

crowded into the common duct by the exudate occurring in the gall-bladder in an attack of acute serous cholecystitis. This exudate can many times be avoided by an early operation upon the gall-bladder. When the stone has entered the common duct, it is likely to remain and give rise to chronic obstruction.

Chronic obstruction of the common duct, or choledocholithiasis, often escapes diagnosis. Jaundice is often wanting; for when the common duct dilates, the infection subsides, and the bile flows by the calculus; also, if the cystic duct remains open and the bile flows through it and the perforated gall-bladder into the intestine there will be no jaundice. True attacks of colic may also be wanting. In their stead there may be simply unpleasant sensations at the pit of the stomach, or chills occurring every few days, and sometimes but not always accompanied by jaundice. It is very important to determine whether the obstruction in the common duct is due to a calculus or to pressure outside of the duct. In chronic obstruction due to calculus, the gall-bladder is usually contracted and cannot be felt. Jaundice is slight and transitory, the fecal discharge is sometimes brown and sometimes gray, and the attacks of fever are of varying degree and of an intermittent type. In chronic obstruction of the common duct due to tumor the gall-bladder is usually large and easily palpable as a tense swelling beneath the liver. Jaundice is marked and of constantly increasing intensity, while the fecal movements are constantly pale. Attacks of colic and fever are almost always wanting. This law, to which Courvoisier first called attention, holds good in about 75 per cent. of the cases.

This brief schedule of the symptoms shows that it is possible in many cases to recognize the particular form of cholelithiasis which exists. Much patience and practice are needed for exact diagnosis. A table of symptoms is submitted in order to aid practising physicians in distinguishing between the different forms of the disease. In using this table one should bear in mind that it does not absolutely apply to every case, and that the different forms of cholelithiasis so shade into one another that an exact diagnosis is sometimes impossible. The symptoms given in the table are those of typical cases.

Form of the disease.	Symptoms.	Diagnosis.	Treatment.
I. Calculi in the gall-bladder whose walls are slightly or not at all altered. The cystic duct is movable. The contents of the gall-bladder are clear bile which contains no purulent bacteria. There are no adhesions.	Usually no symptoms in the latent period. Occasionally slight epigastric pain due to temporary obstruction of the cystic duct. No passage of calculus. No enlargement of the liver.	Palpation shows nothing abnormal, or at most slight tenderness on pressure in the region of the gall-bladder (bimanual examination). Often mistaken for gastric ulcer, intestinal colic, movable kidney, or ventral hernia.	Medicinal treatment sufficient. Carlsbad cure to overcome the tendency to cholelithiasis.

Form of the disease.	Symptoms.	Diagnosis.	Treatment.
II. Acute cholecystitis in a relatively healthy gall-bladder. There is usually a large calculus in the neck of the gall-bladder. Contents of the gall-bladder cloudy or purulent. Walls thickened.	Tumor of the gall-bladder. Riedel's tongue-shaped lobe. Jaundice rare. Intense pain (stomach). Distention of the upper portion of the abdomen. Marked tenderness on pressure. General symptoms slight or severe according to the character of the infection (cholecystitis acutissima, with or without cholangitis); circumscribed peritonitis (pericholecystitis). Fever may or may not be present. No enlargement of the liver except with the cholangitis. Usually no discharge of calculus. If a calculus passes the cystic duct, there will be acute obstruction of the common duct (see IX.).	Diagnosis easy. May be confounded with appendicitis, especially if the appendix is directed upward. Examination should show that the tumor which is felt is a swollen gall-bladder. (Form, mobility, tension, etc.)	Operative treatment preferable, although by laxatives, etc., the inflammation may subside, the calculus remaining. Cystostomy is the normal treatment for cholecystitis.
III. Calculi in the gall-bladder in which there has been previous inflammation. Cystic duct open. Adhesions between the gall-bladder and intestine or omentum.	Similar to those of I. Usually intense colic due to kinking of the cystic duct and overdistention of the gall-bladder. Frequent vomiting. Intense pain on pressure. There may be entire absence of symptoms between attacks.	Similar to that of I. Tumor of the gall-bladder during attacks of colic if the gall-bladder is still capable of distention. Between the attacks palpation shows nothing abnormal.	When attacks recur frequently, operation is urgent, preferably cystectomy combined with drainage of the hepatic duct. The Carlsbad cure yields only temporary benefit.
IV. Acute cholecystitis in a gall-bladder much thickened from previous attacks of inflammation. Cystic duct obliterated or obstructed by calculi. Many adhesions. Contents of the gall-bladder scanty, mucous, or purulent. Fistula between the gall-bladder and intestine.	No palpable tumor because the gall-bladder is well up under the liver. Tenderness as in II. Symptoms variable. Jaundice usually wanting, but if present it usually indicates the passage of a calculus into the common duct (see IX.).	Diagnosis difficult because the results of palpation are unsatisfactory. Diagnosis must often be made from the history. If the general infection is marked and there is no tumor, purulent cholecystitis with moderate pain has been mistaken for typhoid, malaria, or septicæmia. The forms of cholelithiasis III. and IV. are illustrations of chronic recurrent cholecystitis.	Cystectomy should be performed if the Carlsbad cure is unsuccessful, as it is in 50 per cent. of the cases. Complete operation performed when possible.

