be helpful in demonstrating a distended loop or loops of bowel, with perhaps fluid levels in them. An X-ray may also show up a large gall-stone, and if it fails to do so this may be itself an important piece of negative evidence.

In conclusion a few words may be said about differential diagnosis. I do not mean differential diagnosis of the exact nature of the obstructing lesion. That may well be impossible. But differential diagnosis between obstructive and non-obstructive conditions is sometimes difficult. Mistakes are made, and it may be that at operation nothing abnormal is found. Occasionally one finds areas of intestinal spasm for which no adequate cause can be found. At other times some condition is present which gives rise to reflex symptoms suggesting an atypical obstruction. Such, for instance, is torsion of a piece of omentum or of the pedicle of a small ovarian cyst or fibroid. I think the surgeon is right to consider obstruction in such cases, and if in real doubt he must explore.

Strangulated omental herniae may give rise to much anxiety, and there may be definite reflex interference with bowel function. It is often impossible to be sure that there is no bowel present in the sac, and all such cases ought to be operated on. In the same way strangulation of an ovary in a hernia—the ovary in little girls is not a very unusual content of an inguinal hernial sac—may be very confusing. If its function is to be conserved it should in any case call for early operation even if intestinal obstruction can be excluded. Strangulation of a testis impacted in the inguinal canal may also simulate intestinal obstruction.

I have been called to a case of hydrocele of the cord believed to be a strangulated hernia. It is true that these hydroceles do sometimes swell up very quickly, but the excellent general condition of the young patient, and the absence of abdominal symptoms should save us from all real anxiety. There is perhaps a little more to be said for those who mistake an inflamed lymph gland over the external ring for a strangulated hernia. Though not recorded in the textbooks of anatomy a gland undoubtedly occurs in this situation at least in a proportion of people. Adenitis is rather an acute process, the tenderness considerable, the temperature will probably be raised, and there may be some vomiting, but the local signs and the toxæmic symptoms are quite out of proportion to obstructive intestinal ones, and the gland can be felt distinct from the opening of the inguinal canal, so that hernia can be excluded.

The condition that gives most difficulty is perhaps an incarcerated umbilical hernia. It is irreducible of course, and constipation may be very complete. It is as a matter of fact a real case of obstruction, but as there is no strangulation and

the part of the bowel affected is usually low down in the alimentary canal, the symptoms are correspondingly free from urgency. The danger here is that a false sense of security is engendered and, operation delayed until considerable deterioration of the patient's condition has taken place.

Lastly, I would mention that in elderly people there is a tendency for symptoms suggesting obstruction to overshadow the inflammatory signs in cases of intra-peritoneal infections, particularly appendicitis. In these, and indeed in every case where we are faced with an abdominal emergency, the possibility of obstruction has always to be borne in mind. The clinical picture will often tell us clearly that obstruction is present, though it may not justify us in hazarding more than a guess at the exact pathology. That is enough. Where real doubts exist operation in experienced hands represents a very much less risk than any policy of *laissez faire*.

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THE DIAGNOSIS AND SURGERY OF CHRONIC INTESTINAL OBSTRUCTION

INCLUDING ACUTE ON CHRONIC OBSTRUCTION

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An obstruction to the passage of the contents of any tubular organ such as the intestine may arise (a) from pressure on the tube from without, (b) from a condition arising in the wall of the tube itself, or (c) from the nature of the contents.

The commoner causes in the case of the intestine are as follows:—

(a) Pressure from without by a cord-like adhesion between two coils of intestine, or between the

intestine and the abdominal wall, may give rise to intermittent short bouts of obstruction from the kinking of a coil of intestine over the adhesion. Again, the pressure of a tumour such as an ovarian cyst impacted in the pelvis may produce a slowly progressive obstruction.

