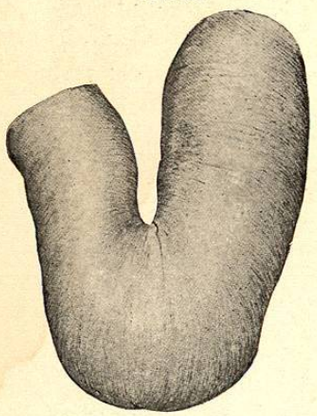
further due to the toxic influences of the anæsthetic or of antiseptics which may have come into contact with the peritoneum during the operation.

2. Secondary hemorrhage produces the symptoms of acute anæmia. This is a more serious symptom if the patient has recovered from the anæsthetic and for a time seems to be in good condition. If the symptoms are severe, the abdominal cavity should be opened and the bleeding vessel searched for. If a diagnosis of secondary hemorrhage is made, one ought never to inject saline solution subcutaneously or into a vein.

3. Gastric hemorrhage or hemorrhage from the intestine may follow opening and suture of either of these organs. Under such circumstances blood may be vomited or passed per anum. Gastric hemorrhage may follow laparotomy although the alimentary canal has not been operated upon. This is not infrequently the case if the omentum or mesentery is extensively ligated. v. Eiselsberg believes that small emboli, possibly venous emboli due to the back-flow of the blood-stream, are the cause of such hemorrhages. Gastric and intestinal hemorrhage may also occur after laparotomy which does not involve any portion of the alimentary canal, although the possible cause in such cases may be a too great stretching of the mesentery to overcome adhesions, etc.

Fig. 63.

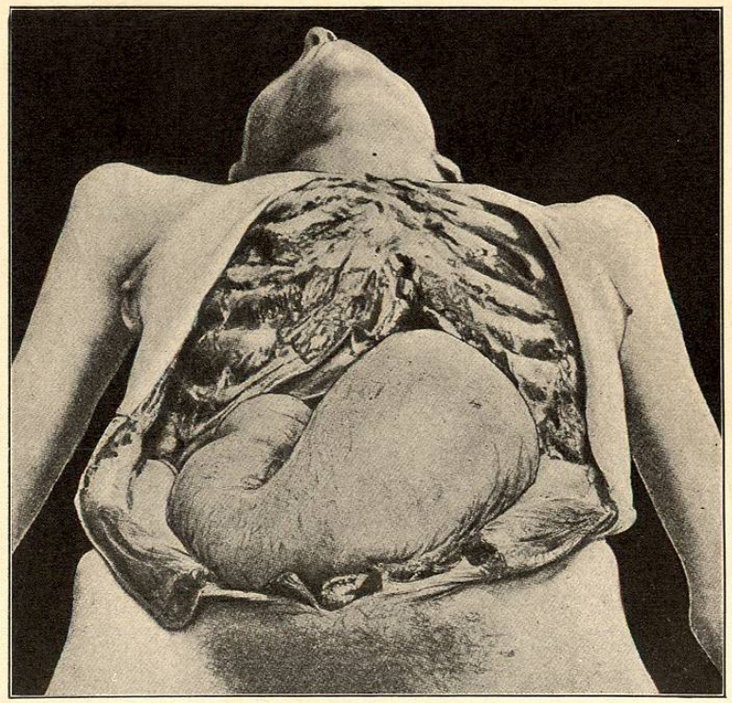


Shape of stomach in acute dilatation.

4. Ileus makes itself manifest two or three days after a laparotomy by a continuation of the vomiting, a change in the character of the vomited material so that it becomes bilious or even fecal, by the failure of gas to pass the anus, by distention of the abdomen, and by the inability of rectal injections to stimulate peristalsis. It is noticeable in these cases that the general condition of the patient is good, as shown by the temperature and pulse, and that septic symptoms are absent. It is necessary to make a differential diagnosis between ileus and peritonitis, and this is oftentimes extremely difficult. In fact, the two conditions are not infrequently associated or one passes into the other.

Ileus may result from peritonitis, as already stated. It may also exist without peritonitis as a simple intestinal paralysis, or it may be due to mechanical causes such as adhesions, or a kink or a twist of a loop of the intestine. Intestinal paralysis may be a direct result of contusion or other injury received during the operation, or it may be due to a circumscribed peritonitis. Intestinal atony of a mild degree often follows a simple laparotomy and disappears in a few days. Kinking or twisting of the intestine may be produced by the operator particularly if the intestines have been brought outside of the peritoneum. Kinking may also be produced by rapidly forming adhesions which serve to fix the intestinal loop in an unfortunate position. Obstruction may also be caused by pre-existing bands, gaps in the mesentery, etc., or by one or more bridges caused by anastomoses, etc. An example of this is the compression of the transverse colon by the jejunum in anterior antecolic gastro-enterostomy.

Fig. 64.



Acute dilatation of the stomach complicating lobar pneumonia and pleurisy.