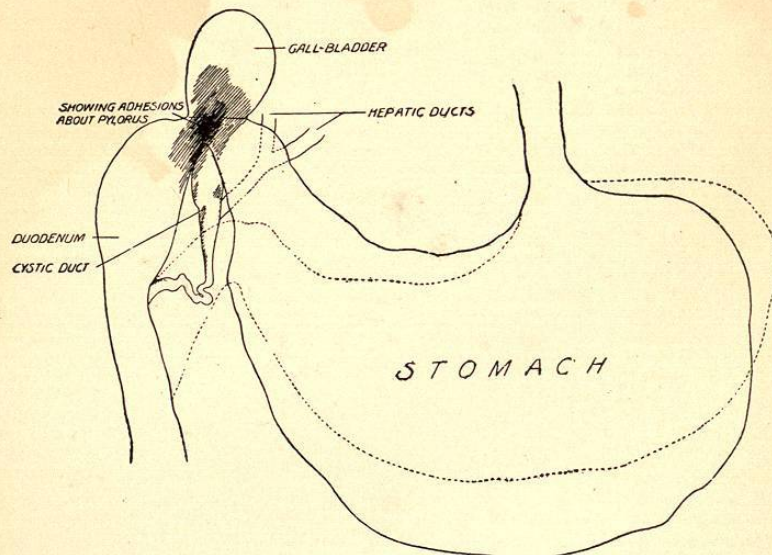
Form of the disease.	Symptoms.	Diagnosis.	Treatment.
V. Conditions the same as III, except that calculi are wanting and adhesions are present.	Pain frequently produced by changes in position (standing up). Otherwise symptoms as in III. Adhesions may cause pyloric stenosis, dilatation of the stomach, or ileus.	Similar to that of III. The symptoms are protracted. The stomach becomes dilated.	Similar to that of III. Cystectomy is the operation of choice, combined with gastro-enterostomy for peripyloritis, since pyloroplasty is uncertain.
VI. Hydrops of the gall-bladder. Cystic duct obliterated or obstructed by a calculus. The gall-bladder contains a usually clear fluid. Its walls are thin as paper.	There may be no symptoms. Or the patient may notice a tumor. But there is often epigastric pain. No passage of the calculus, no jaundice, no swelling of the liver. Riedel's tongue-shaped lobe sometimes present. Sterile contents of the gall-bladder may at any time become infected (through the blood).	Diagnosis easy. The gall-bladder may be mistaken for a movable kidney. The tumor if not adherent moves most from side to side. It can be pushed downward, but comes back at once. Tenderness on pressure is slight. If the gall-bladder is contracted, hydrops fails to produce a palpable tumor. Diagnosis under such circumstance is difficult, as in IV.	Cystostomy with cysticotomy, or, better still, cystectomy.
VII. Empyema of the gall-bladder. The gall-bladder contains pus. There is a calculus in the cystic duct and adhesions are present.	Symptoms at first as in II.; later fever may disappear and the symptoms become as in VI., although the tumor is usually smaller. No passage of calculus. Pain is usually confined to the region of the gall-bladder and the pit of the stomach, but it may extend to the back, breast, etc.	Do not aspirate for the sake of diagnosis. Similar to VI. If perforation occurs, there will be symptoms of peritonitis. At first the gall-bladder is very painful in empyema; later the tenderness lessens or disappears. There is often an encapsulated abscess in the neighborhood of the gall-bladder.	Similar to that of VI.
VIII. Carcinoma of the gall-bladder which contains a calculus.	The first symptoms are those of indigestion without jaundice. If the common duct and the portal lymphatic glands become affected, jaundice and ascites develop. The tumor is hard and uneven. Colic is often wanting. Later cachexia develops.	Tenderness slight. Diagnosis difficult before jaundice appears. It is easy if the portal glands become affected and ascites develops. The carcinomatous gall-bladder which contains calculi often becomes inflamed (empyema).	Treatment unsuccessful except in an early stage, then cystectomy with extensive resection of the liver. In empyema of a carcinomatous gall-bladder cystostomy is of slight benefit.

