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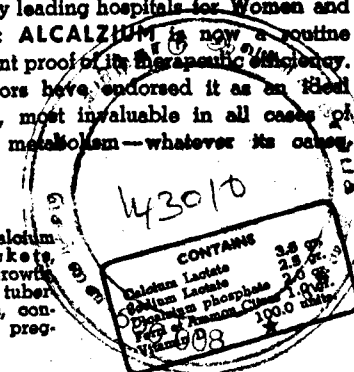
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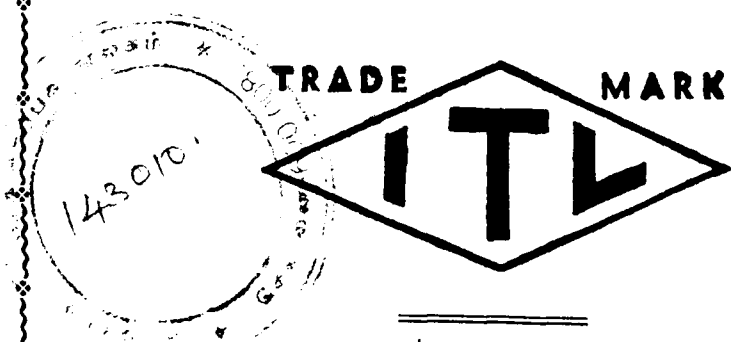
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MEDICO-SURGICAL SUGGESTIONS

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SURGICAL MANAGEMENT OF URETERAL STONE.

EDWARD WILLIAM WHITE, M. D.

Chicago.

Seldom do we witness an acute medical or surgical entity as intriguing in its symptomatology or as momentous in its consequence as is the problem of ureteral calculus; rightly could it be classified as the enigma of medical miseries. Long have we known and willingly accepted the maze of interesting uncertainties attending the correct rationale of stone management, however, the social and economic phase is also important in many cases and must be intelligently considered. Patients of the laboring classes with non-progressive ureteral stone must of necessity be treated surgically to expedite matters so that they may hurriedly return to gainful occupations. Whereas, others in higher brackets in sedentary pursuits, time is not such an all important factor and watchful waiting with certain reservations is advisable. We feel that any decision on surgical intervention requires a wealth of matured judgment and experience, and a thorough knowledge and extent of the menace to the renal integrity.

We feel that it is generally known that in most cases the symptoms characteristic of ureteral stone are quite obvious nevertheless, this syndrome is not always dependable as all have been frequently misled on its correct interpretation. Ureteral stone behavior may and frequently does mimic a wide variety of visceral and skeletal lesions, and a trustworthy diagnosis is only made through the medium of ureterography, cystoscopy and opaque catheters.

Many cases of impacted ureteral stones are uncovered during the course of a general examination, totally devoid of symptoms, yet for the future well-being of the patients and to preserve the renal structure these calculi should be removed. In these instances the infection is not stationary, the kidney function is progressively impaired, the opposite side is undergoing compensatory inflammatory changes, it becomes a surgical or manipulative necessity. It is not

difficult to understand the reasons in these cases for one being lulled into a false sense of security; procrastination and hopeful expectancy we consider a short sided policy. Remove the calculus unless there are contraindications, and other vague symptomatology will finally be eliminated.

The removal of the calculus by whatever means, does not relieve us of responsibility, as we feel that our greatest mission is the understanding and prevention of recurrence.

We are all conversant with the fact that a most plausible advance in the prevention of recurrence is our recognition of the fact that the presence of a calculus is but an outward expression which calls one's attention to an underlying pathologic entity due to various metabolic alterations. Our knowledge of the causative factors productive of urolithiasis, such as, vitamin deficiencies, plaques on the renal papillae, stasis and infection, altered metabolism, hyperparathyroidism and hypercalcemia, have been of small assistance in the prevention of stone recurrence. We could cite any number of cases of small millet seed renal stones, both unilateral and bilateral constantly being formed in the kidney, in which ureteral calculi are continually being removed with but small difficulty, due to repetition, however, the underlying cause is as yet far from clarification. The foregoing citation is not unlike many other medical problems in which the predisposing causes and pathogenesis are vaguely understood, although the therapy is generally satisfactory, for example, peptic ulcer.

CITE OF STONE FORMATION

From clinical investigations of urolithiasis and most noteworthy the excellent studies of Randall, it appears that ureteral stones are primarily originated in the renal papillae, calices, and renal pelvis; whether calculi develop primarily in the ureter or not appears purely academic and of small consequence. It seems difficult to understand these ureteral formations in the light of ureteral parastalsis and downward flow of urinary stream, although they are reported in the literature.

We have frequently seen cases of stones of small diameter produce enormous dilatation of the ureter, equaling the size of the small intestine, with extensive periureteral inflammation and thickening; the ureter partially or completely blocked with hydronephrosis resulting. If extensive infection does not exist, stone removal is sufficient, and nephrectomy and nephrotomy becomes a secondary consideration as the kidney generally returns to normal limits. Paradoxical as it may seem we operated a case recently in which a stone of large dimensions practically occluded the ureteral lumen and yet the upper ureteral spindle and renal pelvis presented but minor dilatations. We find it difficult to evaluate these cases of large stones impinged at the iliac crest minus ureteral or renal morbidity. It is

quite reasonable to assume that in all probability in these instances the stone may have originated at a normal ureteral constriction or possibly descended from the kidney during a period of neuro-muscular imbalance which was productive of acute ureteral dilatation.

URETERAL LITHIASIS AND URETERAL STRICTURE

Any speculative hypothesis on lithiasis, be it renal or ureteral, instantly becomes debatable, based on personal opinion and experience. We have been impressed with the infrequency of fibrotic changes in the ureter during the impaction or passage of calculi down its lumen. The situation is entirely incompatible with similar medical phenomena and especially the hyperemia and inflammation which invariably results from trauma. It is possibly true that in certain instances strictures do result from or are an associate of ureteral calculus, otherwise why do symptoms occasionally persist after stone removal. That stricture resulting from migratory or impacted stones is the exception rather than the rule is frequently borne out by ureteral investigations following stone transit or by post calculus ureterogram.

Urologists who are in a position to manage a large series of calculus disease have been impressed with the relative infrequency of gross pathologic ureteral changes, seen in inaccessible stones lying in the parietal pelvic ureter. Cases have been reported and doubtless many have witnessed patients with neglected calculi which have produced ureteral atony, peri ureteritis and rupture, a typical ureteral emphysema, the stone is delivered from a pocket of pus, the part drained and unbelievable as it appears restoration is not uncommon; sinuses close kidney and readily and fistulas do not seem to persist.

It appears advisable in the foregoing recital to err on the side of safety, remove the stone and the establishment of drainage will often suffice, depending entirely on the degree of opposite renal capacity, and renal reserve on the operated side. A nephrectomy or nephrotomy drainage can be later instituted if the condition warrants.

SURGICAL MANAGEMENT

The management of ureteral calculi, whether medical, manipulative or surgical presents one of the most interesting chapters of urological therapy. Success depends entirely on experience, surgical and anatomical knowledge, and strict adherence to proven surgical principles.