(b) Conditions which arise in the wall of the bowel producing a narrowing of the lumen may be congenital, traumatic, infective or neoplastic. Traumatic strictures may be post-operative or result from the ulcer produced by a foreign body in the bowel. Infective strictures follow diverticulitis, syphilis, dysentery, tuberculosis, actinomycosis and chronic regional ileitis. Neoplastic obstruction is almost invariably due to carcinoma of the colon. A chronic volvulus is occasionally found to be the cause of the obstruction. Apart from the carcinomatous variety stricture of the intestine is not common.

(c) Obstruction due to a block by the contents of the tube may be caused by faecal impactions, gall-stone or chronic intussusception.

The term chronic intestinal obstruction may be held to include two varieties, those cases in which the cause, for example a band of adhesions, remains stationary, and those cases in which it is slowly progressive as in a scirrhus carcinoma of the great intestine.

In the first, the patient, as already mentioned, may be subject for years to occasional short attacks of mild obstructive symptoms, whilst remaining free from symptoms during the intervals. These attacks may pass off suddenly, without apparent reason, but one of them may not, and a state of acute obstruction may develop.

I have recently operated on a patient who illustrates very well this type of obstruction. She was 42 years of age, and gave a very definite history. Since the age of ten years she had suffered from frequent short attacks of slight colic, at times finishing up in the right iliac fossa. Occasionally she had been sick. At the end of each attack there had been a sudden cessation of all symptoms. Naturally she had been examined medically many times, but apparently no decision had been taken to perform a laparotomy, and no definite diagnosis had been made.

During a period of war strain without domestic help, when she was unable to rest during an attack, the attack persisted, and for five weeks she had been on a light diet and had been feeling off colour.

When I saw her first she complained of being sick when she took any nourishment, but not at other times. She had had a barium meal two or three days previously and the report was negative, the barium passing without obstruction. Her temperature and pulse were normal.

On examination there was a tender mass in the right iliac fossa, and on rectal examination the rectum was found to be loaded with hard barium scybala. The colon was cleared by enemata, but there still remained a small soft mass in the region of the right iliac fossa. Next day, possibly as a result of the stimulation caused by the enemata, pain was more severe and became worse at night, when the patient complained of "a bursting feeling." The bowels acted and there was a slight trace of blood in the motion. There was no vomiting except when the patient took fluids.

On palpation under an anaesthetic the mass in the iliac fossa was felt to have grown larger, and in size and mobility gave the impression of a somewhat enlarged movable kidney, though it could not quite be reduced into the loin.

On laparotomy the mass was found to be an intussusception. The head of the intussusceptum was a gangrenous polypus springing from the ileum about four inches from the ileo-caecal valve and having a longitudinal diameter of about one and a half inches. The base of the intussusceptum was on the proximal side of the ileo-caecal valve. The intussusceptum was so oedematous that it could not be reduced by manipulation, and a right hemicolectomy was performed. The patient made a good recovery. The polypus was found histologically to be simple. The intussusceptum was partly gangrenous. The history suggests that the repeated attacks of colic were due to a small intussusception caused by the polypus, but spontaneously reducing itself until the final acute stage when the polypus passed the ileo-caecal valve and could not return.

In the second variety of chronic obstruction the patient passes through definite stages of increasing obstruction till the acute symptoms of complete obstruction appear. Here the obstruction is usually a carcinoma situated in the wall of the great intestine, but not always, for, as an example, an active, tuberculous, mesenteric gland, by producing gradually tightening local adhesions, may cause an obstruction of the small intestine of the same nature.

It has for long been the custom to describe chronic obstruction of this second variety as a condition of two stages, the first called chronic obstruction and the second acute-on-chronic obstruction. The first stage is envisaged and described as a condition in which the symptoms and signs of intestinal obstruction are self-evident and unmistakable, but there is a stage before this, the preemial stage, in which the bowel gives uneasy warnings that something is wrong. This stage is the most important of all from the point of view of treatment and of prognosis, and it is the stage most neglected, perhaps because physical signs are

almost absent and X-ray films show a normal bowel.

I should therefore suggest that the condition of chronic intestinal obstruction should be divided into three stages to correspond with the symptoms and signs. (1) The proemial stage, (2) the stage of declared partial obstruction, (3) the stage of complete obstruction (acute-on-chronic).