Form of the disease.	Symptoms.	Diagnosis.	Treatment.
IX. Acute obstruction of the common duct by a calculus.	Jaundice is well marked, and there are colic and vomiting and frequently chills and fever. The symptoms subside if the calculus passes into the duodenum or becomes loosened. In the former case the calculus may be found a few days or a few weeks later in the feces, but not necessarily.	Diagnosis easy. Typical attacks of colic. Pain extends to the breast and back, while pain due to calculi in the gall-bladder (cholecystitis) is usually confined to the region of the gall-bladder and stomach.	Internal medication. Morphine subcutaneously. Hot poultices. Operation only exceptionally necessary (drainage of the hepatic duct).
X. Chronic obstruction of the common duct by a calculus situated in the supraduodenal portion.	Jaundice moderate or absent. It changes from day to day; stools sometimes brown, sometimes gray. There is often intermittent fever. There is usually pain. The patient gradually becomes cachectic and takes on a hemorrhagic diathesis.	Gall-bladder contracted and not palpable. Liver more or less enlarged. Tenderness on pressure over its centre. The spleen often enlarged.	Cholecystotomy and inspection of the relations of the gall-bladder. Cystectomy and drainage of the common duct if necessary.
XI. Chronic obstruction of the common duct by a calculus situated in the duodenal papilla.	Symptoms as in X. Jaundice usually intense and constant, although it may disappear with subsidence of the inflammation.	Similar to that of X. Gall-bladder contracted if previous inflammations have affected its walls so that they cannot dilate, otherwise a tumor may be present (empyema coexisting).	There is possibility of a fistula between the common duct and duodenum. If no improvement after three months at Carlsbad, an operation should be performed. Cholecystoduodenostomy.
XII. Chronic obstruction of the common duct by a tumor of the pancreas (carcinoma, interstitial pancreatitis), duodenum, or common duct itself.	Marked jaundice, usually constant and gradually increasing. Stools always gray. Usually no fever. Slight or no pain. If present, it is of a dull and not of a colicky character.	Gall-bladder usually large. Liver enlarged. Tenderness on pressure slight or wholly wanting. Spleen often enlarged.	Expectant treatment. Possibly cholecystenterostomy (risk of cholangitis). Treatment of little service in carcinoma, but successful in chronic pancreatitis.