A clear comprehensive understanding of ureteral physiology and ureteral behavior in other pathologic states lends valuable aid in arriving at the correct course to adopt in some of the uncertainties of stone management. Granted that many abdominal and pelvic calculi are successfully attacked with limited anatomical knowledge, nevertheless this action is based on a false preface and investigation ceases to become a virtue.

For descriptive purposes and to assist us in the various surgical approaches, we have found it convenient to divide the ureter into abdominal and pelvic segments, the former being subdivided into the lumbar ureter 8 cm. in length and the iliac ureter also 8 cm. long. The pelvic ureter is approximately 15 cm. long and is subdivided into the parietal and Juxtovesicle ureter and intravesical. In order to expediate matters and that our surgical attack will be of more assurance, it appears necessary to become familiar with certain anatomical objectives. The ureter which is approximately 31 cm. in length lies retro peritoneally, is intimately attached to the parietal peritoneum; it is not dissociated when the peritoneum is stripped forward. As the ureter enters the pelvis it is crossed by the root of the mesentery and the terminal ilium, it lies behind the descending and the transverse parts of the duodenum in its proximal portion. The spermatic, right colic and ilio-colic vessels cross the anterior surface of the ureter and separate it from the peritoneum. Because of their vascular relation the extraperitoneal lumbo-inguinal approach to the ureter is preferable to the transperitoneal. On the left side the ureter lies deep to the peritoneum, covering the left infracolic space. As it enters the pelvis it is covered by the pelvic mesocolon. The spermatic, left colic and sigmoid vessels covers its anterior surface. The ureter in its pelvic segment is also closely related to the peritoneum, crosses the pelvic brim in front of or a little lateral to the common iliac bifurcation, it descends abruptly between the peritoneum and the hypogastric artery which separates it from the posterior wall of the pelvis and the great pelvic nerve trunks. It is well to remember that the superior vesicle artery lies directly above as the ureter approaches the bladder.

The vas deferens, the ureter and seminal vesicles produce a close anatomical proximity at the base of the bladder, and the vas is an unfailing guide as it appears at the internal abdominal ring.

Stones located in the iliac, pelvic ureter, juxta vesicle ureter are often very confusing and difficult of delivery, hence it becomes imperative that we are clearly acquainted with anatomical landmarks. They are particularly indispensable in this area. Preoperative ureteral catheterization in impacted pelvic stones cannot always be depended upon for ureteral identification, as catheterization is generally impossible in these instances.

FACTORS DETERMINING OPERABILITY

Being fully aware that the degree of renal damage in conjunction with ureteral calculus is often an uncertain factor, it becomes necessary that the calculus should be removed with dispatch and with a minimum of destruction to the renal parenchyma. The happy solution naturally would be a spontaneous passage which

occurs in a majority of cases of 0.5 cm. sized stone. We are unalterably opposed to frequent attempts at instrumental delivery in the presence of renal infection, regardless of the many and ingenious improvements available for one's selection. The ultimate choice will depend solely on judgment and past experiences. Infection and back pressure interpreted correctly generally signifies more radical measures in order to preserve renal function.

Our choice between surgical and manipulative measures depends on certain factors as 1. Size and location of the calculus. 2. Frequency of pain and colic. 3. Age and general health. 4. Has the stone made any progress within reasonable limits of time. 5. Degree of renal assault. 6. Social and economic position.

The size and location of the calculi as shown Roentgenologically presents an important factor in determining the choice of procedure. It is important to remember that a stone held at the uretero-pelvic junction or upper one half of ureter is simple of extraction by muscle splitting extraperitoneal operation, hence we feel it best to remove them surgically, in certain cases where progress is not satisfactory. Further descent has often produced great suffering and not the least important is the fact that it may become impacted in an area less favourable and present greater technical difficulties.

In our opinion the small sharp speculated stone caught in the lumbar ureter is generally, more satisfactorily removed surgically, as frequent energetic intraureteral manipulations permanently damages the ureter and not uncommonly the calculus is forced back into the renal pelvis and a return of ureteral spasm and colic ensues.

COLIC

Colic is not always a dependable symptom in stone management. We have seen many cases in which the ureter was completely or partially occluded, yet ureteral and renal pain had entirely ceased. Delay is justifiable when colicky pains are brief and some progress is noted. However, such delay entails much responsibility and intelligent watchfulness.

CONDITIONS DEMANDING IMMEDIATE SURGERY

Cases demanding emergency surgical relief are far less frequently seen than formerly. 1. The absolute emergencies are in those few cases in which life is in jeopardy or renal tissue is obviously failing. 2. Cases of renal agenesis with an impacted stone in the remaining ureter and threatened uremia. These cases must be given immediate relief through the medium of open surgery; to temporize with intraureteral attempts is often fatal. 3. The cases which have been unskillfully handled through crude manipulation which produce extensive ureteral damage, with extravasation, septicemia and reflex anuria. 4. In those few cases of bilateral partially impacted ureteral calculi in which ureteral catheterization is impossible for the purpose of assuring drainage and renal destruction is

eminent. The foregoing does not cover all surgical emergencies, however, all are significant and should be properly recognized. A conclusive evaluation in these instances seems quite difficult.

A group of interesting cases in which surgery is not immediately eminent, although ultimate, are those in which due to renal impairment, relief is obtained surgically. It has been demonstrated by Hinman that after four weeks of complete occlusion, in the absence of infection the kidney will terminate its excretory function, if the obstruction is removed and if the other kidney has a dependable capacity, partial restoration of function will follow, although slow deterioration and disintegration results. It has been frequently noted, that should both kidneys be extensively damaged by bilateral ureteral calculi, removal of the calculus will generally be followed by restoration of function on that side.

Pyonephrosis plus ureteral stone is the most destructive lesion to the kidney, and patients in this group are desperate operative risks. In these instances a nephrectomy or trans renal drainage as a preliminary is sound surgical judgment, preserves life, establishes drainage and eliminates infection. The ureteral calculus is better undisturbed as ureteral empyema rarely occurs, (approximately 2 per cent) and as we have noted in many cases, symptoms certainly do not reappear. If you must attack the stone, that can be accomplished when health is re-established.

In cases of advanced hydronephrosis secondary to ureteral stone and dilatation, the renal status will determine our choice of procedure. Nephroureterectomy is first considered, as otherwise a functionless infected atrophic sack remains. Should the kidney also harbour calculi, plus considerable renal reserve, attempt the ureteral calculus first, and thereby obtain drainage. The renal phase can be operated later if the condition warrants. In other words have in mind the preservation of renal tissue always. In cases of small renal stone complicating ureteral calculus, a pyelo lithotomy may safely be performed in conjunction with a ureterotomy in certain instances. However, we feel in all cases of doubt, especially in dealing with multiple calculi and renal insufficiency, prolonged complicated surgical procedures are to be condemned, of convalescence is prolonged and costly. Nephrectomy and nephrotomy in ureteral stone surgery maintains a real, critical and substantial office. As has been stressed so frequently in this treatise, successful surgical care of ureteral calculi depends greatly on renal assurance and a firm belief that nephrectomy is a life saving measure. While nephrectomy for ureteral stone is not uncommon it is well to remember that a ureterectomy may become a necessity later, hence divide the ureter as near the pelvic brim as possible, in order to ease and to simplify matters later. In so doing a small secondary incision is sufficient and infinitely less shock is associated. Calculi in those

cases which require nephrectomy are usually impacted in the parietal or juxta vesicle ureter and are associated not infrequently with marked ureteral and renal dilatation rendering extraction a simple matter. We divide the vascular pedicle first which renders better visibility of the infected renal pelvis and ureter, and sterilization is simpler of accomplishment.

