

## POSTOPERATIVE INTESTINAL OBSTRUCTION\*

G. D. DELPRAT, M.D., F.A.C.S., AND ALANSON WEEKS, M.D., F.A.C.S.

SAN FRANCISCO, CALIF.

THE causes of intestinal obstruction in the non-operated abdomen are few. It is true that malignancies (principally carcinomas) of the intestine are apt to occur toward late middle life and early senescence, and that congenital anomalies, volvulus and intussusception must be considered in the diagnosis of intestinal obstruction in early life. During the major part of adult life, however, obstruction of the intestine is a rare occurrence except in these persons who have been subjected to an abdominal operation. Before the days of abdominal surgery, strangulated herniae occupied a similar position of importance as a cause of intestinal obstruction in adult life. In backward communities, where reducible herniae are neglected, operations for strangulated herniae are very frequent. Mission surgeons returning from Africa report a surprisingly high incidence of herniae among the natives, most of which sooner or later become strangulated.

In 88 cases of the authors, of intestinal obstruction during the last few years, in which operation was necessary, 32 cases had had some surgical interference in the abdomen. In this paper, however, the occurrence of intestinal obstruction will be considered as a postoperative complication, and only those cases discussed where the obstruction occurred during the patient's stay in the hospital, or happening a very short time after the patient's discharge from the hospital.

The cause of intestinal obstruction (postoperative) is the formation of adhesions either in the form of "fiddle-strings," broad bands, or the plastering together of loops of intestine with angulations or twists. The final cause of adhesions is obscure and their prevention even more elusive. No one has been able to explain why one simple clean case should be

followed by adhesions that obstruct, and another case where extensive manipulations are necessary remain free from symptoms. The plea of "gentleness in handling tissues" should always be made, but it is by no means the whole story. Case 11 came to operation with a three liter multilocular ovarian cyst. With the patient in the Trendelenburg position a low, midline incision was made, and the cyst found immediately below. A trochar was inserted and enough fluid withdrawn to allow the cyst to be delivered from the abdomen. There were no adhesions between the cyst and adjacent organs. The intestines, from the patient's position, were well up in the abdomen and no packing or handling was required. The cyst pedicle was clamped, ligated, sutured, peritonealized without the slightest difficulty, leaving a single small suture line, but to this later became attached the sigmoid colon so firmly in five days that obstruction developed which required surgical relief. It is difficult to imagine an operation on the abdomen where there was less tissue manipulation, and yet how many more serious cases escape this complication.

Another interesting, but most distressing group is the so-called plastic peritonitis case. Here extensive adhesions form between adjacent loops of intestines along varying areas of their contiguous surfaces. This condition is clearly beyond the control of the surgeon, but yet he is faced with the burden of repeated operations. One such case has been operated on four times. In another such case the filmy, sticky adhesions could actually be seen to form on the operating table. This patient developed a second obstruction within a few months, which required operative relief. No chemical or other treatment of value has been found to treat this condition.

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Considered as a postoperative complication it is first necessary to differentiate intestinal obstruction from paralytic ileus. Both conditions are apt to be associated with abdominal distention, tympany and vomiting. An absolute distinction cannot be made because paralytic ileus implies a functional obstruction. But distinction must be made between cases that are to be treated as outlined below for (a) ileus and (b) intestinal obstruction.

As a general rule the later onset of ileus can be predicted at the time of operation. Where abdominal infections have been stirred up, or where there has been undue handling of abdominal organs or intestines, one may confidently expect (and is seldom disappointed) paralysis of the intestine which lasts a varying period of time. Clinically, the patient shows increasing abdominal distention commencing twelve to twenty-four hours after the operation. The abdomen becomes tympanitic and tense. The abdominal muscles feel rigid, but this apparent rigidity is really due to the intra-abdominal pressure. No visible peristaltic waves are seen, and with the stethoscope no borborygmus is heard. Auscultation of the abdomen with the stethoscope is an extremely important part of an examination but is frequently omitted. As the distention increases the patient becomes dyspneic from interference with the movement of the diaphragm. The patient becomes cyanotic from cardiac embarrassment. There is usually a cold, clammy perspiration and the patient has an expression of anxiety and apprehension which may well be reflected in the faces of his attendants. In a short period of time emesis of a small quantity of dark fluid may occur. This is usually the indication for the passage of a stomach tube, which reveals the fact that a large amount of dark, foul-smelling intestinal contents distend the stomach.