In the proemial stage no obstruction as such is present, but the patient feels that everything is not quite right; there may be a little ache or discomfort which will be described as "hardly a pain." This vague discomfort is persistent and is constantly referred to the same abdominal area. The patient asks advice not because of the severity of the symptoms but because he is always conscious of them. Clinical investigation is negative and X-ray examination is unhelpful and often misleading. Women patients are sent by the surgeon to the gynaecologist or vice versa and back again. Such cases should not be dismissed, as they often are, with the label of neurosis. At the moment I can recall four patients with a history of this type on whom I ultimately operated for palpable masses in the colon or rectum.

The cause of the discomfort in some cases may be the local irritation produced by the presence of a very early pathological condition such as carcinoma possibly affecting the nervous mechanism of the bowel, and in view of the frequency of carcinoma of the bowel it is logical to advise a laparotomy in such cases when all other investigations are negative. The following three cases illustrate the problem.

Case 1. Mrs. L. M., aged 33, had complained for about a year of indefinite discomfort in the lower abdomen. She said that she had had a bad time during her first (and only) labour, and that the child had not lived. No gynaecological cause was discovered, and no abnormality was shown by X-ray films. On laparotomy a somewhat fibrous appendix was removed, but on making the routine intra-abdominal examination thereafter a tiny hard nodule was palpated in the sigmoid colon. This was brought to the surface, and presented the appearance of a puckered, fibrous scar, not more than $\frac{1}{4}$ inch in diameter, at the base of one of the appendices epiploicae. This small nodule was excised and the pathological report stated that it consisted of a lobule of fat, the base of which was invaded by carcinoma. A Paul-Mikulicz operation was performed. There has been no recurrence in an interval of over five years. It is probable that the cause of the discomfort in the lower abdomen was the neoplasm of the sigmoid.

Case 2 is similar in some respects to *Case 1*.

Mrs. H. M., aged 54, rather stout, complained

of some persistent discomfort in the region of the gall-bladder, with some flatulence. Apart from slight tenderness in the region of the gall-bladder there were no other symptoms or signs. An X-ray examination after opacol revealed no gall stones. The gall-bladder filled and emptied normally, but showed an irregularity of outline. On laparotomy a normal gall-bladder was found. Two hard, inflamed appendices epiploicae were found with adhesions to the gall-bladder. One of these indurated areas was removed and examined microscopically. The pathological report stated that the specimen was purely inflammatory. Here there is no doubt that the pathological change in the colon was the cause of her symptoms.

Case 3 is of a different nature.

Mrs. M. H., aged 49, had, at the age of 19, an operation for a perforated appendix with peritonitis. Three years later the uterus was removed, but she could not say why. Thereafter she was apparently well enough not to require medical treatment for intestinal trouble until 1941, when, however, an X-ray examination of the intestines produced a "normal" report. Since that date she has complained of dragging pains in the pelvis generally, with some frequency of motions, and flatulence. The symptoms were growing worse. On examination there was some general tenderness on pressure over the lower abdomen. In December 1944, a normal X-ray report was returned after a "follow-through" examination of the intestines. The symptoms were thought to be due to massive pelvic adhesions. On operation the last 5 inches of the ileum were found to be firmly bound down by adhesions in the true pelvis, forming a sharp angled V. At the apex the peritoneum was thickened to form an inelastic band round the bowel.

These three cases, illustrative of the paucity of signs and symptoms during the proemial stage, would without doubt, if left untreated, have proceeded gradually to the second stage of declared obstruction, and possibly to the third; but the process is very gradual and may take years, and in the meantime the patient, having been sent home with a negative X-ray report and a consoling diagnosis such as "a nervous bowel," in many cases fails to pay attention to the gradual increase in severity of the symptoms, and does not return for examination till the signs of obstruction are well advanced.

The picture of the second stage of chronic progressive obstruction is seen best typically in carcinoma of the colon, the lumen of the bowel becoming gradually smaller as the tumour grows or becomes fibrous and contracted.