We feel that the ureteral stone problem presents such far reaching factors that each case is certainly a distinct entity. Our decision as to the correct method of pursue depends on an exacting and critical evaluation of the physical status of the patient, his definite renal values and the degree of his emergency.

SURGERY

When we approach the surgical aspect of renal relief, necessitated by the presence of ureteral stone, our first consideration must be the extent of kidney damage. This knowledge will give us the key to the situation, and hence avoid unnecessary surgery. Secondly, the size and location of the calculus will disclose our operative plan. The correct stone position prior to surgery is imperative and in all instances confirmative x-ray films must be taken immediately before any surgical attempts. We have seen many cases of small ureteral calculi become exceedingly illusive regardless of the most conservative and through preoperative investigation. The large 1 to 2 cm. calculi present no uncertainties in surgical management. However on the other hand the small movable calculus not fixed in position may after an extended period of search become rather disconcerting and deflating.

The subject of surgical approach is adaptly discussed under the following, and depending solely on calculus location.

1. Operation for stones at the uretero pelvic junction and upper one third of lumbar or abdominal ureter.
2. Calculi held in the middle two third of the ureter and including those above the pelvic brim.
3. Operation for stone in pelvic segment of ureter.
4. Operation to reveal the parietal ureter and stones impinged in the juxta vesicle or intramural ureter.

IMPORTANT SURGICAL CONSIDERATION

When one undertakes the responsibility of ureteral stone surgery it is well to remember that incisions should be sufficiently large to enable a full and unrestricted view of the ureter and adjacent structures. The ureter must be thoroughly freed so that it may be well manipulated. Stones firmly fixed in the natural physiologic constrictions or ureteral spindles are better removed by forceps or scoups through an incision in the ureter above the stone, rather than directly over it, as incisions in these natural areas of narrowing often add to future difficulties. When stones have been removed one must not forget to investigate the entire course of the ureter through the

medium of a ureteral catheter. In those cases of stone complicated by fibrous strictures plus pelvic and ureteral dilatation and with sufficient renal reserve for assurance, the ureter is drained by a 10 cc. syringe, the stone removed at the stricturous area and the longitudinal incision is closed transversally. We have found it of distinct advantage to splint these ureteral plastics whenever possible, either preoperatively or postoperatively. The ureteral catheter prevents leakage and assists renal drainage. Ureteral incisions are usually closed by an occasionally interrupted 00 cat gut suture and drained for 8 to 10 days. It has been noted that ureteral leakage generally appears about the 10th day. Contrary to the foregoing we feel that the ureter will close kindly in most instances whether sutured or not; in either case drainage is necessary. Occasionally marked edema of the mucosa follows ureteral incisions and in order to prevent evagination of the lips suturing is advisable.

TECHNIQUE OF SURGICAL APPROACH

We shall not discuss the technique of surgical removal of stone at the uretero-pelvic junction or upper one third. Their removal present no controversial problems, suffice to say, the well known posterior lateral renal incision is generally used and quite satisfactory in all cases. If you are dealing with an unusually short renal pedicle do not attempt to suture, adequate drainage will suffice after a thorough exploration of the kidney.

Stones lodged in the middle two-thirds of the ureter are approached by a left or right straight rectus incision, the so-called Gibson incision or a slightly altered McBurney, depending somewhat on whether the stone is in the middle or lower third of the ureter. The incision may be satisfactory placed at any point on the abdominal wall below the umbilicus and over the suspected obstruction.

The skin incision is made in a line paralleling the fibers of the external umbilicus. It starts at the border of the rectus extends upwards and outwards for 10 to 12 cm. The external oblique is split in the directions of its fibres and retracted. The common tendon of the internal oblique and transversalis is opened as they join the anterior sheath of the rectus. Care must be taken at this time not to injure the peritoneum as it is rather closely adherent to the transversalis fascia. Complete hemostasis is important, and the proper adjustment of retractors. The peritoneum is lifted back and the ureter will be found adherent to its posterior sheath. Under ordinary circumstances the ureter is of easy identification when one remembers that it clings to the peritoneum and not to the psoas muscle.

LOWER URETER

The surgical approach for stone in the middle and lower ureter differs only in extent. The skin incision starts at approximately the level of the anterior superior spine and is carried downward and

inward to the midpoint of the symphysis. The fascia of the external oblique and anterior fascia of the rectus are cleanly prepared and full excised beyond the limits of the upper angle of the wound. Fascial planes and aponeurosis are always barriers to good exposure hence freely incised. Muscle layers are split in the direction of their fibres and sufficiently retracted for free exposure. The transversalis fascia is nicked and incised on a grooved director as you remember the peritoneum is rather closely adherent in this area. The peritoneum and abdominal contents are carefully lifted upward and inward and the ureter which is not uncommonly loosely attached is easily brought into the field.

The ureter in its lower middle segment approaches the great vessels at the point of bifurcation. The spermatic or ovarian vessels, as formerly cited, must be noted as they generally lie immediately external to the ureter at its middle, below they diverge and pass downward on the posterior surface of the peritoneum.

In our experience the foregoing technical description gives ample exposure of the ureter its entire extent and including the juxta vesicle segment. Stones held in the deep pelvic ureter in most instances can be milked upward between thumb and finger to a more accessible position for ureteral incision. When this is not possible the ureter is incised at the pelvic brim or higher and instrumental delivery is usually successful.

In cases of firmly impacted calculi, generally speculated, located at the uretero vesicle junction, we have found it expedient and not particularly difficult, to approach them through a mid line suprapubic incision. The bladder is pulled forward and denuded of its peritoneal covering and approximately two inches of the ureter is visible for any surgical intervention.

Calculi impacted in the intramural ureter, which have resisted instrumental attempts of delivery are easily removed by a cystotomy.

In conclusion and summary we feel that the entire subject of ureteral lithiasis presents momentous potentialities, often vague in exact interpretation and analysis. No attempt has hereby been made to cover the many formidable problems attending manipulative or surgical management, as what you do, or do not do, depends largely on adaptability, judgment and personal decision on the problems presented in a given case.

(Illinois Medical Journal, September 1941.)

SURGERY OF CARCINOMA OF THE COLON AND RECTUM

R. K. GILCHRIST, M.D.

Chicago.

Most authors have found that one-third to one-half of those afflicted with carcinoma of the colon and rectum have lesions which are beyond any hope of surgical cure when first seen. Most of those having inoperable or unfavourable lesions have been under the care of physicians for months, sometimes for more than a year, without a diagnosis being made. Before we discuss treatment, let us review a few of the diagnostic signs.