It has been noted frequently by the senior author that in these cases the general appearance of the patient (aside from the abdominal findings) bears a

close resemblance to that of toxemia from infections of various anaerobic organisms. It has been shown that numerous organisms of the anaerobic group are to be found in the average normal individual. The rapid multiplication of these organisms in a stagnant intestine vitiated by a depressed circulation, would not be surprising, nor is it unlikely that the toxic products of the growth of these organisms has a profound influence on the general condition of the patient.

The clinical picture of a typical postoperative intestinal obstruction is shown in Case III. After a period of uneventful convalescence which may be as short as four days, the patient may suddenly complain of severe, agonizing abdominal pain. The onset of pain may be of startling abruptness. In Case V, the pain came suddenly enough to interrupt a sentence and clip a word in two. Such severe pain is usually of short duration, giving way to a general soreness in the upper abdomen or about the incision, which in a few minutes reaches a crescendo of acute pain. Paroxysms of pain follow one another with definite regularity. Immediately preceding the acute period of pain, peristaltic waves are to be seen in some cases, and even during the quiescent periods, a stethoscope on the abdomen reveals the boiling within. Very soon after the onset of the pain the patient vomits, first the gastric contents and then green, bile-stained, mucus. At first there is usually no abdominal distention. These symptoms are definitely indicative of small intestinal obstruction and immediate treatment is imperative.

Postoperative obstructions involving the colon, and especially the sigmoid as in Case II, are marked by less startling symptoms. Pain may be a less prominent symptom and its paroxysmal character only elicited after careful questioning. Even if this pain is overlooked suspicion of an obstruction must be aroused by the interruption of the fecal stream. Perhaps no other fact alone illustrates as clearly

the need of care of the toilet of the colon in postoperative cases. Vomiting is always a late symptom in obstruction of the colon. Distention, gradually increasing in extent is the rule, but associated with it is an active peristalsis which sometimes may be seen but always may be heard with the stethoscope.

If these symptoms supervene on about the ninth or tenth postoperative day one must be suspicious of a fecal impaction. Each postoperative case should be given an enema every day unless a satisfactory spontaneous evacuation has occurred: in spite of such a "standing order" it occasionally happens that fecal matter is allowed to accumulate and become inspissated, particularly if the intestinal activity has been slowed by morphine. This condition can be ascertained from the clinical notes and occasionally the impaction can be felt through the rectum. The treatment is obvious. This never occurs if the funnel drip is used.

In the treatment of paralytic ileus and intestinal obstruction it is necessary first of all to detoxicate the patient. This can best be done by intravenous injections of 10 per cent glucose. If there has been considerable vomiting the glucose is given in normal salt solution, irrespective of whether there is a decrease of the blood chloride. A liter of this solution is given twice a day. Intramuscular injections of glucose should not be given in a concentration of over 5 per cent. We very rarely give glucose by this method.

Patients showing abdominal distention due to a paralysis of the intestine are further treated by large hot abdominal compresses and almost continuous flushing of the colon with normal salt solution. Between the frequently repeated colon flushings the funnel drip remains in operation. Enemas of milk and molasses are occasionally given, and to be efficacious these should be of 1000 to 1500 c.c. volume. Injections of surgical pituitrin (1 c.c.) are occasionally given, but the use of drug as a routine is not to be recommended. If the slightest sus-

picion exists of the presence of an organic intestinal obstruction the use of pituitrin is absolutely contraindicated. Gastric lavage should be practiced early before the patient begins to vomit. The removal of gastric contents gives great relief, and the stomach should be kept empty. This may be done by passing a duodenal tube which is left in the stomach and through which irrigations with normal salt are made every thirty minutes. In some cases we have employed the Cornell continuous suction. It is rarely necessary to subject the patient to jejunostomy for the relief of this condition. The incision and drainage of loops of lower small intestine serves to collapse only the loop that is drained, but as a therapeutic measure is useless.

