because it may hasten "heart block."

(*Archives of Pediatrics*, Jan. 1939. Page 27)

MODERN TREATMENT OF THE COMMON COLD

After describing the structure of the nose W.K. Russell recounts three stages in acute coryza. First, the dry ischaemic stage which generally lasts for about 24 hours. There is a dryness with a feeling of rawness in the nose, nasopharynx, over the soft palate or in the larynx. This is most frequently felt in the morning on awakening. This is followed by the second, or early catarrhal stage, when the mucous membrane becomes very swollen, causing nasal obstruction and generally leading to mouth breathing. There is a feeling of fullness in the nose. There is a copious discharge of a clear, colourless solution which is very irritating, and often causes soreness of the edges of the nostrils. Swallowing may become painful. The voice is hoarse and sometimes has rather a nasal twang due to impaired resonance. There is generally lachrymation and attacks of sneezing. Taste and smell are impaired and the appetite is capricious. In about 36 hours the nasal secretion becomes turbid and more profuse. In the third, or purulent stage, the swelling of the mucous membrane subsides and the discharge changes in character and becomes viscid and muco-purulent and very difficult to dislodge and eject. The condition may persist, if untreated, for two or three weeks, or even longer.

Following Dochez's work, it is now generally agreed that the chief cause of coryza is an ultra-microscopic, filter-passing virus. The nasal infection may spread to various neighbouring areas, and the accessory nasal sinuses are especially liable to become involved.

Prophylactic Treatment:—A great deal can be done to prevent colds. The general resistance against infection can be raised in a number of different ways. An abnormal amount of clothing should not be worn. Underclothes should be light, loose and porous. Rooms should not be overcrowded. They should be well ventilated. The breathing of cold air does not cause colds. Out-door exercise is another important factor in the avoidence of colds. It is helpful to sleep out of doors. Air and water baths are of great value. Cold sprays or baths should always be taken, provided they produce a healthy skin glow afterwards. They should be avoided by those who become cold, shivery and blue. Turkish and Russian baths are also of great value. They induce free sweating and help to improve the physiological condition of the skin. The diet must be suitable; at least one pint of milk a day and adequate amounts of first-class proteins, vitamins and certain minerals.

Ultra-violet irradiation is now agreed to be of prophylactic value so far as colds are concerned. These rays stimulate the sympathetic system which controls the circulation of the skin. The blood supply is thereby increased, the nutrition of the dermal and epidermal cells is improved and as a result the skin becomes warmer and physiologically more active. A more satisfactory adjustment to environmental temperatures develops and hypersensitivity to cold ceases. The prophylactic value of ultra-violet irradiation has been proved by various experiments carried out among the factory workers and school children.

The next important thing is to correct the abnormal narrowing of the nasal passages, because this predisposes to infection. Adenoids, polypi, deflected septa and enlargement and malformation of the turbinate bones should be attended to. In the course of operative treatment the mucous membrane should be damaged as little as possible.

Since a person's resistance to cold can be markedly lowered by breathing air containing excessive amounts to dust and other irritating particles, care should be taken to avoid these conditions as far possible.

The prophylactic value of anti catarrhal vaccines is doubtful.

Curative Treatment.

The curative treatment can be medicinal which can be given internally or applied locally, or alternatively, physical agents may be used to act on the whole body or locally on the nasal cavities.

Ordinarily the use of antipyretics cannot be justified. The aim of local treatment is to reduce congestion, promote or restore ciliary function, and destroy pathogenic organisms. The cilla making 250 cycles of movement a minute maintain a protective covering of mucus over the surface of the epithelial cells and effectively aid the

drainage of the cavities. Many of the substances which are frequently used in the treatment of cold actually cause destructive changes to the mucous membrane and by impairing ciliary activity favour increased infection These substances can be divided into three groups local anæsthetics, antiseptics, and vaso-constrictors. The chief local anæsthetics are cocaine, camphor, eucalyptus, thymol and menthol but even in such weak solutions as 0·5-1 per cent they slow or completely paralyse ciliary action for a time. Antiseptics, such as diachloramine merithiolate, mercurochrome, metaphen and 2 per cent zinc sulphate all cause ciliary paralysis, and solutions of silver nitrate actually destroy the epithelium. Vaso-constrictors such as adrenaline, benzedrine and ephedrine, should not be used to reduce the inflammatory hyperæmia which is Nature's way of combating infection. In the later stages of neglected cold the author recommends 1 to 3 per cent. solution of ephedrine sulphate in normal saline to reduce congestion and promote drainage. In this stage it does not affect the cilia. It can be used most effectively in an atomised spray. Another preparation which is of value is Glogg's solution, a mixture of soft paraffin one part and liquid paraffin 3 or 4 parts.

A cold can often be aborted by the induction of free sweating. This can be done by means of Turkish bath, but a foam sweating bath, and other form of steam bath or electrical apparatus with Wilde's pyretic couch, is also of value. The use antipyretic drugs is undesirable. If the cold is associated with a rise in temperature the patient should always be kept in bed until the fever subsides. Acute coryza is very infectious in early stages

Ultra Short-Wave therapy is a valuable method of local treatment at our disposal. One application of ultra short waves generally cures a cold, provided that the treatment is given in the first stage, when the inflamed mucosa is dry and free from secretion and before the nasal passages have become occluded. The most suitable appratus for the administration of the treatment is a valve machine, working on a 6 metre wave-length and the 10 centimetre glass Schliephake electrodes are most convenient. The patient sits upright in an arm-chair and one electrode is placed over the nape of the neck and the other over the front of the nose and the lower part of the forehead. The metal plate of the posterior electrode is placed about 2½ cms. from the skin, while the space is less in the case of the anterior one. The treatment which should be 10 to 15 minutes' duration, generally produces a comfortable feeling of warmth. The skin should be carefully dried if perspiration takes place, so as to avoid any risk of burning. It is often advisable to give a second treatment within the next 24 hours, as a precautionary measure.

For sinusitis also he strongly recommends ultra short therapy. Where this is not available radiant heat and infra-red ray are of great use. The lamp preferably of the radiant heat type emitting both infra-red and visible rays, should be placed 12-36 inches away from the face, depending on the candle power of the lamp. The treatment can be given for 15 to 20 minutes every two hours if necessary. The irradiation is soothing and comfortable. Local ultra-violet irradiation is another valuable method of treating coryza.

(*The Medical Press and Circular*, September 27, 1939, (p. 272.)

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