The most constant symptom of carcinoma of the large bowel is a change in bowel habits. This is usually a slight tendency to diarrhea where no such tendency existed before, or there may be an alternating constipation and diarrhea. Red or dark red blood is often seen. This is on the outside of the stool if the lesion is low in the bowel. In lesions of the right side of the colon, the blood may be microscopic and not visible grossly. Cramping pains, a feeling of fullness, or a dull uncomfortable feeling in the region of the tumor is common with larger lesions. Flat or toothpaste ribbon stools are common with lesions of the rectum and sigmoid.

The first step in making a diagnosis is to *think of the possibility of Carcinoma*. The next step is to do a rectal examination with the patient lying on his side. If in doubt, have the patient squat and strain down while the rectal examination is done. If no tumor is palpable, a proctoscopic examination is indicated. Anyone can examine a formed stool grossly. Blood on the outside of the stool, in the absence of a fissure at the skin margin, demands a thorough examination. Remember that the X-ray examination of the rectum and colon has its limitations. You can not expect the roentgenologist to demonstrate early lesions which are so low that they cannot be moved by the examiner's hand palpating through the abdomen. If the tumor is visible and can be biopsied through the proctoscope, fluoroscopy should not be done, as a thorough examination is apt to lead to an obstruction and an incomplete examination is of little value. If X-ray examination is negative my patients return after two or three weeks and three stools are examined for blood by the benzidine test after they have been on a meat free diet. If blood is present, a search for the bleeding area must again be made. *Not all rectal bleeding comes from Hemorrhoids or rectal fissures. If we think of the possibility of Carcinoma, more operable lesions will be found,* and remember that one negative X-Ray examination does not rule out the possibility of carcinoma of the large bowel.

When a tumor of the rectum or colon is diagnosed, the possibility of removal must be determined. We consider all carcinomas

operable if there is no sign of spread beyond the field of possible resection. Of course, metastases to the liver, lungs or other distant organs cancels any hope of permanent cure. Fixation of the tumor to adjacent structures is a sign of inoperability if the structure invaded cannot be removed. Therefore, when there is tight fixation to the sacrum, the base of the bladder, aorta or iliac vessels, complete removal cannot be done. Fixation to the abdominal wall, the dome of the bladder, the more accessible part of the uterus, the posterior vaginal wall low down, or even to a loop of small bowel, does not necessarily spell defeat, as these can have wide resection around the invaded area and some of these will be cured for 5 or more years.

Invasion of blood vessels by the tumor was found in 17 per cent. of surgically removed specimens of carcinoma of the rectum by Collier, et. al.¹ This could not be diagnosed preoperatively.

Spread by the lymph system is very difficult to determine grossly. I examined 496 nodes from freshly removed specimens of carcinoma of the rectum. These were cut in two with a razor blade and of the 111 nodes containing metastases, only 48 showed any gross change. In carcinomas of the right side of the colon, very large lymph nodes are often palpable and visible and very commonly these are found to be un-involved when they are sectioned microscopically.

A careful study of the lymph node metastases in 154 operative specimens of carcinoma of the rectum and colon has been made in our laboratory. This was done by clearing the specimens as described by Gilchrist and David.² Full scale drawings of all specimens with the arterial tree and the exact location of the lymph nodes in relation to the tumor and arteries were made. More than 8,000 different lymph nodes from these specimens were studied microscopically. 63.5 per cent. or 81 of 127 specimens of carcinoma of the rectum contained lymph node metastases, as did 65.4 per cent. of 27 specimens of the colon. The specimens of the rectum averaged more than 60 nodes per specimen. One contained 210 nodes. Specimens of the colon averaged 49 nodes.

Analysis of the specimens studied in this series has led to the following conclusions.

The size of the tumor is of little value in determining the presence or absence of lymph node metastases. This is an excellent example of this phenomenon. The patient, age 68, had had symptoms for five months. The tumor involved at least 75 per cent. of the circumference of the bowel. 53 lymph nodes were removed from the specimen; all were normal. He died of pulmonary embolism, 110 retroperitoneal nodes also failed to show lymph node metastases. In contrast, a man 49 years of age who had had symptoms for two months, had a tumor which involved 20 per cent. of the circumference of the bowel. The specimen was studied by gross

dissection; 32 nodes were found, 25 of them contained metastases. 15 of the 25 involved nodes showed pathologic changes on sectioning, before fixation.

Where the upward lymph channels are blocked by metastases, there may be a retrograde metastasis downward as in a patient age 65 who had had symptoms for at least six months. The tumor involved about 65 per cent. of the circumference of her bowel. 27 nodes were found by gross dissection, 22 of them having metastasis. The lowest of the five nodes below the tumor was 4 cm. below the lowest edge of the tumor. In six cases, retrograde metastasis of lymph nodes was found below carcinomata of the bowel or rectum. In every case enough of the nodes central to the lesion were completely replaced by carcinoma to make us feel certain that there was a very marked obstruction to lymph flow, and the metastasis was by retrograde means. Sections of the tumor and of the topmost node, one node near the tumor and two nodes below the tumor show how very difficult it is to grade these tumors. There is the most marked difference in cellular structure between metastases in adjacent nodes or even between parts of the same node. A single section of the tumor should not influence one too much in the ultimate prognosis.

Permeation of carcinoma through lymph channels was seen only when the lymph nodes central to the channel involved were already blocked with carcinoma.

Carcinoma metastases do not completely destroy the function of a node until all of the node is destroyed. This was shown in a surgical specimen of carcinoma of the breast. The lymph channels in the neighbourhood of the tumor were injected with a suspension of carbon particles. The specimen was cleared and some of the lymph channels and several lymph nodes were seen to be outlined in black. This section shows how the carbon particles could still flow into the normal part of the node although some of it penetrates a short distance along spaces between the cancer cells.

Throughout the entire series a common pattern of lymph node metastasis was seen. When the metastasis has grown larger than the small subcapsular lesion, the spread is by expansion around the subcapsular space and into the depth of the node. This is usually accompanied by a thickening of the capsule especially over the area adjacent to the growth. There may be a more or less heavy layer of fibrous tissue between the cancer cells and the lymph cells. In many cases there is so much interference with nutrition that we see a thick layer of fibrous tissue, a thin rim of live cancer cells within this, and necrosis in the center. Growth progress until we see one or several large nodes, usually lying close to the main blood vessels, in which the lymphoid tissue is completely replaced by carcinoma. Groups of lymph nodes which are completely replaced by metastases tend to be found in certain regions. In specimens of the rectum and

lower sigmoid such nodes are usually located near the bifurcation of the superior hemorrhoidal artery. The group of heavily involved nodes is along the main or primary line of drainage. Nodes involved below or lateral to these nodes are apt to be subcapsular lesions or ones which are obviously late metastases.

In no case has there been any evidence of penetration of carcinoma outside of the capsule of any node, except where there was a collection of large involved nodes lying tightly packed together. In seven of the nine cases where this occurred, the superior hemorrhoidal artery or the main artery supplying the region of the nodes was blocked by pressure of the nodes. Several of these nodes contained necrotic material.