The symptoms and signs of this stage are not

well marked at first, but soon become unmistakable. The early signs indicating that actual obstruction is beginning are initiated by bouts of constipation. The regular habit of the bowel changes, discomfort increases and there may be an occasional attack of vomiting. There is much flatulence. Later the passage of a fluid stool immediately on rising in the morning is a characteristic symptom when the obstruction is due to carcinoma of the lower colon. The patient obtains a satisfactory evacuation of the bowels only by taking increasing doses of purgatives. In due course the purgatives do not produce the desired effect but result only in griping pain and perhaps vomiting. The patient may be able to indicate the position of obstruction in the colon if asked to point to where the "stoppage" takes place.

The symptom of alternating constipation and diarrhoea is an indication that complete obstruction is imminent, for it means that the lumen of the bowel has become so narrowed that nothing but liquid faeces will pass. It also indicates that the obstruction is in the large bowel probably distal to the caecum. A bout of constipation will produce the hold up of a faecal mass proximal to the constriction, followed by an irritation and possibly ulceration of the mucous membrane associated with organismal liquefaction of the faecal mass and resulting in a period of diarrhoea with much straining. The motions consist of much mucus and little faeces.

The bowel above the obstruction becomes distended and hypertrophied. The abdomen as a whole is increased in size, and visible peristalsis is present, accompanied by colicky pain and borborygmi. During the waves of peristalsis the bowel becomes hard and easily palpable.

When the small intestine is hypertrophied the well-known ladder pattern may be seen on inspecting the abdomen. When the great intestine is extensively involved colonic peristalsis may be recognised. On rectal examination this lowest part of the great intestine may be found distended and paralysed, the so-called ballooning of the rectum.

As the symptoms become severe, toxins from the stagnant contents of the gut are absorbed, and the patient exhibits the usual signs of toxæmia, which may be so severe as to cause collapse and death.

Case 4 was a patient who had reached an advanced second stage obstruction before seeking medical advice on 24/II/44. Mr. R. W., aged 61, stated that for 2 or 3 months he had had slight attacks of abdominal pain, but that the bowels had been regular and the appetite good until 18/II/44, when the pains became more severe. He became constipated and suffered from flatulence.

He was not relieved by aperients, but had some relief from enemata. He had only been sick once. There had been no alternating constipation and diarrhoea and no blood or mucus in the stools. On examination he pointed to the spot where the colicky pains ceased and where he felt that there was a "stoppage." This spot indicated the splenic flexure. As he had a thin abdominal wall, though he said he had lost no weight, there was very visible and palpable peristalsis of the transverse colon, with much distension and hypertrophy. The peristalsis appeared to come to an end at the splenic flexure, but there was no palpable tumour to be felt. On pressing on the transverse colon when in peristalsis a gurgle was produced, as if the bowel contents were being pushed through an obstruction. Rectal examination was negative. There was no ballooning. No toxæmia was present. X-ray examination showed that a barium enema flowed without hindrance to the splenic flexure, where it was held up. After routine preparation the abdomen was opened in the mid line above the umbilicus, with the intention of performing a Paul-Mikulicz operation for removal of the splenic flexure. It was found, however, that the carcinoma, about two inches in diameter, was adherent to the spleen, and, as the patient was deemed unfit, for the time being, to stand the more prolonged operation which the complication rendered necessary, a temporary transverse colostomy was performed. Ten days later, through another incision, the growth was separated from the spleen by diathermy, the adhesions not being extensive, and a Paul-Mikulicz operation was performed. He has made a good recovery.

The faecal hold up, associated with local oedema of the mucous membrane, will finally produce a complete obstruction, and the third stage of so called acute-on-chronic obstruction is initiated.

In this third stage there is at first an increase in colicky pain, but the bowel soon becomes exhausted, and great gaseous distension, with paralysis, results. There is a complete stoppage of the passage of faeces and flatus per anum. Vomiting, exhausting and persistent, supervenes, and the upper intestinal contents appear in the vomitus—the so-called "faecal vomiting." Distension and vomiting here are terminal signs, and unless operation is undertaken immediately, the patient will die either from exhaustion or from peritonitis. When the obstruction occurs in the small bowel, however, the onset of complete obstruction is more dramatic and unexpected, the vomiting is more distressing, and intervals between the bouts are shorter. Shock is greater, and the onset of faecal vomiting and exhaustion is more rapid.

