

pendicitis. Sixty-eight per cent of the fatal cases die during the first eight days. Extension to the general peritonæum is almost always fatal. Perforation into the bowel is often followed by recovery. Perforation externally is still less serious. Nowadays, with the prompt surgical interference, the prognosis is very much better.

Treatment.—The studies of Pepper, Noyes, With, and Matterstock, and more particularly the elaborate and thorough study of Fitz, have directed the attention of physicians to the clinical features of the diseases in the cæcal region, but to the surgeons we owe invaluable lessons relating to diagnosis and, above all, to treatment.

The suggestion of Willard Parker with reference to early operation has been carried out and advocated by Sands, Bull, and Weir in New York, by Morton and Keen in Philadelphia, and by Treves in London.

Treatment of the Attack.—The medical treatment of appendicitis can be expressed in three words—rest, opium, and enemata. The patient should be quiet in bed with an ice-bag placed in the right iliac fossa. If there is much pain, opium should be given either hypodermically or by the mouth. Medium-sized injections of warm water may be given twice daily. I would protest most earnestly against the indiscriminate use of saline purges, which have been advocated under a total misapprehension. It cannot be too strongly emphasized that, as a rule, the initial condition, which produces the pain, the fever, and the local signs, is the establishment after perforation of a localized peritonitis. So long as the abscess cavity remains limited, resolution is possible. Saline purges mean more or less disturbance of the local conditions and a definite increase in the risk of general peritonitis. It is an entirely different matter when this is established. Salines in some instances then do good, but in appendicitis, when the general peritonæum is involved, the mischief is done, and neither salines nor laparotomy materially influence the result.

The profession has yet to learn the lesson that perforative appendicitis is in more than three fourths of all cases a surgical affection, and perhaps the most important function of the physician, under whose care the disease always comes at first, is to say whether the case is suitable and when the operation should be performed.

Operation is indicated: (a) in all cases of acute inflammatory trouble in the cæcal region when, whether tumor is present or not, the general symptoms are severe, as shown by tympany, spreading pain, increase in fever, and increase in the rapidity of the pulse. In so many of the cases no tumor is to be felt that stress cannot be laid upon its absence.

(b) When a definite tumor is present, associated with attacks such as have been described, particularly if they have been recurrent. An occasional exception may be made to this rule when, even with small tumor, the symptoms rapidly subside and the patient improves. We are here on the horns of a dilemma. On the one hand, it is in just such cases that perforation and fatal peritonitis may at any moment occur, and, on the

other, the tumor may gradually disappear and the patient may have no further trouble.

(c) In recurrent appendicitis, when the attacks are of such severity and frequency as seriously to interrupt the patient's occupation. Is the interim operation advisable or shall the patient be advised to wait until an attack? Opinions differ on this point. It is best, I think, to wait. The operation has risks; patients have died from the interim laparotomy; and there is always a chance that the recovery from an attack may prove permanent. Both clinical observation and morbid anatomy show that complete healing is by no means rare. The physician must be guided too by the character of the surgical technique at his command, and could hand over his patient without qualms to a modern operator whose success has demonstrated the safety of his methods.

IV. INTESTINAL OBSTRUCTION.

Intestinal obstruction may be caused by strangulation, intussusception, twists and knots, strictures and tumors, and by abnormal contents.

Etiology and Pathology.—(a) *Strangulation.*—This is the most frequent cause of acute obstruction, and occurred in thirty-four per cent of the 295 cases analyzed by Fitz,* and in thirty-five per cent of the 1,134 cases of Leichtenstern.† Of the 101 cases of strangulation in Fitz's table, which has the special value of having been carefully selected from the literature since 1880, the following were the causes: Adhesions, 63; vitelline remains, 21; adherent appendix, 6; mesenteric and omental slits, 6; peritoneal pouches and openings, 3; adherent tube, 1; peduncular tumor, 1. The bands and adhesions result, in a majority of cases, from former peritonitis. A number of instances have been reported following operations upon the pelvic organs in women. The strangulation may be recent and due to adhesion of the bowel to the abdominal wound or a coil may be caught between the pedicle of a tumor and the pelvic wall. Such cases are only too common. Late occlusion after recovery from the operation is due to bands and adhesions.