Postmortem examination of surgical patients demonstrates the tendency of the lymph nodes to block the spread of carcinoma even in advanced cases. In seven cases where the patients died within two weeks after resection of the rectum or sigmoid for carcinoma, microscopic sections were made of all of the retroperitoneal nodes from above the point of origin of the superior mesenteric artery to the inferior border of the prostate, as far distal as it is possible to cut the arteries from within the abdomen. Each of these preparations contained 110 to 168 lymph nodes. Two patients who had no metastases in their operative specimens and one patient who had three involved nodes in the operative specimen had none in the abdominal nodes examined. One patient had had symptoms for more than a year, and had had a biopsy made a year before, but had refused operation at that time. The tumor was ulcerating and it had penetrated all coats of the bowel. Nodes were palpable in the hollow of the sacrum. 62 nodes were found, 43 of them showed metastases. The highest node involved was only 3 cm. below the point of ligation of the superior hemorrhoidal artery. He had an uneventful postoperative course until the eight postoperative day, when he suffered a massive pulmonary embolus and died. 160 nodes were examined. In spite of the extensive lymphatic involvement, there were no metastases above the point of resection. The one node involved was about 1 cm. lateral to the widest point of resection, along the levator ani muscle.

Another man 72 years of age had a number of enlarged nodes high up. Because of a peculiar congenital peritoneal anomaly, the superior hemorrhoidal artery could not be resected as high as it usually is. 35 nodes were found in the operative specimen, seven of them contained carcinoma. 111 nodes were studied in the postmortem preparation; four of them contained carcinoma. In the case, at least one of these nodes would have been beyond any hope of removal.

Another man 66 years of age had had a known coronary thrombosis ten months before. The lesion was just above the rectosigmoid.

It was the size of a fist and there was a large mass of nodes up to the promontory of the sacrum. A David type of obstruction resection was performed. Many of the nodes near the highest point of resection were completely destroyed by carcinoma. Only one of the 168 nodes found in the postmortem preparation contained carcinoma, and that was a very small subcapsular metastases in a node not 1 cm. beyond the line of resection.

Another man 72 years of age had had symptoms for four months. 14 of the nodes in the surgical specimen contained carcinoma. The highest of these was just below the line of resection. In the post-mortem preparation, 114 nodes were found. Four nodes just above the highest point of resection contained carcinoma as did one node just lateral to the growth, along the levator ani muscle. All of these involved nodes might possibly have been removed if their presence had been known.

As far as the surgical procedures used to remove cancer of the rectum and colon are concerned, we can make a few general rules, the rest must depend on the experience of the individual surgeon. First, never do any kind of large bowel resection if there is any obstruction present. If this rule is broken, you can expect more than the 10 per cent. mortality, which is considered satisfactory in most groups. Second, if there is evidence of node involvement, be sure to resect as widely as is possible. Third, in tumors of the sigmoid and higher, where the growth can be removed through the abdomen, it is much safer to do an obstruction resection with a closure of the colostomy later than to attempt any kind of primary anastomosis. Fourth, in tumors of the right side of the colon, caecum and ascending colon, a resection of the terminal ileum, caecum and to the middle of the transverse colon is best. This may be done after a preliminary lateral anastomosis of ileum to transverse colon, or the anastomosis may be done primarily if there is no obstruction. If in doubt, anastomose first and resect at a later date.

CONCLUSIONS

1. The size of the tumor and the duration of symptoms are unreliable prognostic signs in carcinoma of the large bowel.
2. About 65 per cent. of all operatively removed specimens of the rectum and colon will have lymph node metastasis, if they are searched for carefully.
3. The spread of carcinoma through the lymphatic system is by lymphatic emboli.
4. Hematogenous metastasis of carcinoma is an accident and does not seem to be common in grossly operable lesions.
5. Postmortem examination of surgical patients demonstrates the tendency of the lymph nodes to block the spread of carcinoma even in advanced cases.

The object of surgery of cancer is a reasonably wide resection of the tumor and the most extensive resection of the lymph node bearing tissue that is possible without increasing the mortality appreciably.

(*Illinois Medical Journal*, September, 1941.)

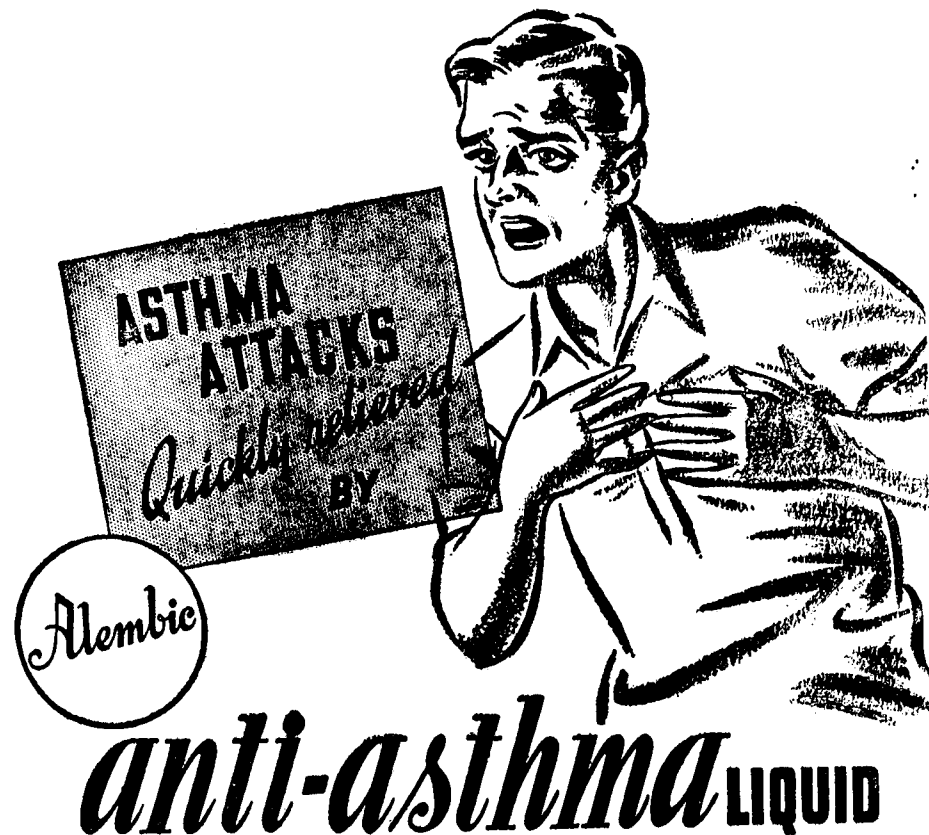
NEWER DRUGS IN TREATMENT OF ARTHRITIS

BY K. K. SHERWOOD, M.D.

The chronic arthritic comes to the doctor seeking relief from pain, stiffness, swelling and deformity. In order to properly choose therapeutic agents of greatest value, it is important to visualize the changes which are taking place within the affected joint. At one end of the scale we have frank unorganized inflammation, that is, free exudate and all the clinical evidence of frank infection. If, instead of unorganized inflammatory tissue, there is organized we have the more chronic proliferative or atrophic type of arthritis. If the infection is absent or acting upon the joint only by its toxins, with or without trauma, we have oedema in the joint structures. If the symptoms are purely the result of trauma, we are dealing with structural disintegrations which mechanically limit joint use. While obviously both suppuration and proliferation may end in structural disintegrations, it is equally as obvious that the treatment of two extremes of joint pathology will be radically different.