Differential Diagnosis

In the first stage of chronic progressive obstruction a differential diagnosis is one of great difficulty, and is twofold in nature. Two questions must be answered. (1) Is the patient suffering from incipient obstruction? (2) If incipient chronic obstruction is suspected what is the cause of the obstruction?

(1) There are no signs of obstruction, clinically or on X-ray examination, and a vague abdominal discomfort is the only symptom of disorder—a symptom which might be merely the result of errors in diet or other slight abdominal upset. The condition, however, which leads one to suspect that something more than a temporary upset is present is the persistence of the discomfort and its fixed position. It might be said that this condition applies equally well to a mild, chronic appendicitis, salpingitis or cholecystitis. That is quite true and a differential diagnosis may only be possible on laparotomy. If, however, by other means such as X-ray examination it is found that there is no abnormality of the other organs which usually occupy the position of the fixed discomfort, then the intestine must be suspected.

(2) As there are no symptoms or signs by which a possible cause of the suspected incipient obstruction may be diagnosed, the age of the patient may be the only source of help. For example, in the child tuberculous adhesions or disease of the bowel, and in the adult old peritoneal adhesions or malignant disease should be first thought of.

In the second stage, where the symptoms and signs of declared obstruction are present, differential diagnosis is limited to the possible cause of the obstruction. A full history of the previous illnesses and operations and of the course of the present illness must be taken. A careful clinical examination must be made. A palpable tumour may solve the problem or an operation scar may lead one to suspect underlying adhesions. There may, however, be no clinical indication of the cause, and again one may have to fall back upon the consideration of the possible causes of obstruction associated with the age of the patient.

In the child one would exclude a faecal impaction or Hirschsprung's disease by abdominal and rectal examination, or a chronic intussusception might be palpable. In the absence of such definite signs the presence of tuberculous disease in the peritoneum, mesenteric glands or bowel must be given first consideration.

In the adult all the possible causes enumerated at the beginning of this paper must be considered in the light of the previous history, and of the duration and progress of the present symptoms.

In the aged the common causes are faecal

accumulation, carcinoma of the colon and occasionally chronic intussusception. If the patient is in good condition and is fit for an X-ray examination then a barium meal or enema should be given, and may give much help. It must be remembered that a barium meal may aggravate the symptoms of obstruction; a barium enema, however, can be evacuated immediately after the film is exposed, and the bowel washed out.

When the third stage of obstruction has been entered into the condition is now acute. There are complete stoppage of faeces and flatus, great distension and vomiting. The patient is frequently seen by the surgeon for the first time in this stage, and is in a very critical condition, suffering from shock and exhaustion.

It is necessary immediately to establish the fact that the condition is one of complete stoppage. The history of the illness is usually sufficient to establish the diagnosis, but it may be necessary to exclude uraemia, which sometimes simulates this condition with uncontrollable vomiting and abdominal distension. The tongue in this stage of obstruction may be dry and brown. In uraemia the tongue is foul but not so dry. An examination of urine may help. In cases where there is any doubt about the completeness of the stoppage two enemata should be given. The first enema may clear the lower bowel, but if the second enema produces no faeces and no flatus then a condition of absolute constipation is present.

Once this has been established, and also in cases of doubt, an immediate operation should be performed, no delay should occur, and no time should be wasted in attempting to make a differential diagnosis as to the cause of the obstruction apart from a careful review of the history. Unless relieved at once the condition will terminate fatally.

Treatment

The division into pre-operative, operative and post-operative treatment is in no condition more important than in chronic intestinal obstruction.

Pre-operative Treatment

Some time may be devoted to pre-operative treatment when acute obstruction has not supervened or has been relieved by drainage. It consists essentially in clearing the bowel, in rectal salines and other routine methods of preparation for any abdominal operation, and will be detailed later.