The vitelline remains are represented by Meckel's diverticulum, which forms a finger-like projection from the ileum, usually within eighteen inches of the ileo-cæcal valve. It is a remnant of the omphalo-mesenteric duct, through which, in the early embryo, the intestine communicated with the yolk-sac. The end, though commonly free, may be attached to the abdominal wall near the navel, or to the mesentery, and a ring is thus formed through which the gut may pass.

Seventy per cent of the cases of obstruction from strangulation occur

* Transactions of the Congress of American Physicians and Surgeons, vol. i, 1889. The percentages of his tables are used throughout this section.

† Von Ziemssen's Encyclopædia of Practical Medicine.

in males; forty per cent of all the cases occur between the ages of fifteen and thirty years. In ninety per cent of the cases of obstruction from these causes the site of the trouble is in the small bowel; the position of the strangulated portion was in the right iliac fossa in sixty-seven per cent of the cases, and in the lower abdomen in eighty-three per cent.

(b) *Intussusception*.—In this condition one portion of the intestine slips into an adjacent portion, forming an invagination or intussusception. The two portions make a cylindrical tumor, which varies in length from a half-inch to a foot or more. The condition is always a descending intussusception, and as the process proceeds, the middle and inner layers increase at the expense of the outer layer. An intussusception consists of three layers of bowel: the outermost, known as the intussusciens, or receiving layer; a middle or returning layer; and the innermost or entering layer. The student can obtain a clear idea of the arrangement by making the end of a glove-finger pass into the lower portion. The actual condition can be very clearly studied in the post-mortem invaginations which are so common in the small bowel of children. In the statistics of Fitz, 93 of 295 cases of acute intestinal obstruction were due to this cause. Of these, 52 were in males and 27 in females. The cases are most common in early life, thirty-four per cent under one year and fifty-six per cent under the tenth year. No definite causes could be assigned in 42 of the cases; in the others diarrhoea or habitual constipation had existed.

The site of the invagination varies. We may recognize (1) an *ileo-cæcal*, when the ileo-cæcal valve descends into the colon. There are cases in which this is so extensive that the valve has been felt per rectum. This form occurred in seventy-five per cent of the cases. In the *ileo-colic* the lower part of the ileum passes through the ileo-cæcal valve. (2) The *ileal*, in which the ileum is alone involved. (3) The *colic*, in which it is confined to the large intestine. And (4) *colico-rectal*, in which the colon and rectum are involved.

Irregular peristalsis is the essential cause of intussusception. Nothnagel found in the localized peristalsis caused by the faradic current that it was not the descent of one portion into the other, but the drawing up of the receiving layer by contraction of the longitudinal coat. Invagination may follow any limited, sudden, and severe peristalsis.

In the post-mortem examination, in a case of death from intussusception, the condition is very characteristic. Peritonitis may be present or an acute injection of the serous membrane. When death occurs early, as it may do from shock, there is little to be seen. The portion of bowel affected is large and thick, and forms an elongated tumor with a curved outline. The parts are swollen and congested, owing to the constriction of the mesentery between the layers. The entire mass may be of a deep livid-red color. If very recent there is only congestion, and perhaps a slight layer of lymph, and the intussusception can be reduced, but when it

has lasted for a few days, lymph is thrown out, the layers are glued together, and the entering portion of the gut cannot be withdrawn.

The anatomical condition accounts for the presence of the tumor, which exists in two thirds of all cases; and the engorgement, which results from the compression of the mesenteric vessels, explains the frequent occurrence of blood in the discharges, which has so important a diagnostic value. If the patient survives, necrosis and sloughing of the invaginated portion may occur, and if union has taken place between the middle and outer layer, the calibre of the gut may be restored and a cure in this way effected. Many cases of the kind are on record. In the Museum of the Medical Faculty of McGill University are 17 inches of small intestine, which were passed by a lad who had had symptoms of internal strangulation, and who made a complete recovery.