In the joint with unorganized inflammation, what treatment is the most efficacious? The systemic manifestations of suppuration and local discomfort will automatically result in symptomatic treatment of rest and sedation. The etiology is clearly infectious, usually from an easily demonstrable focus. Sulphanilamide or its derivatives is obviously indicated. Clinically, this type of case is characterized by involvement of either a single joint or scattered joints throughout the body. The larger joints are usually chiefly involved. They may be bilateral, but if so, the small joints distal to them are not symmetrically involved. This asymmetry is a diagnostic feature of arthritis due to focal infection.

With the acute infection there is a marked increase in the need of vitamin C in the body and its administration should be part of the treatment supplementary to sulphanilamide. In the occasional case of this type with a relative acute onset, the disease may become chronic, and when this occurs, it is of benefit to simulate the reaction of an acute attack by means of fever and leucocytosis produced by



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typhoid injections. After the disease has been arrested focal infection removal will prevent recurrences.

Our proliferative type of arthritis is a more insidious disease, whose onset is gradual and frequently not etiologically connected with intercurrent infection. The constitutional symptoms are those of chronic disease: fatigue, weight and strength loss, anaemia and low grade temperature. There is no free pus within the joints which are symmetrically involved, with the disease usually beginning in either both hands or feet. The larger joints, knees, elbows and shoulders are only involved after the hands, wrists, feet and ankles. Leucocytosis is usually absent and sulphanilamide is of little benefit, even when combined with artificial fever. Indeed, these patients frequently have an idiosyncrasy to sulphanilamide and occasional marked leucopenia results from its use in this type of case.

Because we have unknown factors other than a focus at work in the etiology of these symmetrical proliferative cases, focal removal is important only as it generally rehabilitates the patient and has no specific effect upon the arthritis per se. In other words, removal of enlarged infected tonsils may improve the general health and consequently give some joint improvement, but is not a curative procedure. Because of the longer duration of the disease, vitamin C is often extremely depleted and beyond the ordinary dietary intake: additional feedings of 100 mg. of pure ascorbutic acid two or three times daily are indicated. It will be found that, even with a dietary intake of 150 or 200 mg. it will be a matter of weeks before the blood level becomes normal, even with 300 additional milligrams of the pure drug being taken daily.

It is in this type of case, that is, chronic symmetrical atrophic arthritis with normal white blood count but rapid sedimentation, that gold is of a special value. We may say categorically that the larger the dose of gold administered, the quicker the results will be obtained. We may also say with equal lack of equivocation, that the larger the dose, the higher the mortality. I wish especially to emphasize these words, "higher mortality." Gold is a lethal drug and its administration can easily cure the disease but kill the patient. The successful and safe use of gold depends upon the proper selection of cases and careful control of the case. It should not be used in the presence of liver or kidney diseases. Symptoms of gold intoxication can develop after the first dose, on matter how small, or may not develop until later in its administration. If symptoms of gold intoxication are carefully looked for and an established uniform compound used, fatalities should be extremely rare and serious complications unusual.

The foremost serious complications of gold administration are dermatitis, purpura, haematuria and jaundice. The dermatitis is

always preceded by itching, and if the use of the drug is discontinued at the beginning of itching, the dermatitis will not be extreme. If its use is persisted in, there will develop an exfoliative dermatitis which will persist not for weeks but for months. There is no known successful treatment for the dermatitis other than time. Purpura is a relatively rare complication in my hands. If crystalline preparation of gold is used and freshly dissolved before each administration, it occurs rarely. However, the onset of purpura or bleeding gums in a patient receiving gold is an absolute contraindication for its further use. I have had four such cases, all of which responded to intramuscular liver and vitamin C. With this treatment, I feel that purpura is an alarming but not unduly serious complication.

Haematuria has occurred, in my experience, only in ankylosing spondylitis. The results of gold administration in such cases is rarely good and the haematuria so frequent that I now use gold rarely in spondylitis and only with a urinary analysis preceding each dose. I have had one case of haematuria which necessitated transfusion. He had a total of 20 mg. of gold sodium thiosulphate. Jaundice or acute atrophy of the liver is relatively rare and I feel probably occurs only when large doses are administered. I have had no personal experience with this complication. Pain in the involved joints following the first few injections of gold is a common complaint and does not warrant discontinuing it. Stomatitis may be a symptom of intoxication but with low dosage is usually mild. Iritis is also said to occur.

I feel that in these symmetrical, chronic proliferative cases of arthritis with a normal white blood count and rapid sedimentation, small doses, 10mg. of gold thiosulphate, administered once or twice a week is a very beneficial, relatively inexpensive drug. I routinely check the haemoglobin, white blood count and urine at least every month in all cases receiving gold. I have followed the lead of English authorities who believe that vitamin C partially protects against gold intoxication and routinely administer pure vitamin C to all cases receiving gold. I do not give any set series but continue the administration of gold until the patient is well, improvement ceases or the signs of intoxication occur. In four years I have had one case requiring hospitalization and no fatalities.

The third class of joint pathology oedema of the joint structures, is even more obscure in etiology than proliferation. Undoubtedly trauma plays a role and any treatment directed at joint oedema, which neglects mechanical features of weight and posture, is doomed to indifferent success. These cases frequently have low vitamin C and I know of no satisfactory way of estimating this other than chemical analysis of the blood. The use of vitamin C should be restricted to those cases which have a deficient amount in their blood. Foci of infection are occasionally important contributing

causes and their removal in cases of muscular rheumatism, so-called menopausal arthralgia, shoulder and back cases will occasionally give rise to dramatic improvement.

I have yet to observe dramatic improvement in cases of senile hips or Heberden's nodes following focal removal. Sulphanilamide is without effect. In the absence of rapid sedimentation rate, gold is of no clinical value. Vitamin B may occasionally be helpful in large doses. It is undoubtedly analgesic and mildly laxative.

In neuralgias, where there is supposedly oedema, by improving nerve metabolism and supposedly muscular tone, vitamin B is of occasional benefit. It should be emphasized that, while vitamin B is curative in alcoholic or deficiency neuritis, most cases of neuralgia, in my experience, have a toxic or focal infection factor and satisfactory results with the use of vitamin B alone do not persist. In other words, the patient may improve for a week or two, but if vitamin B alone is used, his symptoms tend to recur and focal removal, with or without vaccine therapy, is indicated. In true neuritis intramuscular or intravenous thiamine is the drug of choice. In the more indefinite neuralgias powdered yeast by mouth to me seems preferable.

The last group of cases is that in which the symptoms arrive through structural disintegration of the joint. Recognition of this will automatically show one the futility of the use of sulphanilamide or gold. If oedema is a prominent factor, focal infection removal occasionally will decrease the pain. Vitamin B, by improving muscle tone and increasing nerve control, may decrease the speed of structural disintegration, but unless the problem is dealt with orthopaedically, little satisfaction will result.