When the stage of acute obstruction has been reached the necessity for immediate operation prevents any prolonged preparation. The immediate operation for the relief of the obstruction might even be looked upon as pre-operative treat-

ment prior to the removal of the obstruction; adequate preparation, however, is essential and its omission may be fatal.

The patient must be treated for shock. He must have warmth, and $\frac{1}{4}$ gr. of morphia if in pain. The fluid and chloride loss must be made up and alkalosis remedied. Two or three pints of 5% glucose in normal saline should be given intravenously. Ryle's tube should be passed to the stomach and the contents aspirated with a syringe. The tube should be inserted before operation and should be retained during operation and for 24 hours after, for the purpose of keeping the stomach and upper intestine empty. Without this precaution a general anaesthetic is contraindicated. A spinal anaesthetic should be given if the patient is fit for it. In many cases, however, a local anaesthetic is all that the patient's condition will allow.

Operative Treatment

It is essential at all stages to remove the cause of obstruction and to ensure that a continuity of healthy bowel remains before closing the abdomen. This may be very easy, for example, when the obstruction is due to the kinking of a loop of intestine over a band adhesion and when the bowel has not become gangrenous; when, however, the obstruction has to be removed with a part of the intestinal tube the operation may be so serious that it requires to be performed in three or even four sittings.

As the condition of chronic intestinal obstruction advancing to acute obstruction is most commonly the result of a neoplasm in the great intestine the description of the operative treatment will be limited to this variety. Rectal growths will not be dealt with.

In each of the three stages of obstruction the object of the operation remains the same, the removal of the affected part of the bowel and the restoration of continuity.

In the first and second stages, before complete obstruction, this can be done with comparative safety to the patient, but in the third stage the operation is beset with dangers so great that the life of the patient may hang on a thread easily broken, especially in the early or preliminary part of the complete operation.

By the time the patient suffering from the acute-on-chronic obstruction is seen by the surgeon the intestines are most often distended by flatus and fluid to such an extent that there is no possibility of localising the obstruction by physical examination except that a growth of the rectum can be excluded by digital examination. The patient is in such a poor condition from vomiting and loss of fluid that no major operation can be

attempted. Even if the general condition were good the local condition of the bowel, distended and hypertrophied above the obstruction, collapsed and flabby below, makes a resection and anastomosis a dangerous procedure, apart altogether from the highly septic nature of the bowel contents above the obstruction and the consequent danger of peritoneal contamination.

How much should be done at the first operation? The minimum and essential procedure is the drainage of the bowel above the obstruction. No prolonged attempt should be made to explore the abdomen and determine the position and nature of the obstruction.

Much discussion has arisen between those who advocate a blind caecostomy and nothing more, and those who explore the abdomen first and then perform a caecostomy, having determined the nature and site of the obstruction. Personally I have no liking for a caecostomy, blind or otherwise. The contents that escape through the caecostomy are to all intents and purposes small bowel contents, and the skin around the opening frequently becomes very sore and inflamed, thus increasing the risk of subsequent operative procedure. Again, the caecum will usually require to be closed by operation.

In certain cases the patient is too ill to be given a general anaesthetic, and here there is no alternative to a local anaesthetic and a blind caecostomy. Many patients, however, who are fit to accept a general anaesthetic are too ill to stand the strain of an exploration first through a suitable incision, followed by a fresh caecostomy opening. My own procedure here is to drain the transverse colon through an exploratory incision large enough to admit the hand. The incision is made just above the umbilicus to the right of the mid line. This incision is justified, I believe, by the fact that it is very rarely indeed that an obstruction in the right half of the colon reaches the third stage without a diagnosis having been made, for carcinoma in this area is usually of the large ulcerating type, and is easily palpable long before the lumen is too much narrowed for the fluid, or semi-fluid, contents to pass.