(c) *Twists and Knots*.—*Volvulus* or twist occurred in 42 of the 295 cases. Sixty-eight per cent were in males. It is most frequent between the ages of thirty and forty. In the great majority of all cases the twist is axial and associated with an unusually long mesentery. In fifty per cent of the cases it was in the sigmoid flexure. The next most common situation is about the cæcum, which may be twisted upon its axis or bent upon itself. As a rule, in *volvulus* the loop of bowel is simply twisted upon its long axis, and the portions at the end of the loop cross each other and so cause the strangulation. It occasionally happens that one portion of the bowel is twisted about another.

(d) *Strictures and Tumors*.—These are very much less important causes of acute obstruction, as may be judged by the fact that there are only 15 instances out of the 295 cases, in 14 of which the obstruction occurred in the large intestine. On the other hand, they are common causes of chronic obstruction.

The obstruction may result from: (1) *Congenital stricture*. These are exceedingly rare. Much more commonly the condition is that of complete occlusion, either forming the imperforate anus or the congenital defect by which the duodenum is not united to the pylorus. (2) *Simple cicatricial stenosis*, which results from ulceration, tuberculous or syphilitic, more rarely from dysentery, and most rarely of all from typhoid ulceration. (3) *New growths*. The malignant strictures are due chiefly to cylindrical epithelioma, which forms an annular tumor, most commonly met with in the large bowel, about the sigmoid flexure, or the descending colon. Of benign growths, papillomata, adenomata, lipomata, and fibromata occasionally induce obstruction. (4) *Compression and traction*. Tumors of neighboring organs, particularly of the pelvic viscera, may cause obstruction by adhesion and traction; more rarely, a coil, such as the sigmoid flexure, filled with faeces, compresses and obstructs a neighboring coil. In the healing of tuberculous peritonitis the contraction of the thick exudate may cause compression and narrowing of the coils.

(e) **Abnormal Contents.**—Foreign bodies, such as fruit stones, coins, pins, needles, or false teeth, are occasionally swallowed accidentally, or by lunatics on purpose. Round worms may become rolled into a tangled mass and cause obstruction. In reality, however, the majority of foreign bodies, such as coins, buttons, and pins, swallowed by children, cause no inconvenience whatever, but in a day or two are found in the stools. Occasionally such a foreign body as a pin will pass through the œsophagus and will be found lodged in some adjacent organ, as in the heart (Peabody), or a barley ear may reach the liver (Dock).

Medicines, such as magnesia or bismuth, have been known to accumulate in the bowels and produce obstruction, but in the great majority of the cases the condition is caused by fæces, gall-stones, or enteroliths. Of 44 cases, in 23 the obstruction was by gall-stones, in 19 by fæces, and in 2 by enteroliths. Obstruction by fæces may happen at any period of life. As mentioned when speaking of dilatation of the colon, it may occur in young children and persist for weeks. In fæcal accumulation the large bowel may reach an enormous size and the contents become very hard. The retained masses may be channeled, and small quantities of fæcal matter are passed until a mass too large enters the lumen and causes obstruction. There may be very few symptoms, as the condition may be borne for weeks or even for months.

Obstruction by gall-stones is not very infrequent, as may be gathered from the fact that twenty-three cases were reported in the literature in eight years. Eighteen of these were in women and five in men. In six sevenths of the cases it occurred after the fiftieth year. The obstruction is usually in the ileo-cæcal region, but it may be in the duodenum. These large solitary gall-stones ulcerate through the gall-bladder, usually into the small intestine, occasionally into the colon. In the latter case they rarely cause obstruction. Courvoisier has collected one hundred and thirty-one cases in the literature.

Enteroliths may be formed of masses of hair, more commonly of the phosphates of lime and magnesia, with a nucleus formed of a foreign body or of hardened fæces. Nearly every museum possesses specimens of this kind. They are not so common in men as in ruminants, and, as indicated in Fitz's statistics, are very rare causes of obstruction.