With the sudden postoperative appearance of symptoms of intestinal obstruction immediate operation is indicated. Case v was operated on two hours after the onset of symptoms. Morphine should not be given until operation has been offered and accepted by the patient. In recent postoperative cases the best approach is through the previous incision. If the previous abdominal wound is completely healed, the incision should be made about an inch to one side. The site of obstruction is usually felt without difficulty, and must be relieved. It is surprising how firmly organized adhesions may become in a very few days. The technic of freeing the obstructive condition must vary with the operative findings. Fiddle-string adhesions are cut and the points of attachment buried with a purse-string suture. Broad adhesions are divided with sharp dissection and an endeavor made to cover raw surfaces.

After obstruction of the small intestine has supervened for some hours it is our practice to insert into the dilated loop of jejunum a catheter which is carried out through the abdominal incision. Irrigations with normal salt can be accomplished through this channel. Although "milking out the dilated intestine" has been advised by many surgeons, we have felt that this

treatment involves too much manipulation for safety.

In obstructions of the large bowel drainage of the small intestine is also accomplished by jejunostomy. In cases of long standing obstruction with marked toxemia, where an attempt to free the obstructing adhesions seems hazardous on account of the condition of the patient, a jejunostomy should be performed through a small high left rectus incision. This procedure may carry a patient out of the acutely toxic period and allow the obstruction to be relieved with safety at a later date. It is frequently noted that after the small intestine has been drained, and the intra-abdominal pressure reduced, as by an ileostomy, jejunostomy, or cecostomy, an apparently complete bowel obstruction will allow fluid and gas to pass.

We consider that the treatment of the conditions discussed above is definite and positive. In abdominal distention (due to ileus or peritonitis) without obstruction, gastric lavage, compresses to the abdomen, colon irrigation and intravenous fluid medication are instituted. If from the increasing pressure, fluid keeps flowing into the stomach, and gastric lavage proves unsatisfactory, jejunostomy is indicated. If the stomach can be kept properly emptied, jejunostomy gives no added advantage. The stomach tube must be passed early.

In intestinal obstruction operation, with or without drainage of the intestine, is indicated as early as possible. Conservative treatment, "Waiting for a kink to unwind" is dangerous, and is usually based upon a lack of careful consideration of clinical symptoms.

The following cases typical of post-operative obstruction, developing soon after operation, have been selected as illustrations:

CASE I. Operation, St. Luke's Hospital, January 19, 1924, cholecystectomy. Discharged from the hospital on February 2, 1924. Readmitted on February 15, with history of repeated vomiting, and evidence of first partial and

later complete upper intestinal obstruction. Operation February 16 showed duodenum closely adherent to the lower surface of the liver and the gall bladder fossa, which caused complete obstruction of the duodenum. This adhesion was not separated, but a posterior gastroenterostomy performed. Convalescence uneventful.

CASE II. Patient aged sixty-nine. Operation St. Luke's Hospital November 1, 1927. Low midline incision. Very large multilocular cyst presented, partly aspirated and delivered with long pedicle arising from left broad ligament. This was tied off and raw surfaces covered. November 4 the abdomen was moderately distended with gas, but fecal matter was returned by colon irrigation. November 5 colon flushes returned practically clear; some gas was passing but very little. The distention was increasing. Patient was nauseated and vomited a small amount of mucus. One thousand c.c. 10 per cent glucose in saline intravenous administered. November 6, 2:30 A.M. patient was having cramp-like pains. Distension still present, and peristaltic waves were seen passing across the abdomen. Occasional gas bubbles passed through the funnel drip. Operation November 6, 1927, 10 A.M. through old abdominal incision. Intestines were greatly distended, both large and small, but free from evidence of peritonitis. Small amount of serosanguineous fluid in the belly. In the left broad ligament the sigmoid was attached with organizing adhesions through a distance of about  $2\frac{1}{2}$  inches. When these adhesions were freed, sudden gurgling of gas was heard, indicating that the obstruction had been relieved. A catheter was sewn into a dilated loop of jejunum, drawn out through a gap in the omentum through the upper end of the wound, to make certain of upper intestinal drainage, should the sigmoid again close. Abdomen closed. During the next eight or nine days the patient continued to be moderately distended. Gas and fecal matter were passed. Intravenous injections of 1000 c.c. of 10 per cent glucose in saline were made twice daily for eight days, and once daily for the next seven days. Massive milk and molasses enemas were given frequently and produced the best results. This procedure is dirty but the most effective to iron out kinks and angles in lumen of the bowel. By the fourteenth day the patient was walking and left the hospital without