It may be found on making this incision that the obstruction is in the transverse colon, in which case it may be possible to bring a loop of bowel out of the abdomen and combine drainage with the first stage of a Paul-Mikulicz operation. Again, from this incision a very brief and non-traumatic palpation of the left half of a distended colon and the lower surface of the liver can be made, sufficient to locate the growth and to give an indication of the necessary future procedure. If this short exploration is omitted it is true that the growth can be located subsequently by a

barium enema, which, however, will not give much help in determining the possibility or otherwise of future successful removal.

If the obstruction is found in the splenic flexure or distal to that area the transverse colon is attached to the anterior abdominal wall and drained through the incision already made.

When drainage has been established the state of acute obstruction has been relieved, and the subsequent treatment is that of stage 2.

When the stage of acute obstruction has not been reached or where it has been dealt with by this preliminary drainage some time must be given to the preparation of the patient before the colectomy is performed. Steps should be taken to improve the general health and the local condition of the bowel. Diet should be modified with a view to preventing much residue or gaseous distension, but food must be nourishing, and of sufficient quantity, and the patient must be encouraged to take plenty of bland fluids. Smoking should be banned, and alcohol should be avoided.

The condition of the respiratory, circulatory and renal systems should be investigated; anaemia should be treated, and a blood transfusion given when necessary. When at all possible the patient should be out of bed for a few days before the operation. The great intestine should be cleared by simple enemata and irrigation, and mild aperients should be taken, but all local treatment of the bowel should stop on the morning of the day preceding the operation and a small dose of morphia be given in the evening. Personally, I do not prescribe intestinal antiseptics or vaccines.

In suitable cases a period of 3 weeks is not too long to spend on this preparation of the patient.

The question of anaesthesia is one which calls for careful consideration and consultation with an expert anaesthetist, but from the surgeon's point of view spinal anaesthesia, if the patient is fit for this mode of administration, provides the greatest help in carrying out the resection.

The position of the incision depends on the position of the growth. The length of bowel removed depends on the arterial supply and on the lymphatic drainage. When the growth is situated in the caecum or ascending colon, the bowel, which must be removed with the mesentery and lymphatic drainage area, includes the last 6 inches of the ileum, the caecum, ascending colon and the hepatic flexure. When the growth is in the hepatic flexure the excision begins as above but extends to about the middle of the transverse colon.

A transverse colon growth should be excised with about 4 inches of the bowel on each side of it. For a growth in the splenic flexure the bowel from the junction of the middle and left third of

the transverse colon to the middle of the descending colon should be removed. The same upper limit is necessary for a growth of the descending colon, but the lower limit must be extended to the middle of the sigmoid flexure.

For growths of the sigmoid flexure the growth without about 4 inches of bowel on either side should be removed.

Notwithstanding the findings of any previous examination of the growth, the surgeon, before he commits himself to the operation for the removal of the neoplasm, must again examine the liver, lymphatic glands and peritoneum carefully for secondary deposits, and the growth itself for pathological adhesions and fixation.

If secondaries are found in the liver or peritoneum no further operative measures are taken apart from the relief of obstruction by colostomy. If the liver is free from secondaries but the growth itself is found to be irremovable then, if possible, a lateral anastomosis should be made between the colon above the growth and the bowel distal to the growth. If this cannot be done because of the low position of the carcinoma a sigmoid colostomy should be performed. When this is done the transverse colostomy, if it has previously been established, will tend to close of itself.

Excision of part of the colon is a much more serious and dangerous operation than a similar operation on the small intestine, for several reasons. The bowel contents are more infective, the extra-peritoneal cellular tissue is often laid open, the blood supply is not nearly so good, and the suturing is rendered more difficult by the presence of the appendices epiploicae and by the difference in the texture of the bowel wall above and below the obstruction.