Symptoms.—(a) **Acute Obstruction.**—Constipation, pain in the abdomen, and vomiting are the three important symptoms. Pain sets in early and may come on abruptly while the patient is walking or, more commonly, during the performance of some action. It is at first colicky in character, but subsequently it becomes continuous and very intense. Vomiting follows quickly and is a constant and most distressing symptom. At first the contents of the stomach are voided, and then greenish, bile-stained material, and soon, in cases of acute and permanent obstruction, the material vomited is a brownish-black liquid, with a distinctly fæcal odor. This sequence of gastric, bilious, and, finally, stercoraceous vomit-

ing is perhaps the most important diagnostic feature of acute obstruction. The constipation may be absolute, without the discharge of either fæces or gas. Very often the contents of the bowel below the stricture are discharged. Distention of the abdomen usually occurs, and when the large bowel is involved it is extreme. On the other hand, if the obstruction is high up in the small intestine, there may be very slight tympany. At first the abdomen is not painful, but subsequently it may become acutely tender.

The constitutional symptoms from the outset are severe. The face is pallid and anxious, and finally collapse symptoms supervene. The eyes become sunken, the features pinched, and the skin is covered with a cold, clammy sweat. The pulse becomes rapid and feeble. There may be no fever; the axillary temperature is often subnormal. The tongue is dry and parched and the thirst is incessant. The urine is high-colored, scanty, and there may be suppression, particularly when the obstruction is high up in the bowel. This is probably due to the constant vomiting and the small amount of liquid which is absorbed. The case terminates as a rule in from three to six days. In some instances the patient dies from shock or sinks into coma.

(b) **Symptoms of Chronic Obstruction.**—When due to fæcal impaction, there is a history of long-standing constipation. There may have been discharge of mucus, or in some instances the fæcal masses have been channeled, and so have allowed the contents of the upper portion of the bowel to pass through. In elderly persons this is not infrequent; but examination, either *per rectum* or externally, in the course of the colon, will reveal the presence of hard scybalous masses. There may be retention of fæces for weeks without exciting serious symptoms. In other instances there are vomiting, pain in the abdomen, gradual distention, and finally the ejecta become fæcal. The hardened masses may excite an intense colitis or even peritonitis.

In stricture, whether cicatricial or cancerous, the symptoms of obstruction are very diverse. Constipation gradually comes on, is extremely variable, and it may be months or even years before there is complete obstruction. There are transient attacks, in which from some cause the fæces accumulate above the stricture, the intestine becomes greatly distended, and in the swollen abdomen the coils can be seen in active peristalsis. In such attacks there may be vomiting, but it is very rarely of a fæcal character. In the majority of these cases the general health is seriously impaired; the patient gradually becomes anæmic and emaciated, and finally, in an attack in which the obstruction is complete, death occurs with all the features of acute occlusion or the case may be prolonged for ten or twelve days.

Diagnosis.—(a) **The Situation of the Obstruction.**—Hernia must be excluded, which is by no means always easy, as fatal obstruction may occur from the involvement of a very limited portion of the gut in the

external ring or in the obturator foramen. Mistakes from both of these causes have come under my observation; they were cases in which it was impossible to make a diagnosis other than acute obstruction. Timely operation would have saved both lives. A thorough rectal and vaginal examination should be made, which will give important information as to the condition of the pelvic and rectal contents, particularly in cases of intussusception, in which the descending bowel can sometimes be felt. In cases of obstruction high up the empty coils sink into the pelvis and can there be detected. Rectal exploration with the entire hand is of doubtful value. In the inspection of the abdomen there are important indications, as the special prominence in certain regions, the occurrence of definite, well-defined masses, and the presence of hypertrophied coils in active peristalsis. In obstruction in the duodenum or jejunum there may only be slight distention in the upper part of the abdomen, associated usually with rapid collapse and anuria.

In the ileum and cæcum the distention is more in the central portion of the abdomen; the vomiting is distinctly faecal and occurs early. In obstruction of the colon, tympanites is much more extensive and general. Tenesmus is more common, with the passage of mucus and blood. The course is not so quick, the collapse does not supervene so rapidly, and the urinary secretion is not so much reduced.

In obstruction from stricture or tumor the situation can in some cases be accurately localized, but in others it is very difficult. Digital examination of the rectum should first be made. The rectal tube may then be passed, but it is impossible to get beyond the sigmoid flexure. In the use of the rigid tube there is danger of perforation of the bowel in the neighborhood of a stricture. The quantity of fluid which can be passed into the large intestine should be estimated. The capacity of the large bowel is about six quarts. The safe limits of pressure have been determined to be under ten feet in an infant and twenty feet in an adult. To thoroughly irrigate the bowel the patient should be chloroformed and should lie on the back or on the side; best on the back with the hips elevated. Treves suggests that the cæcal region should be auscultated during the passage of the fluid. For diagnostic purposes the rectum may be inflated, either by the bellows or by the use of bicarbonate of soda and tartaric acid. In certain cases these measures give important indications as to the situation of the obstruction in the large bowel.

