of which cannot otherwise be definitely shown. Aspiration should in all cases be followed by operation, so that infectious material may not spread through the wound made by the needle. Bimanual examination with one finger in the vagina or rectum is a valuable means of determining the presence of intra-abdominal abscess. In opening the abscess it is all-important not to break through protecting adhesions and open the general peritoneal cavity. If the inflammatory tumor is attached to the abdominal wall, this danger is easily avoided. In some cases it is of advantage to open the abscess from behind either in the lumbar region or through the vagina or rectum. If the abscess is situated immediately beneath the diaphragm, it is necessary to resect the bony wall of the thorax and to open the abscess through the pleural cavity and the diaphragm. If the general peritoneal cavity must be opened in order to reach the abscess, it should be protected by gauze. When this has been done, the abscess may be opened immediately, or one may wait until adhesions have formed before opening it.

In most cases the operation should consist in simple evacuation of the abscess and drainage, treatment of the diseased organ being left for a later date. For this purpose a short incision usually suffices, and it is of advantage to separate the muscular fibres of the different planes rather than to incise them. The risk of subsequent hernia is thereby reduced. The abscess cavity when opened is washed with sterile water and drained with a tube wrapped about with gauze to prevent pressure-necrosis of the intestine. The tube should not remain too long in position.

If the abscess is very large, a counteropening should be made when possible.

Subphrenic Abscess.—Peritonitis localized beneath the arch of the diaphragm may develop secondarily to disease of several organs. The transverse colon with its mesocolon and the omentum forms a partition to the abdominal cavity, so that adhesions can easily shut off an inflammation above it from the peritoneal space below, or *vice versa*. The upper space contains the stomach, liver, spleen, and pancreas. Injury or disease of any one of these organs may lead to suppuration in the subphrenic cavity. Such a suppuration may also develop from disease of the appendix vermiformis and persist long after inflammation in other portions of the abdomen has subsided.

The liver occupies the right half of the space described and a portion of the left. Its suspensory ligament forms a sagittal partition situated somewhat to the right of the median line. Suppuration in the right side of the subphrenic space is usually due to appendicitis or disease of the liver or gall-bladder or of the right kidney, while suppuration in the left side of the subphrenic space may come from the stomach, duodenum, pancreas, spleen, lung, kidney, or left lobe of the liver.

Etiology.—Inflammation of the appendix may extend to the subphrenic space and set up suppuration in two ways. It may extend

intraperitoneally along the colon until it reaches the edge of the liver; and may extend still farther between the liver and diaphragm. It may also extend between the layers of the mesentery and the vermiform appendix, and then work its way upward in the loose connective tissue behind the cæcum and colon and liver until it reaches the subphrenic space. Injections of staining fluid show how easily inflammation can spread by this route. The attack of appendicitis may be so slight that unless the patient has been frequently seen, or the history of the attack has been carefully inquired into, the cause of the subphrenic abscess may be overlooked.

Subphrenic abscess may be secondary to various processes in the liver and biliary passages. A biliary calculus may set up suppuration in the gall-bladder, causing rupture of the gall-bladder and formation of an abscess either in the peritoneal cavity around the gall-bladder or in the liver. A biliary calculus may set up suppuration in the larger biliary passages, which, reaching the surface of the liver, may involve its peritoneal covering and so give rise to subphrenic abscess. Abscess of the liver of whatever nature (dysentery, pylephlebitis, pyæmia), suppurating echinococcus cyst, or infected wounds of the liver may give rise to subphrenic abscess.

Disease of the stomach and upper portion of the peritoneum is a common cause of subphrenic abscess. If a simple ulcer leads to a slow perforation, the general peritoneal cavity may be protected by adhesions; but if the ulceration continues, suppuration may be set up in the subphrenic space. If the perforation occurs more rapidly, the general peritoneal cavity will become infected and diffuse peritonitis will follow. In rare cases an ulcer in the region of the pylorus will produce an abscess of the right side of the subphrenic space, the abscess first forming beneath the right lobe of the liver and its extension being limited by adhesions. Injury of the stomach or carcinoma seldom gives rise to subphrenic suppuration. If the perforation is a minute one, gas and some infectious material will escape from the stomach, while the coarser particles of food will not find their way into the abscess cavity. When such an abscess is due to gastric perforation, it will be bounded on the right by the suspensory ligament of the liver, below by the left lobe of the liver and the adhesions between the stomach, colon, and adherent abdominal wall, and on the left by the spleen and diaphragm. The diaphragm, of course, bounds it above and the posterior wall of the abdomen behind.