further complications on December 7. She has been entirely well since that time.

CASE III. Operation January 24, 1929. Dante Sanitarium, for two enormous fibroid tumors of the uterus and a cystic right ovary. Supravaginal hysterectomy and right salpingo-oophorectomy. Stump of cervix and right broad ligament peritonealized in the usual manner. Convalescence uneventful. Patient home on the 12th of February, 1929 (home 110 miles from this city). Returned to hospital on February 20 with a history of very severe abdominal pain, coming on suddenly on the evening of February 17. Patient vomited soon after onset of pain. Pain was paroxysmal in character, severe, had continued until her admission to the hospital. Her physician at her home told her she had a "kink which would straighten out." The vomiting became fecal and patient markedly toxic and dehydrated. When admitted to the hospital the patient was in marked acidosis, with deep stupor but could be aroused. Pulse of poor quality, about 100. Temperature subnormal. She was given 1000 c.c. of 10 per cent glucose in salt solution intravenously. Operation under ethylene anesthesia on February 20. Incision through dense clean scar of the old operation. Considerable clear, yellow fluid in the abdomen. Dense adhesions found binding the sigmoid over to the right of the cecum. The terminal ileum was angulated and obstructed in the right iliac fossa. After freeing this obstruction it was found that a small portion of the terminal ileum was bound down in the right iliac fossa by a congenital band of peritoneum which was separated with some difficulty. A catheter sewed in the jejunum was led out through the abdominal wound. Patient received a second glucose in salt intravenous infusion, but expired twelve hours later, a victim of delay and conservatism.

CASE IV. Patient was subjected to 2 cesarean operations. During the three or four years following the first cesarean operation the patient had frequent symptoms which were undoubtedly attacks of partial and almost

complete intestinal obstruction. These cleared. We were called upon to do a second cesarean operation, but at the time of this operation no exploration was made, since a long period of time had elapsed since the last attack of partial obstruction, and there seemed to be no indication for prolonging the cesarean operation by an abdominal exploration. Two or three days following the cesarean operation the patient developed complete obstruction of the small intestine. This condition called for another abdominal operation. On opening the abdomen it was found that the mesentery of the transverse colon was tightly adherent to the posterior parietal peritoneum and was pulled down before the ligament of Treitz, leaving a small ring through which more than half the small intestine had herniated. This hernia had never become completely occluded until the distention occurred, which followed the insult of the cesarean operation, with its associated postoperative ileus. At the time of operation this hernia was angulated sufficiently to completely block the bowel in this ring.

CASE V. Aged twenty-four. Operation St. Luke's Hospital March 13, 1930, for right ovarian cyst and chronic appendix. Low, mid-line incision. Right ovarian cyst and appendix removed in routine manner without difficulty. Abdomen closed. Convalescence entirely uneventful. Temperature normal. Pulse 80-90. Patient allowed up and around ward on the tenth day. On March 23 at 8:00 P.M. patient had sudden onset of excruciating pain in the right lower quadrant and vomited dinner eaten at 6:00 o'clock. Vomitus continued until operation at 10:00 P.M. Pains definitely paroxysmal and very severe. Abdomen sore between paroxysms which came every two or three minutes. Peristaltic waves seen. Operation March 23 at 10 P.M. through old incision. Two adhesions of the ileum found to the cecum, with a loop herniated through the space between these and also attached. These adhesions were very well organized and were freed with careful knife dissection. Raw surfaces peritonealized. Postoperative convalescence entirely uneventful.