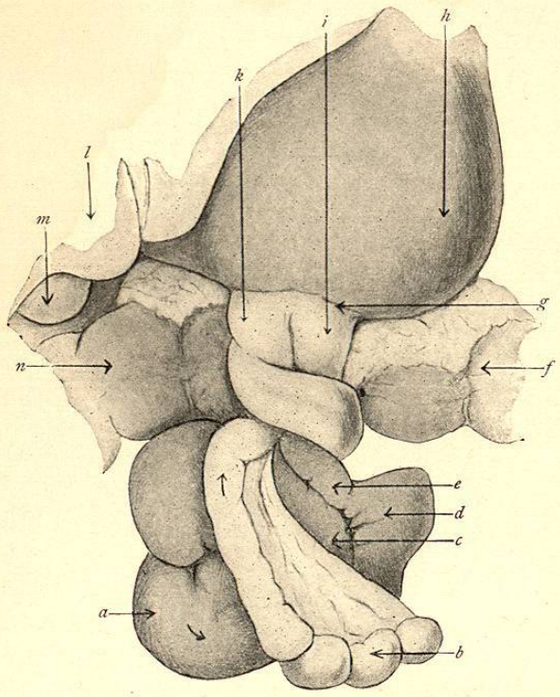
Acute dilatation of the stomach is a form of paralysis which may follow operation upon the abdomen or acute infectious disease. (Figs. 63 and 64.)

If ileus is suspected, all nourishment by mouth should be stopped, the stomach washed out as often as may seem necessary, and the rectum and lower colon irrigated with two or three litres of saline solution. A nutritive enema may follow irrigation. If it is probable that the ileus is due to intestinal paralysis or to a slight kinking from fresh adhesions, it is allowable to stimulate peristalsis by laxatives given by mouth and by glycerin suppositories, etc. If ileus is due to a more serious mechanical obstruction, the abdomen should again be opened

before the patient's strength is exhausted and before peritonitis develops. (Figs. 65 and 66.) This subject is more fully discussed on page 345. Vomiting due to the establishment of a vicious circle after a gastro-enterostomy is discussed on page 437.

5. Peritonitis. A laparotomy is often followed by a slight increase in temperature which has no special significance. If the temperature reaches 38° or 38.5° C. (101° to 101.5° F.) without obvious cause, such as pneumonia, it is always a grave sign. The condition of the

FIG. 65.

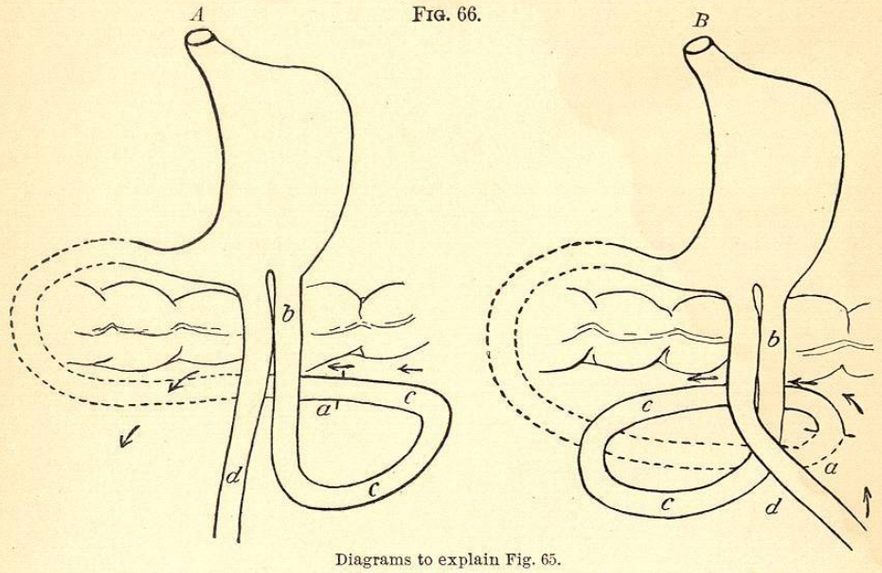


Volvulus of the jejunum after gastro-enterostomy: *e*, enterostomy; *f*, *n*, colon; *g*, gastro-enterostomy; *h*, stomach; *l*, liver; *m*, gall-bladder; *a*, *b*, *c*, afferent bowel; *d*, *k*, efferent bowel.

pulse is even more important than that of the temperature. If it remains below 100 and is of good quality, one need not feel disturbed; but if it is considerably higher and its rapidity is increasing while its character is becoming smaller and softer, the outlook is serious. If it steadily rises until it exceeds 120, the diagnosis of peritonitis is very probable; but even then the patient may recover without further operation. If it reaches 140 and is thread-like, and cyanosis and coolness of the extremities and face develop, the case is almost hopeless. A cold perspiration breaking out on skin which was previously dry and hot is a symptom which closely precedes death.