Suppuration around the œsophagus (mediastinitis postica), a result of ulcerative or traumatic perforation, can reach the subphrenic space between the pylorus and diaphragm.

Suppuration in the pleural cavity, especially if it is of gangrenous character, may break through the diaphragm and produce subphrenic abscess. In such cases it is not always easy to determine whether the original process is above or below the diaphragm, since a subphrenic abscess may also perforate the diaphragm and involve the pleura.

Abscess of the spleen, suppurating echinococcus cyst, suppurating

hæmatoma, or suppuration in the head or tail of the pancreas may lead to subphrenic abscess. Such may also be the result of perforation of the transverse colon. Perforation of the intestine beneath the transverse colon gives rise to a general suppurative peritonitis; but if this is of a fibrinopurulent type, it may extend to the subphrenic space and produce an abscess there after the virulence of the inflammation has elsewhere abated. The upper pole of the kidney on either side reaches into the vault of the diaphragm, and therefore subphrenic abscess may follow suppurative pyelitis or suppuration in connection with calculus, or renal abscess, renal tuberculosis, etc.

In a few instances suppuration of the lower ribs or bodies of the vertebræ (osteomyelitis, periostitis) has led to subphrenic abscess.

A subphrenic abscess usually contains free gas, which may be derived from the stomach or duodenum in cases of perforation of these organs, or it may come from the action of gas-forming bacteria.

While the lymph-vessels of the peritoneum do not directly communicate with those of the pleura, still extension of inflammation to the pleura or to the pericardium in case of subphrenic abscess is not rare. The exudate in these spaces may be serous or purulent. In some instances direct perforation into the pleural cavity has been followed by a discharge of pus from the bronchi.

Symptoms.—The symptoms of subphrenic abscess are so indefinite that a diagnosis is often made with difficulty. The disease usually begins with a chill, fever, and intense pain in the upper abdomen. In other cases in which the subphrenic trouble is secondary to chronic appendicitis, cholecystitis, perinephritis, etc., its beginning may be ill defined. The fever is often of the remittent type. The patient is much depressed, feels weak, and loses appetite. If the trouble originates in the stomach, vomiting is common. The abdomen is not distended and not tender to pressure. If the onset is gradual, the only subjective symptoms may be a feeling of pressure and interference with deep respiration. Tenderness on pressure in the intercostal spaces of the affected side or distention of the lower portions of the thorax may point to the seat of the trouble.

Diagnosis.—Diagnosis is made from the history of the disease, from the physical examination, and possibly from the results of puncture. The existence of a previous inflammatory process in the abdomen may usually be determined.

Physical examination of the thorax and upper portions of the abdomen will usually show that the organs have been displaced by the abscess. The diaphragm is displaced upward. If the abscess is situated on the right side, the free margin of the liver is displaced downward to a greater or less extent. The upper margin of the dull area is convex upward and is sharply differentiated from the pulmonary resonance. If the abscess cavity contains gas, which is not often the case in a right-sided abscess, an area of tympanitic resonance will exist between the pulmonary resonance and the dulness due to the liver. This condition when it exists is a most characteristic one. An

abnormally high area of dulness convex upward in the situation of the liver indicates in most cases echinococcus or abscess of the liver or a subphrenic abscess. If the abscess is situated behind the liver, the physical condition is not so striking. The area of hepatic dulness may extend higher than usual, but will not be so distinctly arched. If there is an area of abnormal dulness on the right side, either in front or behind, in a patient whose general condition indicates suppuration and no disease of the pleura or liver can be shown to exist, and especially if the patient has previously had an inflammation in the abdomen one must think of the possibility of a subphrenic abscess, and by means of exploratory puncture ascertain the cause of the abnormal dulness.

The diagnosis is more difficult if the subphrenic abscess is associated with a fluid exudate above the diaphragm. If this exudate is serous, as shown by puncture, the nature of the case may still be recognized; but if the pleural exudate is purulent, subphrenic abscess will hardly be suspected, unless at operation the strongly convex diaphragm is observed. In other cases it is difficult to say whether the collection of pus is situated in the upper portion of the liver or between the liver and diaphragm.