	<i>Etiology</i>	<i>Treatment</i>
Unorganized infection	Infection	Sulphanilamide Vitamin C Focal removal
Proliferation	Unknown and infection	Vitamin C Gold questionable Focal removal questionable Vaccine questionable
Oedema	Minor trauma and infection	Orthopaedic Focal removal questionable Vitamin B questionable Vitamin C questionable Vaccine questionable
Structural disintegration	Trauma	Orthopaedic Vitamin B questionable Vitamin C questionable

The views expressed in this paper are tabulated in the table.
("Northwest Medicine," Dec., 1940.)

TREATMENT OF SINUSITIS BY THE DISPLACEMENT METHOD

BY LAWRENCE K. GUNDRUM, M. D.

The displacement method, in our hands, has given the best results in the treatment of subacute and chronic sinusitis. Suggested by Proetz in 1926, the method consists of displacing air in the sinuses and substituting the desired medicant.

Diagnosis: Establishment of a definite diagnosis is necessary, especially the differentiation between sinusitis and other chronic diseases of the nose.

In the typical allergic case the nasal mucosa is pale and oedematous, whereas in true sinusitis the inflammatory signs of redness and swelling are present.

Polyps due to sinusitis are firmer than those caused by allergy. In the latter, a smear made from the nasal secretions or from sinus washings gives a predominance of eosinophiles, whereas in sinusitis pus cells and bacteria abound. A culture and cell count from the antrum may provide valuable information.

X-ray examination may be of value. One picture may show a sinus cloudy to the point of simulating polyp formation. Another, taken a few days later, may show a similar condition in a different sinus. Such a change suggests allergy.

Filling the sinuses with a radio-opaque substance aids materially in diagnosis. In allergy, the shadow is not so dense, is ballooned rather than pebbled, and usually does not follow the bone outline as in infection of the lining membrane. Complete failure to fill is not pathognomonic of allergy, but it is so striking as to be highly suggestive. We have found in allergic patients that the manner of filling varies greatly in a short period of time, without demonstrable pathology. The normal sinus empties in about 72 hours.

Anatomic Status: Before specific treatment is instituted, the nose must be placed in as nearly a perfect anatomic position as possible, correcting such predisposing causes of infection as deviated septum hypertrophied or polypoid turbinate.

Methods of Treatment: Each of the variety of treatments now in use appears to have some merit. Nasal packs have aided some patients. Ionization has lost some of its popularity because of undesirable sequelae following its repeated use. Diathermy and other kinds of physiotherapy have their advocates.

General hygienic care, coupled with a proper dietary regime, certainly aids in treatment. The antra are readily accessible to irrigation, and frequent washings in many cases effect a cure. The frontals and sphenoids may also be treated in this manner, but our experience with these has not been so successful.

Displacement Method: After thorough shrinking of the nasal mucosa, the patient is placed in the supine position, with the head

completely inverted. This places the ethmoidal and sphenoidal sinuses in their most dependent positions. The original directions given by Proetz are cited below.

1. The patient's head is inverted so that the chin and external auditory meati are in the same vertical plane. 2 Fluid is instilled into the nose. 3 Negative pressure (150 mm.) is applied intermittently to the one nostril, while a finger closes the other, and the patient closes the pharynx by saying "k." 4 The patient is returned to the erect position.

At first we used 0.5 per cent ephedrine in normal saline, twice a week. Under this regime 58 per cent of cases were relieved of principal symptoms, with the mucous membranes returned to normal.

Bacterial Antigens: We have found that the addition of bacterial antigens adds to the improvement and increases the number of good results. The theory of local immunity appears to be the most plausible explanation.

The instillation of bacterial antigens initially may be irritating, and may provoke a severe reaction, consisting of headache, nasal stoppage and general malaise. For this reason it is best to begin with a dilute solution.

We begin routinely with 0.25 cc. of either 0.5 of antigen in 6 to 8 cc. of either 0.5 per cent ephedrine or 0.125 per cent. neosynephrin in normal saline. Recently we have been using 5.0 per cent isophrin as a diluent, finding it more pleasant and less irritating.

The amount of antigen is increased gradually, care being taken to avoid doses producing unpleasant reactions. Although Proetz recommends treatments every other day with ephedrine, we have obtained better results with bacterial antigens twice weekly. Recovery is as rapid, but reactions are fewer.

The patient's condition and reaction after each treatment must be studied carefully. If the reaction is prolonged until the next treatment, we have found it best to limit them to one treatment a week. In fact, in nearly every case, if the course of treatment is prolonged, it is best to reduce the number to one per week.

We have treated 520 cases to date by this method. Of 20 of these treated with autogenous antigen, 12 (65 per cent) showed definite improvement. Stock bacterial antigens prepared from staphylococcus, streptococcus and *B. coli*, were administered to 500, with definite improvement in 354 cases (71 per cent.).

Permanency of Results. Of the patients classed as improved, 100 were chosen at random and recontacted 2 to 6 years after they were discharged. Thirty-one patients had recurrences or reinfections, each following an attack of acute rhinitis. Sixty eight had no recurrence and can be classed as cured. In general it might be said that 90 per cent have had permanent favourable results.

We do not use the displacement method in actual conditions. We have had no complications other than a few ephedrine reactions, none of which occurred when neo-synephrin was used as the diluent ("The Laryngoscope," Oct. 1940.)

Extracts.

CEREBRAL SYMPTOMS OCCURRING DURING SULPHAPYRIDINE TREATMENT OF MENINGOCOCCAL MENINGITIS.

Johnstone (*Brit. M. J.*, 1941: 1:772), out of 70 cases of meningococcal meningitis treated with sulphapyridine at the City Isolation Hospital, Plymouth, reports 5 cases whose clinical history suggests that heavy doses of sulphapyridine may give rise to persistent cerebral symptoms (irritability, restlessness, confusion and stupor) closely simulating those of acute meningitis which may, therefore, be erroneously ascribed to the infection itself. It is very difficult to decide whether the symptoms are due to the toxic effects of the drug. Lumbar puncture may be of great help—if the fluid is clear and under normal pressure the use of the drug should at once be stopped as its continuance becomes fatal. A sample of C. S. fluid should be obtained from every patient whose cerebral symptoms fail to clear within two or three days after the beginning of treatment with sulphapyridine and in all cases in which these symptoms set in during the course of treatment or recur after a transient improvement. The author further points out that the incidence of this type of toxic reaction is greater among children than among adults and those receiving the drug by the parenteral route are more liable to it than those taking it by mouth.

NON-BLOODY VAGINA DISCHARGES OF PREGNANCY.

Gueriero and Arnell (*New Orleans M. & S. J.*, 1941: 93:574) write that though there is an increase in the vaginal discharge in the normal pregnancy all vaginal discharges are by no means normal. The chief causes of non-bloody vaginal discharge in pregnancy do not differ from those of similar discharges in the non-pregnant woman. They may be grouped as follows: (1) Infections and infestations due to gonorrhoea, trichomoniasis, mycosis, non-specific infections, chancroid, syphilis, lymphogranuloma and granuloma inguinale; (2) noninfectious states, including congestion, hypersecretion and lack of cleanliness; (3) erosions of the cervix and endocervicitis. The treatment of specific vaginal discharges during pregnancy does not differ from the treatment of similar conditions in non-pregnant subjects. All manipulations are naturally undertaken

with greatest care and gentleness. Low pressure douches and vaginal instillations even in the eighth month have been used without any untoward ill-effects.