Prognosis.—In most cases of cholelithiasis the prognosis is uncertain even when the attacks of colic are mild and infrequently repeated. In many cases the disease progresses without marked symptoms and then suddenly becomes much worse. On the other hand, encapsulation of the calculus, dying out of the infection, or perforation, may lead to a happy termination of a very severe case. It is quite impossible to prophesy the outcome. The disease may continue for years. The chief dangers of cholelithiasis are due to perforation, cholangitis, and carcinoma. But even if none of these complications arise, it may wear the patient out with its ever-recurring pain. It shows little tendency to spontaneous cure, though it is frequently marked by latent

periods. Temporary benefit is frequently obtained by rest-cures, by cures at Carlsbad or elsewhere, and by proper treatment of the accompanying gastric or intestinal catarrh (irrigation, oil injections). The spontaneous passage of a calculus through the intestine may bring about a cure, but other calculi usually remain in the gall-bladder, any one of which may set up another inflammatory attack. Spontaneous cure may also follow the passage of a calculus by perforation from the gall-bladder to the colon, or from the cystic duct into the duodenum, or from the papilla into the duodenum. Such results are to be looked upon as happy accidents which cannot at all be counted upon in attempting the prognosis of the disease. Furthermore they frequently lead to the development of cholangitis; or the inflammation may produce peritoneal adhesions with resultant digestive disturbances. (Figs. 319 and 320.)

FIG. 319.

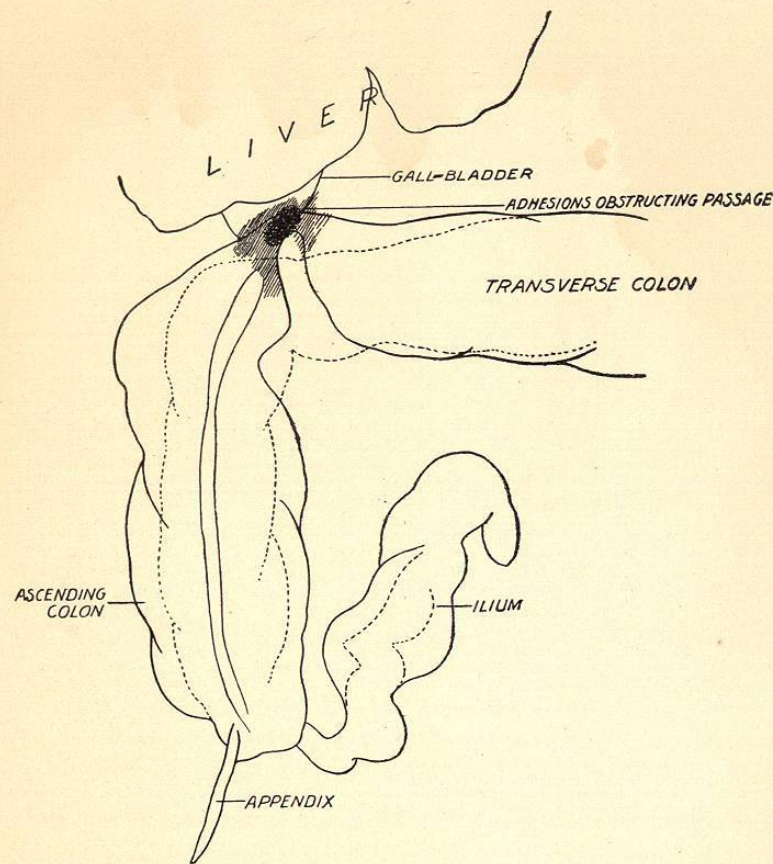


Showing the effects of adhesions between the liver, gall-bladder, and pylorus. The pylorus is drawn out of place and stenosed, and the stomach is dilated to about four times its normal capacity. (Niles.)

Indications for Operation.—Unfortunately, surgeons and physicians are not yet agreed as to the indications in cholelithiasis which make operative treatment necessary. Some, like Winiwarter, believe that operation is indicated as soon as the diagnosis of calculi is made. Others, like Riedel, believe that internal treatment has its place, but that it should not be continued too long, and that it is better to operate while the calculus is still easily accessible in the gall-bladder. There is still a third opinion to the effect that operation is not indicated until internal treatment has been tried for a long time and has failed, and there are others who do not advocate operation at all except under conditions which threaten the patient's life.