(b) *Nature of the Obstruction.*—This is often difficult, not infrequently impossible, to determine. *Strangulation* is not common in very early life. In many instances there have been previous attacks of abdominal pain, or there are etiological factors which give a clue, such as old peritonitis or operation on the pelvic viscera. Neither the onset nor the character of the pain gives us any information. In rare instances nausea and vomiting may be absent. The vomiting usually becomes faecal from the third to the fifth day. A tumor is not common in strangulation, and

was present in only one fifth of the cases. Fever is not of diagnostic value.

Intussusception is an affection of childhood, and is of all forms of internal obstruction the one most readily diagnosed. The presence of tumor, bloody stools, and tenesmus are the important factors. The tumor is usually sausage-shaped and felt in the region of the transverse colon. It existed in 66 of 93 cases. It was present on the first day in more than one third of the cases, on the second day in more than one fourth, and on the third day in more than one fifth. Blood in the stools occurs in at least three fifths of the cases, either spontaneously or following the use of an enema. The blood may be mixed with mucus. Tenesmus is present in one third of the cases. Faecal vomiting is not very common and was present in only 12 of the 93 instances. Abdominal tympany is a symptom of slight importance, occurring in only one third of the cases.

Volvulus can rarely be diagnosed. The frequency with which it involves the sigmoid flexure is to be borne in mind. The passage of a flexible tube or injecting fluids might in these cases give valuable indications. An absolute diagnosis can probably be made only by an abdominal section.

In *faecal obstruction* the condition is usually clear, as the faeces can be felt per rectum and also in the distended colon. Faecal vomiting, tympany, abdominal pain, nausea, and vomiting are late and are not so constant. In obstruction by gall-stone a few of the cases gave a previous history of gall-stone colic. Jaundice was present in only two of the twenty-three cases. Pain and vomiting, as a rule, occur early and are severe, and faecal vomiting is present in two thirds of the cases. A tumor is rarely evident.

(c) *Diagnosis from other Conditions.*—Acute enteritis with great relaxation of the intestinal coils, vomiting, and pain may be mistaken for obstruction. In an autopsy on a case of this kind the small and large bowels were intensely inflamed, relaxed, sodden, and enormously distended. The symptoms were those of acute obstruction, but the intestine was free from duodenum to rectum. Of late years many instances have been reported in which peritonitis following disease of the appendix has been mistaken for acute obstruction. The intense vomiting, the general tympany and abdominal tenderness, and in some instances the suddenness of the onset are very deceptive, and in two cases which have come under my notice the symptoms pointed very strongly to internal strangulation. In appendix disease the temperature is more frequently elevated, the vomiting is never faecal, and in many cases there is a history of previous attacks in the cæcal region. Acute hæmorrhagic pancreatitis may produce symptoms which simulate closely intestinal obstruction. A boy was admitted to the Johns Hopkins Hospital with a history of obstinate vomiting, intense abdominal pain, gradually increasing tympany, and no passage for several days. His condition seemed serious and he was transferred at once to the surgical wards. At the operation the coils were found uniformly

distended and covered in places with the thinnest film of lymph. No obstruction existed, but there was a tumor-like mass surrounding the pancreas, firm, hard, and deeply infiltrated with blood. The patient improved after the operation and recovered completely.

Treatment.—Purgatives should not be given. For the pain hypodermics of morphia are indicated. To allay the distressing vomiting, the stomach should be washed out. Not only is this directly beneficial, but Küssmaul claims that the abdominal distention is relieved, the pressure in the bowel above the seat of obstruction is lessened, and the violent peristalsis is diminished. It may be practised three or four times a day, and in some instances has proved beneficial; in others curative. Thorough irrigation of the large bowel with injections should be practised, the fluid being allowed to flow in from a siphon syringe, and the amount carefully estimated. Jonathan Hutchinson recommends that the patient be placed under an anæsthetic, the abdomen thoroughly kneaded, and a copious enema given while in the inverted position. Then, with the aid of three or four strong men, the patient is to be thoroughly shaken, first with the abdomen held downward, and subsequently in the inverted position.