Vaginitis caused by *trichomonas vaginalis* is treated with one of the two following methods: (1) Beta lactose (1 gm. in No. 12 veterinary capsule is inserted into the vagina each night and low pressure douches of lactic acid (U. S. P. oz. 2 per two quarts of water) are taken each morning—the treatment is continued for approximately 3 weeks after which douches are continued for from four to six weeks, three times a week; (2) sodium perborate (1 gm. in capsule) is instilled into the vagina each morning and a douche containing 15 gm. of sodium perborate to one quart of lukewarm water is taken at bed time—this treatment is continued for 10 days after the first hanging drop method becomes negative. (If the vaginal reaction is alkaline this treatment is to be preceded by lactic acid douches). Treatment of *monilia* infection consists of painting the vagina with a 5 per cent aqueous solution of gentian violet after it has been carefully dried, for a week thereafter the patient, once daily, instills 5 c.c. of the same solution into the vaginal canal with a syringe; at the end of the week the vagina is again thoroughly painted with gentian violet and for the next two weeks the patient takes daily douches of Lugol's solution (oz. 2, half strength) in two quarts of water. *Gonorrhoea* is treated with sulphanilamide with great success.

60 per cent. of the patients treated belonged to the group of specific infections already mentioned and in the majority of the remaining cases, however, there was no related specific organism. Cervicitis in the early months is treated by 25 per cent. silver nitrate applications to the eroded areas and the instillation of sulphanilamide powder to the lesion. Cervicitis associated with the specific cause of leukorrhoea is treated by eradicating the causal agent.

The author stresses on the necessity of investigating all vaginal discharges in pregnancy with emphasis on therapy even in the late pregnancy.

SULPHATHIAZOL THERAPY IN INFANTILE DIARRHOEA.

Taylor (*J. Pediat.*, 1941: 18: 469) reports on the successful treatment of parenteral diarrhoea or bacillary dysentery in children with sulphathiazol. Of 27 children admitted to the hospital with diarrhoea 13 were treated with sulphathiazol and the 14 controls were not given the drug on admission but 6 of them had it in the late course of the disease. The patients in the two groups were comparable as to age, sex, severity and type of infection and other clinical and laboratory findings. In the group treated with sulphathiazol the average time required for the stool to reach normal color

and consistency was 3.2 days and in the control group 15.6 days ; no deaths occurred in the sulphathiazol group and 2 children in the control group died, one nine hours after admission and the other after a protracted course of 28 days. In the sulphathiazol group the duration of the disease after treatment was instituted bore no relation to the duration before admission to the hospital but in the control group recovery was delayed in those cases who had prolonged diarrhoea before admission. The initial dose of sulphathiazol was 1 gm. per year of age upto a maximum of 3 gm ; subsequently the same amount was given daily in divided doses (6 doses). There was no untoward reaction in the cases in which sulphathiazol was given when treatment was first instituted—in one case where sulphathiazol was given on the 4th day of the treatment previously existing jaundice became slightly increased. The author maintains that sulphathiazol is effective in the treatment of children with parteral diarrhoea or bacillary dysentery, particularly the latter.

PREVENTION OF ASPHYXIA NEONATORUM.

Lund (*Am. J. Obst. & Gynec.*, 1941 :41 :934) writes that the rational approach to the problem of asphyxia neonatorum is by prophylaxis and puts below the analysis of the etiologic factors of asphyxia as seen in 2,006 consecutively born infants.

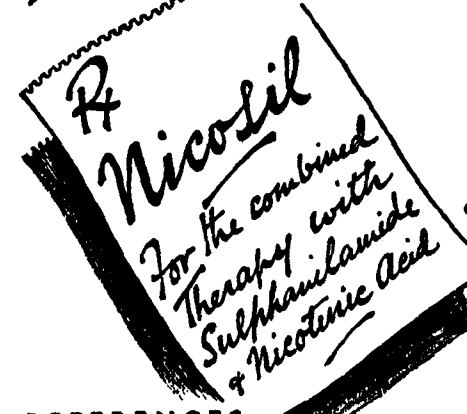
Parity—Primiparas had 18.9 per cent. asphyxiated babies while the multiparas had 11 per cent. but after the eighth child asphyxia increased with parity. *Prenatal complications*—the presence of increased asphyxia from 11 per cent. in uncomplicated to 26 per cent. in the complicated cases. Metabolic diseases, soft and bony abnormalities, toxæmias, multiple pregnancy and diseases of the gastrointestinal and urinary tracts were followed by greatest incidence of asphyxia. *Prematurity*—the greatest single factor in our series, most dangerous when combined with analgesic drugs, were as high as 70 per cent. *Presentation and position*—breech presentation was followed by 27 per cent. asphyxia, occiput posteriors by 18.2 per cent and occiput anteriors by 12.2 per cent. asphyxia. *Duration of labour*—only when the first stage was over 30 hours was there a marked increase in asphyxia : a second stage over one and one half hours was followed by a progressive increase in asphyxia. *Type of delivery and trauma*—spontaneous deliveries showed a rate of 10 per cent asphyxia whereas operative deliveries were followed by 25 per cent. asphyxia. Use of non-volatile analgesic before operative delivery greatly increased asphyxia. *Complications of labour*—variations in rate and rhythm of the foetal heart, maternal bleeding, cord prolapse, operative dystocia and prolonged labour were accompanied by asphyxia varying from 35 to 55 per cent; uncomplicated labour resulted in 12 per cent. asphyxiated infants. *Analgesics*—analgesics studied were

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Georgia Medical Association Journal Atlanta, 28. 39-80 Feb. 1939, Journal of American Medical Association p. 756, V. 114, March 1940, Journal of American Medical Association p. 1606, V. 114, No. 17 April 1940, British Leadership in Pharmacy, p. 17, Dec. 1940, Schweiz. Med. Wchnschr. p. 453, V. 70, 1940, Practitioner p. 213, V. 145, 1940, Journal of the Indian Medical Association p. 273, V. 10, No. 6 March 1941, Vitamins by Robert Wollheim, Published by Books of Merit, Inc. New York, U.S.A. p. 52, 1941 Medical Bulletin p. 307, V. 9 No. 9 May 1941.

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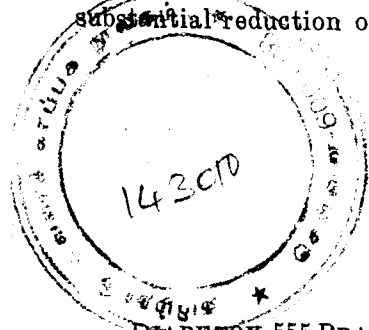
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primarily heroine and morphine with or without scopolamine. In spontaneous deliveries heroine stood midway between the group receiving no sedation and those receiving morphine. This advantage was lost following operative deliveries. Repeated administration of heroine was followed by increased asphyxia inspite of its rapid action. *Medical induction of labour*—this had little effect on asphyxia to 45 per cent. when the infant was asphyxiated at birth.

The author advises the individual evaluation of every obstetric case on the basis of foetal asphyxial risk and general obstetric risk. Prenatal care and conduct of labour on this basis should result in a substantial reduction of the incidence of asphyxia neonatorum.



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