It should be clearly understood that internal treatment, such as that given at Carlsbad, rarely cures a patient, but produces a latent period in the disease in about 50 per cent. of the cases. However, such a latent period is looked upon by these sufferers as a cure, and they are not likely to agree to operation until the pains recur. The patient should be more or less under observation while he is receiving medical treatment. Thus, an acute seropurulent cholecystitis with

FIG. 320.



Showing adhesions between the gall-bladder and colon, almost completely obstructing the latter. (Niles.)

marked distention of the gall-bladder may disappear during internal treatment, but it may also lead to perforation. In these cases operation—that is, cystostomy—has so slight a risk that it ought to be given a preference over internal treatment. If there is a calculus in the common duct, the patient may be advised to begin treatment at Carlsbad, but on account of the risk of cholæmia and infection opera-

tion should not be postponed too long. Other patients seek surgical relief on account of the pain, or the gradual loss of weight, or jaundice, or fever.

Operation is indicated:

1. In all cases in which the internal treatment is unsuccessful, as well as in cases which do not admit of any delay (acute suppurative cholecystitis with chronic obstruction of the cystic duct).

2. In all cases in which treatment by medicine, diet, and baths fails to prevent recurrences of the trouble, and in which the attacks are sufficient to interfere seriously with the patient's mode of life. This is the position taken by most physicians. Frequently a patient who suffers from calculi will have contracted the morphine-habit, from which he can best be cured by an operation to relieve him of his trouble. If the gall-bladder is plainly distended, or there is enlargement of the liver, or jaundice, it is easier for the patient as well as for the physician to decide upon operation. But the absence of these physical signs must not be considered to throw doubt upon the diagnosis. The history of the disease is often of more value in making a diagnosis than the results of physical examination. This is especially true if there are repeated attacks of pain. Such pains are frequently due to adhesions between the gall-bladder and portions of the intestine, the results of circumscribed peritonitis, and these adhesions are usually not palpable. Hence repeated attacks of pain may be looked upon as an indication for operation in the absence of any positive results of palpation.

3. In all cases in which there is a suspicion of carcinoma (a hard tumor of the gall-bladder), or of perforation, or of suppuration in the vicinity of the biliary passages. Unfortunately, diagnosis in all these cases is apt to be made after the favorable time for operation has passed.

The idea of early operation in cholelithiasis is undoubtedly gaining ground both among surgeons and physicians. When one considers the distressing pathological conditions which can be produced by calculi, and when one compares the ease of cholecystostomy with the great difficulty often experienced in removing a calculus from the common duct, the advice of Riedel is appreciated. He advocates removing a biliary calculus early, before it has time to leave the gall-bladder. On the other hand, one must not forget that even a very severe attack may pass over. If the pains come on at rare intervals and the patient feels perfectly well between attacks, the indication for operation is less urgent. Then the social condition of the patient also has its bearing. While a rich man can spare himself, can indulge in cures at Carlsbad or elsewhere, a man who depends upon his health to earn his living will rather incline to operation.

Operation upon men is more difficult than upon women since the former press and strain more during the narcosis and the fixedness of the abdominal organs makes it more difficult to expose the diseased parts. Their power of resistance is often reduced by alcohol and

nicotine. Hence a cystostomy may be justifiable in men in circumstances in which a cystectomy would be performed in women. Old age is no counterindication for operation. Kehr has successfully operated upon many patients over sixty years of age. In the aged the prognosis should be guarded since carcinoma frequently coexists. If one is skilled in the technic, his results will be notably better than those of a beginner, since the time occupied in the operation will be decidedly less (half an hour for choledochotomy, as compared with two or three hours).