Subphrenic abscess of the left side usually comes from the stomach or duodenum, less often from the spleen, pancreas, or kidney. For this reason most of these abscesses contain gas. If the abscess is situated anteriorly, the epigastric region is prominent and tender on pressure, and one is frequently able to palpate the depressed margin of the left lobe of the liver and the adhesions which have formed about it. The heart is displaced upward, and on the left and posterior side of the thorax there is an increased area of dulness which possibly contains a tympanitic area shifting with the position of the patient if there is free gas. Too much dependence should not be placed upon this symptom, as it is difficult to distinguish between tympanites due to gas outside of the stomach and that due to gas within the stomach. The dulness due to the spleen is continuous with that due to the abscess, while just above the dulness due to the abscess the pulmonary resonance is especially well marked unless there is pleurisy with effusion. This obscures the diagnosis just as it does on the right side. In rare cases when the patient is sitting up one may demonstrate from above downward pulmonary resonance, dulness due to the pleuritic effusion, tympanites due to gas in the subphrenic space, and dulness due to the pus.

Abscess originating in the stomach or duodenum has ordinarily an acute onset. There may or may not have been a history of gastric disturbance. Such a history combined with the results of physical examination will often serve to establish a correct diagnosis. In other cases, and especially if the pleura is simultaneously involved, it will be impossible to say with certainty whether or not a subphrenic abscess is present.

Aspiration with a hollow needle will show whether the exudate is purulent or serous, or due to the presence of echinococcus, while the

depth to which the needle passes will give some idea of the seat of the pus. Such a puncture should be made with a long, medium-sized needle under rigid asepsis. The site usually chosen for puncture is within the dull area at a point where the tenderness on pressure is most marked. The syringe should be attached to the needle, and from time to time, as the needle is slowly introduced, the piston should be withdrawn slightly. When the needle enters the diaphragm respiratory motion will be communicated to it. By this one can tell whether the pus obtained is situated above or below the diaphragm. But this sign will not enable the operator to say whether the pus is between the liver and the diaphragm or in an abscess cavity within the liver. If serous fluid is obtained when the needle enters the pleural cavity and pus when it is pushed deeper through the diaphragm, the diagnosis is sufficiently clear. Sometimes the needle must be inserted in several places before pus is obtained. One should not hesitate to make repeated punctures if the diagnosis of subphrenic abscess seems probable. The risk is slight, far less than the danger of leaving unopened a subphrenic abscess. Operation is scarcely justifiable unless one proves the presence of pus by aspiration.

Treatment.—A subphrenic abscess usually terminates fatally unless it is relieved by operation. Its contents are so foul that resorption is not to be expected, and as long as the abscess exists there is risk of rupture into the general peritoneal cavity, into the pleura, or into the pericardium. Rupture into the bronchi may give relief, but this is so rare an outcome that one cannot trust to its occurrence. Most of the patients die from sepsis or some complicating disease unless escape for the pus is provided. This would be afforded by repeated aspirations. Therefore as soon as aspiration has established the diagnosis the abscess cavity should be freely opened and drained.

A subphrenic abscess may be opened through the pleura or it may be opened from below by an incision along the costal margin.

The transpleural operation is carried out as follows: One or two ribs, usually the eighth and ninth, or the ninth and tenth, are resected for a distance of 6 to 8 cm. (2.4 to 3.2 inches) at the point where aspiration has shown that the abscess cavity may be reached. The condition of the pleural cavity is next determined. If its lower portion is obliterated, the condition is most favorable. If the two serous layers of the pleura are seen to move upon one another during respiration, the pleural cavity must be protected from infection. This can, of course, be done by dividing the operation into two parts so as to allow time for adhesions to form. But this is usually not advisable since the condition of the patient will be injured by the delay. The diaphragm is usually pressed well upward so that one can suture the costal pleura to the diaphragmatic pleura without difficulty. Such a suture is applied in a circle, or, if the stitches will not hold, a circle of iodoform gauze is pressed firmly against the diaphragm and the incision is made in the centre of it. The edges of the wound through the diaphragm and pleura are clamped and drawn forward so that the pleural

cavity may be still further protected. The abscess cavity is washed out with sterile water and drained by a large tube wrapped about with iodoform gauze. In some cases it is desirable to make a counteropening posteriorly. If the pleural cavity contains pus, it must also be drained, and even if it contains serum drainage is advisable, since the serum is almost certain to become infected.