Naturally a rapid pulse may be due to other causes than peritonitis, such as an excitable temperament, a previous myocarditis, the effect of morphine, iodine, or other drugs. But under these circumstances the pulse does not steadily increase in rate and the other symptoms mentioned are wanting. Further symptoms of peritonitis are abdominal pain and tenderness on pressure, hiccough, and vomiting. But these symptoms, like the fever, are less significant than the pulse, and in certain cases they are wanting. This is particularly true of patients who are much run down, in whom severe or diffuse peritonitis may run its course without temperature elevation.

FIG. 66.



Diagrams to explain Fig. 65.

A, position after operation; *B*, position after the twist began; *a*, *b*, *c*, and *d*, same as in Fig. 65.

Abdominal tenderness on pressure may be slight, especially if the patient has been given morphine. Meteorism is a symptom which is always present in the later stages of ileus. It has little significance of itself, since it may occur in simple atonic conditions of the intestine; but as it is never wanting in a late stage of peritonitis, its presence or absence may serve to decide a differential diagnosis. As a rule it increases in conformity with the increase in the pulse-rate.

The skin of the peritonitic patient is dry. The symptoms of general sepsis seen in peritonitis are a dry skin, a coated tongue, a decrease in excretion, and a peculiar alteration in the feeling of the patient, which is best described by saying that he feels wretched. As soon as the practised surgeon enters the patient's room he recognizes the presence of this symptom by two vertical creases between the eyebrows (facies abdominalis). Such a patient cannot clearly describe his feelings. His gradually increasing pulse will confirm the

suspicion of the surgeon; and later, restlessness becomes more marked. At a still later period the patient often experiences a feeling of great comfort, the result of general intoxication.

While the different forms of peritonitis are described in detail elsewhere in this volume, those symptoms are properly mentioned here which, developing after operation, have a bearing upon prognosis and treatment. Thus it is important to know when a second laparotomy is indicated. The surgeon must distinguish between two forms of peritonitis which occur under such circumstances.

True diffuse peritonitis may follow operation on account of germs introduced from without by reason of faulty technic, or the germs may have been derived from some hollow abdominal organ and spread throughout the peritoneal cavity before the operation. Under such circumstances it is useless to reopen the peritoneal cavity, as the process is so widespread that it is not possible to attack it successfully. This has been tried many times without success. Moreover, such an infection of the peritoneum may be recovered from if it is not too extensive. To perform a second laparotomy lessens the chances of the patient for spontaneous recovery. Such a patient's strength should be kept up, and restlessness and pain should be controlled with morphine. Good results may follow the application of hot moist compresses from the thighs to the breasts. French surgeons recommend irrigation of the vascular system brought about by repeated large saline injections. They do this in the hope of eliminating toxins. The immediate effect is often striking, since the scarcely perceptible pulse grows stronger, the dull eye brightens, and consciousness returns. Unfortunately the improvement disappears in a few hours and the results of subsequent injections are less and less marked. Sometimes death may be postponed some hours or even a day by such methods, but in Mikulicz's experience no patient has been cured of a true diffuse peritonitis by these means.

A peritonitis which starts from faulty ligation or suture of the stomach or intestine or other organ which contains bacteria is quite different. It begins as a local process and does not spread until later. It is comparable to a subacute perforative peritonitis. Under such circumstances prompt opening of the abdominal cavity, exposure, and tamponade of the infected area may save a patient who would otherwise be lost.

A distressing hiccough may occur in any form of operative peritonitis, and, indeed, may be due to peritoneal irritation without inflammation. This symptom is difficult to control. Some remedies which have been used with benefit are bits of ice swallowed plain or after dipping them in a 1 per cent. solution of cocaine, ice-water by spoonfuls, cold lemonade, well-shaken champagne, and various hot drinks such as tea or lemonade. The most efficient drug is morphine injected subcutaneously.

6. Pneumonia, and especially bronchopneumonia, occur more frequently after laparotomy than after other operations of equal magnitude. There are several causes for this. The patient may inspire mucus,

etc., after vomiting. Respiratory motions and expectoration may be limited by abdominal pain. There may be small emboli in the lungs or the vagus nerves may be irritated or paralyzed. The subject needs further study.

Whatever the cause, a considerable percentage of patients are attacked with pneumonia after laparotomy, especially patients beyond middle age. It must be admitted, however, that a number of the patients whose lungs at autopsy exhibit pneumonic processes have died from other causes than pneumonia, and doubtless material from the stomach which is found under such circumstances in the bronchial tubes has sometimes entered them during the death struggle and has had nothing to do with the death itself. The treatment of pneumonia occurring after laparotomy has no peculiarities. One should not fail to control abdominal pain so that a patient can expectorate with comfort. If the patient is old or suffers from emphysema or chronic bronchitis, it is well to keep his shoulders somewhat elevated and to turn him upon his side from time to time.

7. Thrombosis of the vessels of the abdominal cavity, especially of its pelvic portion, may produce thrombosis of the veins of the lower extremities or pulmonary embolism. In doubtful cases the patient should be kept in bed for a long time. Thrombosis and embolism of the smaller vessels of the mesentery are spoken of under paragraph 4.