Operation is counterindicated:

1. In acute obstruction of the common duct. Under such circumstances there is a fair chance that the calculus will pass through the common duct into the duodenum, and that any other calculi remaining in the gall-bladder will give no further trouble. If fever is added to the symptoms of obstruction of the common duct, showing that cholangitis is taking place, and the patient's general condition is worse, operation with drainage of the hepatic duct should be performed.

2. In very old individuals, and in those who suffer from diabetes, arteriosclerosis, cardiac or pulmonary disease, and in very stout persons.

3. In extensive carcinoma of the biliary passages.

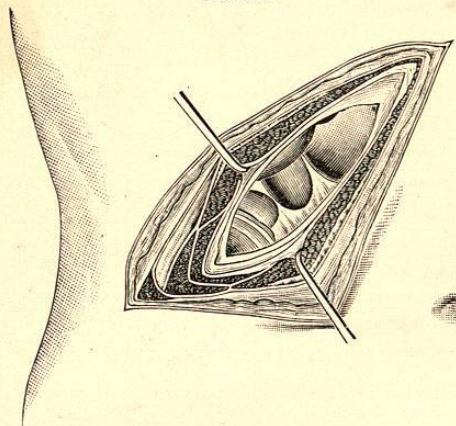
4. In cases of repeated attacks of icterus and the discharge of small calculi, provided the patient feels well between the attacks. There is always a possibility that such a patient may be cured by internal treatment.

While it is rarely possible to carry out Riedel's idea of removing biliary calculi before they leave the gall-bladder, yet an improvement in the diagnosis of cholelithiasis will bring one nearer and nearer to this desired position. No one except a thoroughly skilled surgeon should attempt to operate for cholelithiasis. What is apparently a very simple case may turn out to be a very difficult one. The surgeon may begin with the expectation of performing cystostomy, and find it necessary to drain the hepatic duct or to perform gastro-enterostomy on account of pyloric stenosis. For the same reason it is best to perform operations of this sort only in a well-appointed hospital.

Technic of Operation.—The patient should be prepared with baths, cathartics, etc., as for a laparotomy. Asepsis should be carefully observed. The incision may be a transverse one parallel to the costal margin or lower margin of the liver (Courvoisier, Robson (Figs. 322 and 323)), or along the outer margin of the right rectus muscle (Tait), or in the muscle itself (Riedel). Czerny makes a vertical incision in the linea alba and a right transverse incision which joins this below the umbilicus. Löwker employs a median incision. Kocher prefers an oblique incision. (Fig. 321.) Kehr makes use of an incision similar to the one advocated by Bevan. It begins at the ensiform cartilage, extends 3 or 4 cm. (1.2 to 1.6 inches) downward in the median line and then bends to the right parallel to the costal margin until it has divided two-thirds of the rectus muscle, when it bends downward and follows the muscular fibres. This incision, the "wave cut," as he

calls it, is a combination of vertical and transverse lines, which gives an excellent view of the biliary tract, especially if a firm cushion or sand-bag is placed under the patient's back. It is rarely necessary to resect the costal cartilages, as advocated by Lannelongue, or to resect the overlying portion of the liver. Superficial bloodvessels are clamped, but not ligated unless the patient has jaundice. The peritoneum is lifted with two sharp forceps and divided between them. The incision is prolonged and a large gauze compress is introduced into the abdominal cavity. If the gall-bladder is adherent to the abdominal wall or an abscess exists between these two structures, the relations of the parts may be better known after aspiration with a fine needle. If there are no adhesions, the biliary passages can be mapped out by inspection, and still more accurately by palpation, since the finger recognizes, as the eye cannot, every adhesion which may exist

FIG. 321.



Exposure of the stomach, gall-bladder, and colon by the oblique incision. (Kocher.)