This transpleural method of operating can be performed with only a slight narcosis, or, if need be, under the influence of a local anæsthetic. It must be admitted that one cannot always protect a healthy pleura from infection by this method of operating. However, in a majority of cases the pleura will be found infected at the time of operation.

The other method of operating is to make an incision along the costal margin and follow this with a blunt dissection along the under surface of the diaphragm until the abscess is opened. This method is to be recommended for abscesses situated behind the liver. Some surgeons resect the lower ribs when operating by this method, although it entails a risk of infecting the pleural cavity. Subphrenic abscess from the appendix, spleen, and kidney is suited to this method of treatment.

If a subphrenic abscess derived from the stomach or duodenum lies well forward, it can be opened by an incision in the median line from the ensiform process downward. The perforation in the stomach is usually so hidden by adhesions that it is not accessible. If the abscess cavity is very large and extends well backward, a counteropening should be made on the left side by traversing the pleura or beneath the twelfth rib. The cavity of the subphrenic abscess rapidly decreases in size after it has been drained and is completely closed by granulations in six or eight weeks, or in even less time in favorable cases.

Prognosis.—The prognosis of subphrenic abscess after operation depends upon the general condition of the patient, the size of the abscess, the source of the trouble, and any complications which may exist. Therefore the prognosis is much more favorable if an abscess is opened early. Körte operated upon 60 cases of subphrenic abscess, with 40 recoveries and 20 deaths, a mortality 33.3 per cent. The origin of the abscess in these cases was as follows:

Source of abscess.	No. of cases.	Recoveries.	Deaths.
Appendicitis	27	18	9
Stomach	9	5	4
Duodenum	1	—	1
Spleen	5	3	2
Perirenal	4	2	2
Liver and gall-bladder	2	2	—
Pleural	4	3	1
Costal	2	2	—
Pancreas	1	1	—
Ecchinococcus	3	3	—
Undetermined	2	1	1
Total	60	40	20

Maydl's statistics include records of 10 operations upon abscesses of gastric origin with 3 recoveries; 14 of pericæcal origin with 9 recoveries; 5 of hepatic origin with 4 recoveries; 4 of intestinal origin with no recoveries. Altogether operation was performed in 74 cases of subphrenic abscess, with 39 recoveries and 35 deaths, a mortality of 47.2.

Chronic Peritonitis.—A chronic inflammation of the peritoneum may follow an acute inflammation, or the inflammation may be chronic from the beginning, and in the form of an exudative or an adhesive peritonitis.

Exudative Chronic Peritonitis.—Chronic inflammation of the peritoneum with the formation of an abundant fluid exudate is so closely allied in form to tuberculous peritonitis that a microscopical examination may be necessary to determine which exists. The attacks of simple chronic peritonitis which have been described by Vierordt, Galvagni, Fränkel, and others, terminated for the most part in recovery, so that the certainty of diagnosis which might have followed an autopsy is wanting. It is fair, however, to assume that all such cases are not tuberculous because simultaneous affection of the pleura and bronchial tubes makes it more than probable that some of these inflammations are of a tuberculous character.

The etiology of simple chronic peritonitis is uncertain. Sometimes it has been ascribed to taking cold and at other times to traumatism. It is not even possible to say whether the affection of the peritoneum is primary or whether it is secondary to that of some abdominal organ.

The disease is more common in young persons than in those of adult life, and is more common in females than in males. This suggests the possibility of its development from the female genitals. Indeed, its appearance at the time of menstruation has been noted. Its onset is gradual, the first symptoms noted being usually the presence of a serous exudate which gradually increases in quantity until its amount may be very great. Sometimes the collection of fluid gives rise to no pain. At other times there is pain, either spontaneous or produced by pressure. If the quantity of fluid is large, it may press upon the abdominal organs and interfere with their functions. This is especially true in regard to the intestine. Sometimes firm, pebbly tumors have been observed in the region of the umbilicus. In about half of the cases there is fever. The general health is almost always affected. The patient is pale, weak, and loses weight. The condition is frequently complicated by pleurisy.