Inflation may also be tried, by forcing the air into the rectum with the bellows or with a Davidson's syringe. It is a measure not without risk, as instances of rupture of the bowel have been reported. Fitz's figures show that in the first eight years of the last decade there were thirty-three cases of recovery after injection or inflation in cases of certain or probable intussusception, and eleven deaths. In cases of acute obstruction, if these means do not prove successful by the third day, surgical measures should be resorted to, and when the obstruction seems persistent and the condition serious, laparotomy should be performed at once.

For the tympanites turpentine stupes and hot applications may be applied; if extreme, the bowel may be punctured with a small aspirator needle. In cases of chronic obstruction the diet must be carefully regulated, and opium and belladonna are useful for the paroxysmal pains. Enemata should be employed, and if the obstruction becomes complete, resort must be had to surgical measures.

V. CONSTIPATION (*Costiveness*).

Definition.—Retention of fæces from any cause.

Constipation in Adults.—The causes are varied and may be classed as general and local.

General Causes.—(a) Constitutional peculiarities: Torpidity of the bowels is often a family complaint and is found more often in dark than in fair persons. (b) Sedentary habits, particularly in persons who eat too much and neglect the calls of nature. (c) Certain diseases, such as anæmia, neurasthenia and hysteria, chronic affections of the liver, stomach,

and intestines, and the acute fevers. Under this heading may appropriately be placed that most injurious of all habits, *drug-taking*. (d) Either a coarse diet, which leaves too much residue, or a diet which leaves too little may be a cause of costiveness.

Local Causes.—Weakness of the abdominal muscles in obesity or from overdistention in repeated pregnancies. Atony of the large bowel from chronic disease of the mucosa; the presence of tumors, physiological or pathological, pressing upon the bowel; enteritis; foreign bodies, large masses of scybala, and strictures of all kinds. By far the most important local cause is atony of the colon, particularly of the muscles of the sigmoid flexure by which the fæces are propelled into the rectum.

Symptoms.—The most persistent constipation for weeks or even months may exist with fair health. All kinds of evils have been attributed to poisoning by the resorption of noxious matters from the retained fæces—copræmia—but it is not likely that this takes place to any extent. Chlorosis, which Sir Andrew Clark attributes to fæcal poisoning, is not always associated with constipation, and if due to this cause should be in men, women, and children the most common of all disorders. Debility, lassitude, and mental depression are frequent symptoms in constipation, particularly in persons of a nervous temperament. Headache, loss of appetite, and a furred tongue may also occur. Individuals differ extraordinarily in this matter; one feels wretched all day without the accustomed evacuation; another is comfortable all the week except on the day on which by purge or enema the bowels are relieved.

When persistent, the accumulation of fæces leads to unpleasant, sometimes serious symptoms, such as piles, ulceration of the colon, distention of the sacculi, perforation, enteritis, and occlusion. In women pressure may cause pain at the time of menstruation and a sensation of fulness and distention in the pelvic organs. Neuralgia of the sacral nerves may be caused by an overloaded sigmoid flexure. The fæces collect chiefly in the colon. Even in extreme grades of constipation it is rare to find dry fæces in the cæcum. The fæces may form large tumors at the hepatic or splenic flexures, or a sausage-like, doughy mass above the navel, or an irregular lumpy tumor in the left inguinal region. In old persons the sacculi of the colon become distended and the scybala may remain in them and undergo calcification, forming enteroliths.

In cases with prolonged retention the fæcal masses become channelled and diarrhœa may occur for days before the true condition is discovered by rectal or external examination. In women who have been habitually constipated, attacks of diarrhœa with nausea and vomiting should excite suspicion and lead to a thorough examination of the large bowel. Fever may occur in these cases, and Meigs has reported an instance in which the condition simulated typhoid fever.

Constipation in infants is a common and troublesome disorder. The causes are congenital, dietetic, and local. There are instances in which