Because of the danger of post-operative peritonitis various operations have been devised to ensure an aseptic anastomosis, but none of these is completely reliable, and so, up to the present, my own procedure is as follows:—

For growths situated at, or above, the hepatic flexure (a position in which obstruction is not usually evident at the time of the operation) a one-stage operation for removal of the bowel and side to side anastomosis is performed. The line of anastomosis is dusted with sulphamezathine and a small drainage tube is inserted to the neighbourhood of the anastomosis for 2–3 days. In all other situations a many-stage operation of the type of Paul-Mikulicz is performed. If a colostomy has not already been established, then, if possible, it is avoided, for drainage can be established when the loop of bowel with the growth is delivered at the beginning of the Paul-Mikulicz operation. In future, however, with the introduction of sulphamezathine into the peritoneal cavity around the

suture line it may be possible, with safety, to bring operations on growths in the left half of the colon into line with those in the right.

After Treatment

When the right half of the colon has been removed and the lower end of the ileum has been anastomosed with the transverse colon a rectal tube should be left in situ for a week. During the first 48 hours small quantities of glucose and water should be allowed by mouth, and glucose should also be administered intravenously. Rectal salines should not be given. Liquid paraffin should be given by mouth as soon as the patient can retain it. Thereafter a return to the pre-operative diet, by stages, should not be delayed. Notwithstanding the presence of the rectal tube the patient is likely to suffer from flatulent distension for a few days. Enemata cannot be given, but glycerine suppositories are usually helpful, while a hypodermic injection of morphia, and warmth applied to the abdomen (most conveniently by an electric blanket) will bring relief.

When the stethoscope reveals that peristalsis is re-established then this should be stimulated by the exhibition of pituitrin and eserine in repeated small doses. A laxative should not be administered during the first ten days at least.

After the Paul-Mikulicz operation, at the end of four days, the tube in the upper, and the clamp on the lower, cut end of the bowel should be removed and the enterotome introduced, for if this stage in the operation is delayed the spur between the two openings becomes hard and fixed, and difficult to remove even by the efficient use of the enterotome. Thereafter a return to the pre-operative diet may be achieved in a few days' time. The colostomy will not as a rule close of itself, and a small operation may be necessary for its closure.

Summary

The course of chronic intestinal obstruction has been divided into three stages, (1) proemial, (2) partial declared obstruction, and (3) complete or acute-on-chronic obstruction. From the point of view of treatment and prognosis the first is by far the most important, and every endeavour should be made, even to the extent of an exploratory laparotomy in suspicious cases, to establish the presence or absence of a condition leading to obstruction.

In the second stage some time may be given to discover the cause of the obstruction, but in the third no time must be wasted; a laparotomy must be done at once.

In this article an attempt is made to indicate

the treatment appropriate to the three stages, as well as to point out the grave dangers attending operation in the third stage.

INTESTINAL OBSTRUCTION IN CHILDHOOD

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Introduction.

Intestinal obstruction presents many interesting problems both in diagnosis and treatment, and this is particularly true in the case of a young child, for here frequently the history may be misleading, the appearance of the child deceptive, and the actual examination of the abdomen both difficult and puzzling. Atypical cases of partial obstruction may be missed until the small patient is dangerously ill, and the less acute cases may be wrongly diagnosed, particularly in infancy, as disorders of feeding. Hence it is important to consider the subject of intestinal obstruction as it affects the young child.

It is a well-known fact that the younger the child the greater the risk to life of acute dehydration with its oft-associated toxæmia, and not infrequently the onset of obstruction may be masked in its early stages and later progress with alarming rapidity to a fatal issue. It is, thus, essential that we should make an early diagnosis and institute treatment, whether surgical or conservative, without delay if a satisfactory result is to be achieved.

The multiplicity of pathological conditions which may be met with is a confusing factor, particularly when one remembers the number of congenital errors which may, at some date, be responsible for the onset of an intestinal obstruction: it is by no means essential, and at times not even wise, to attempt to make an accurate diagnosis as to the exact cause or site, for the important decision to be reached is the answer to the question, "Is this child suffering from acute intestinal obstruction?" It is, however, certainly useful and instructive to make a tentative diagnosis when possible, particularly as to the level of the lesion, for, as in the adult, high obstruction is relatively more dangerous than obstruction of the distal colon.

Classification.

There are many potential causes of obstruction in childhood, particularly of the acute variety, and