Diagnosis.—The diagnosis rests upon the history and progress of the disease as well as upon the physical signs, especially the fluid and the existence of nodular tumors. The differential diagnosis with tuberculous peritonitis may be made by injection of tuberculin or the injection of the exudate into animals, otherwise a differential diagnosis cannot be made before operation. Other diseases which should be considered are ascites due to cirrhosis of the liver or to diffuse congestion, and carcinomatous peritonitis.

Prognosis.—The prognosis is favorable, since a majority of patients recover under the influence of internal remedies, inunction of mercurial salve, or hydropathic treatment.

Treatment.—On account of this favorable prognosis surgical treatment is not indicated unless the exudate is so great as to interfere with the functions of the abdominal organs. In that case the patient should be relieved by tapping. If the diagnosis between simple peritonitis and tuberculous peritonitis is not clear, it is better to open the abdomen, since an exploratory laparotomy will not injure a patient having a simple chronic peritonitis, while the good effect of this treatment upon tuberculous peritonitis is well known. Exploratory laparotomy frequently hastens recovery from a simple peritonitis. The operation should be confined to removal of the fluid and inspection of the abdominal cavity. Lennander recommends that the abdominal cavity be irrigated, and that if the peritonitis is not cured by one irrigation, that it should be repeated several times if necessary.

Adhesive Chronic Peritonitis.—The second form of chronic peritonitis is associated with the formation of adhesions and cicatricial contractions of the peritoneal folds. This form of inflammation may affect one or more portions of the abdominal cavity. It is most likely to occur in the neighborhood of the female pelvic organs, the gall-bladder, a flexure of the colon, the root of the mesentery, or the omentum. The effect of the inflammation is thickening of the peritoneum, which later leads to contraction. Such contraction of the mesentery has been held to favor the development of volvulus, although this view has been disputed by Riedel. Adhesions which may form between movable abdominal organs interfere very much with their function, and, indeed, may threaten life by obstructing the intestine. Chronic adhesive peritonitis may follow acute inflammation in some abdominal organ. It may also follow injury or a laparotomy. But it may also develop in a chronic manner without such predisposing cause, or, indeed, without any apparent cause. In most cases, however, it is a secondary manifestation of obscure inflammation of some portion of the alimentary canal. Fecal obstruction, the traumatic irritation to which a hernia is subjected, and the lesions of syphilis in some abdominal organ, have all been mentioned as causes of chronic peritonitis.

Symptoms.—The symptoms of chronic adhesive peritonitis vary according to the extent and situation of the trouble. They are usually well localized. Thus, adhesions in the neighborhood of the gall-bladder and pylorus will produce intense colicky pains if they are of such a character as to interfere with the normal passage of food and bile. Adhesions of the omentum to the intestine or to the anterior abdominal wall may give rise to intense intestinal colic. Chronic inflammation of the peritoneum of the pelvis often leads to displacement and disturbance of function of the pelvic organs. Adhesions about the cæcum or hepatic or splenic or sigmoid flexure may seriously interfere with the function of the large intestine and produce chronic constipation.

TREATMENT.—Surgical treatment may be demanded either because of the degree to which chronic adhesions interfere with the natural functions or because they have produced some acute condition, such as volvulus or other obstruction of the intestine, which threatens the patient's life. Riedel strongly advocates operation as a cure of this trouble. If division of the bands and separation of the adhesions have no permanent good result, he believes in removing the starting-point of the inflammation if this is possible. Thus, the points of attachment at either end of the fibrous cord may be excised. If the adherent surfaces are extensive, they cannot be treated in this manner unless the diseased organ is the appendix or gall-bladder or Fallopian tube, or some other abdominal organ whose presence may be dispensed with. Still, encouragement is found for operation in the fact that adhesions which normally form after every laparotomy disappear in the course of time. Thus if one can so free the distorted adherent intestine that its function will be restored and congestion avoided, it is reasonable to hope that it will in time cause disappearance of the adhesions of chronic peritonitis.

Tuberculous Peritonitis.—Tuberculosis of the peritoneum appears in two forms: either as miliary tuberculosis, in which case it is a part of a general miliary tuberculosis, and therefore gives no special symptoms and requires no special treatment; or it appears as a tuberculous inflammation of the serosa. In the latter case the peritoneum is swollen and its vessels injected; its smooth surface becomes rough and covered with numerous grayish nodules which tend to coalesce and form larger nodules. The process is usually accompanied by an exudate, which may be fibrinous, seropurulent, or hemorrhagic, or a combination of these different kinds.

For clinical purposes it is convenient to divide tuberculous peritonitis into three forms: (1) that which is associated with an abundant serous exudate; (2) that which is accompanied by adhesions and large nodular tumors in the omentum and mesentery; and (3) an ulcerative purulent form in which intestinal coils and omentum are crowded together in an indistinguishable mass in which are pockets having caseous and purulent contents. The dividing-line between these different forms is not a sharp one, but one may pass into the other or different lesions may coexist.

Tuberculosis of the peritoneum is rarely a primary disease. Borschke, who examined 226 cases, found only 2 in which there was no starting-point for the disease outside of the peritoneum. The lungs were the seat of the primary lesion in 200 of these 226 cases, while in the remaining cases the disease began in other serous membranes, such as the pleura or peritoneum, or in the intestine, or in the lymph-glands or bones or joints. The tubercle bacilli may reach the peritoneum through the bloodvessels or lymph-vessels, or by direct extension from some organ which is covered with peritoneum. The previous existence of cirrhosis of the liver has been mentioned, but no connection between the two diseases has been shown. The serous exudate is

usually sterile, and tubercle bacilli are found in it with difficulty. The best test is to inject the serum into a guinea-pig.

Symptoms.—The disease affects children especially, and also young persons. It runs a chronic course, being aggravated from time to time by acuter attacks. The chief symptom noticed is a progressive cachexia. The temperature may be elevated. The pulse and respiration are unfavorably affected by the distention of the abdomen. There are rarely symptoms directly attributable to an inflammation of the peritoneum. Sometimes the patient complains of abdominal pains, but these are never so severe as those which are present in acute peritonitis, unless the tuberculous process has obstructed the intestine. Tenderness on pressure is usually slight. Vomiting is not a prominent symptom, and when it does occur it has not the stormy character of vomiting which accompanies acute peritonitis. The function of the intestine may be disturbed by contraction of the mesentery, or by adhesions, so that obstruction may even be complete. In most cases, however, the intestine is not paralyzed or dilated.

The symptoms of the disease are due to a gradually increasing quantity of fluid in the peritoneal cavity. This accumulation of fluid may continue until the abdominal walls are tightly stretched and respiration and blood circulation are much interfered with. Sometimes the abdominal fluid is confined by adhesions. This encapsulation of the fluid simulates a cystic tumor, so that a mistake in diagnosis has frequently been made. The nodular masses spoken of are usually formed of the omentum or mesenteric glands. If disease of some intra-abdominal organ coexists—for example, the intestine or female genital organs—symptoms due to such disease may obscure those due to the tuberculous peritonitis.

Tuberculosis of the cæcum and vermiform appendix leads to the formation of a tumor which may be mistaken for a simple chronic appendicitis or for a malignant growth. It may bring about stenosis of the intestine with the well-known symptoms. Tuberculosis of the tubes gives symptoms similar to these of perimetritis. Rupture of a tuberculous ulcer may bring about purulent inflammation which may be either diffuse or circumscribed.

Diagnosis.—The diagnosis of tuberculous peritonitis can be made from the symptoms above described of a disease running a chronic or subacute course, gradual loss of strength, the presence of free or encapsulated exudate, or nodular tumors in different portions of the abdomen. The diagnosis is confirmed by the presence of tuberculosis of the lungs or some other organ. Chronic peritonitis of a non-tuberculous character cannot be distinguished clinically from tuberculous peritonitis. Some writers assert that the so-called idiopathic chronic peritonitis of a non-tuberculous character does not exist. The injection of tuberculin may be of assistance in determining the nature of a chronic peritonitis. It should be remembered that this test is not wholly without risk, especially in cases of intestinal tuberculosis. The

injection of guinea-pigs with the exudate is another means of diagnosis which has sometimes proved valuable. In other cases it is difficult to decide between sarcomatous and tuberculous peritonitis. The age of the patient and the presence of malignant tumor in the abdomen or elsewhere, and the reaction which follows the injection of tuberculin will assist in making the diagnosis in such cases. In doubtful cases an exploratory laparotomy is justifiable. Helbing mentions a case of chronic peritonitis resembling tuberculous peritonitis which was produced by the eggs of a tapeworm. Cirrhosis of the liver with ascites may simulate tuberculous peritonitis. Under such circumstances there may be a history of abuse of alcoholic drinks, swelling of the spleen, and jaundice.

Treatment.—For a long time it was considered that peritoneal tuberculosis could be treated only medicinally and the outlook was very unfavorable. Forty years ago Spencer Wells unintentionally operated upon a patient with tuberculous peritonitis who made a prompt recovery. Since that time many such patients have been treated by operation, usually with good results in the serous form of disease, and with passably good results in the dry form. The results in the ulcerative form are unfavorable. The ultimate results are not so favorable as the immediate results. Borchgrevink and Rose have both examined the results of treatment in the past ten years, and both come to the conclusion that about one-third of all cases of peritoneal tuberculosis will recover spontaneously or without operative treatment, and that operation upon patients who are suffering from tuberculous peritonitis with fever may be extremely harmful.

Treatment by operation is simple. The abdomen is opened in the median line with the usual aseptic precautions, care being taken not to wound adherent intestine. The fluid exudate is allowed to flow out and the rest of it is sponged out until the peritoneal cavity is quite dry. Some surgeons dust the peritoneum with iodoform. The abdominal wound is closed in layers, with or without iodoform gauze drainage. The reaction is slight. There is often some reaccumulation of fluid soon after the operation. This is usually resorbed, so that a second operation is rarely necessary. Sometimes operation is followed by the formation of tuberculous fistulas. Löhlein advises opening a tuberculous peritoneal cavity in females through Douglas's pouch.

Operation in ulcerative tuberculous peritonitis is likely to be followed by intestinal fistulas which exhaust the patient and hasten his death. Other counterindications for operation are: advanced tuberculosis or amyloid changes in the lungs, intestine, or kidneys, which will either prevent recovery from the operation or make it likely that the condition of the patient can be improved for only a short time.

If the surgeon finds well-localized tuberculous lesions in the abdomen—for example, in the cæcum or appendix or Fallopian tubes—it may be possible to remove them without taxing the strength of the patient too much. Such an operation as resection of the intestine had better

be postponed until the patient has gained strength and has at least partly recovered from the tuberculous peritonitis. If adhesions obstruct the intestines, so that some operation is urgently demanded, it should be of the simplest character—for example, an entero-anastomosis. The serosa which is affected by tuberculous inflammation is easily torn, and is therefore stitched with difficulty. One should not disturb extensive adhesions, since they are very vascular, and in attempting to separate the adherent intestinal coils the bowel is easily torn.

The exact method by which operation benefits a patient having tuberculous peritonitis is a matter of dispute. It seems probable, however, that the evacuation of the exudate by relieving the tension of the abdominal wall and the irritation of the serosa brings about improvement in the circulation of the serosa so that the leucocytes are able to attack the tubercle bacilli in greater numbers. Borchgrevink states that these same processes may take place without operation, and hence is inclined to deny that any good effect is due to the operation itself. Gatti believes that the fluid exudate which follows operation exerts an injurious effect upon the tubercle bacilli and thus promotes recovery.

Prognosis.—The immediate results of operation except in cases of the ulcerative form of the disease are good. The later results are less favorable, since a certain number of patients die from recurrence or from tuberculosis in other organs. Thus Rörsch collected reports of 358 cases, showing 70 per cent. of immediate cures and 14.8 per cent. of cures lasting more than two years. Wunderlich, who collected reports of 344 cases, found 23.6 per cent. of deaths and 23.3 per cent. of cures over three years. These are general statistics; the results of individual surgeons are somewhat better. Thus in Czerny's clinic from 40 to 50 per cent. of patients suffering from the exudative form of the disease were cured by operation, while only 25 per cent. of those who suffered from adhesive tuberculous peritonitis were cured. The best results were obtained in cases of tuberculous peritonitis proceeding from the adnexa when these affected organs could be removed at the operation.

The relative advantages of operative and non-operative treatment can only be determined when a large number of patients have been treated by both means under similar conditions so that results can be compared. If the views of Borchgrevink and Rose are correct, operation is indicated only in cases of exudative or adhesive tuberculous peritonitis after a patient has been given the advantages of internal treatment combined with good food and fresh air for a considerable period without improvement. All writers are agreed that operation cannot benefit a patient who suffers from the ulcerative form of the disease.