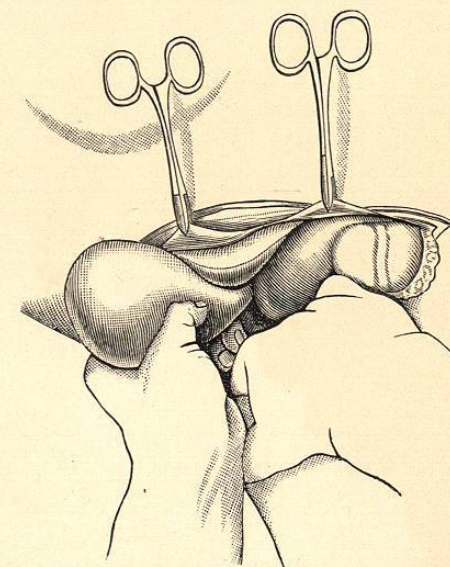
between the biliary passages and the intestine. (Figs. 319 and 320.) Any recent adhesions about the gall-bladder are torn through with the finger, while old adhesions should be divided under guidance of the eye. It is rarely necessary to ligate them. Any adhesions between the cystic duct and the stomach or duodenum, and between the gall-bladder and colon, may contain a fistula between these organs. If such be the case, the abdomen should be protected from the escape of bile or feces, the opening in the stomach or intestine carefully sutured, and the gall-bladder removed. In every case the surgeon should make it a point to expose freely, inspect, and palpate the larger bile-ducts. This should only be omitted in case the patient is weak or takes the anæsthetic badly. Such a thorough examination is possible in about 98 per cent. of the cases. The pylorus, duodenum, and pancreas should also be examined since these organs are often affected after cholelithiasis. The glands along the cystic or common duct are frequently so hard that they have been mistaken for calculi and cut into.

The technic of special operations is as follows:

1. Cystostomy in two steps: The short vertical incision (5 to 10 cm.—2 to 4 inches) is made in the outer third of the right rectus muscle or along its outer border.

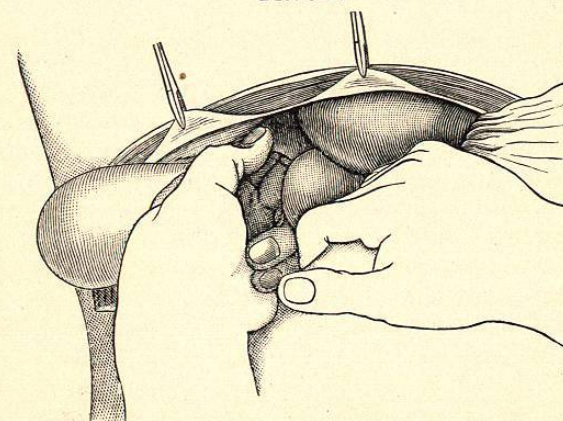
The fundus of the gall-bladder is wrapped in sterile gauze and brought out through the incision in the peritoneum. The rest of the wound may be closed, but sufficient space should remain to permit the completion of the operation, namely, the opening of the gall-bladder at a later date. The gall-bladder may be fixed in position by a few sutures, or the point in it at which the incision is to be made may be marked by a black silk thread. The adhesions formed after suture are firmer than those which form if only a tampon is used. Care should be taken not to puncture the gall-bladder with a needle. Its wall is often very thin. The dressing is first changed ten to fourteen days later, and if the adhesions are then firm, the gall-bladder

FIG. 322.



Robson's incision for exposing the gall-bladder and common duct. A sand-bag is placed under the loin.

FIG. 323.

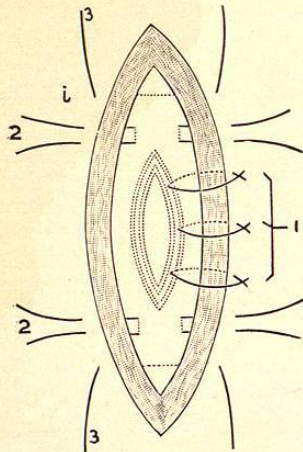


Robson's incision for exposing the gall-bladder and common duct. A sand-bag is placed under the loin.

is opened with a sharp pointed knife or a fine thermocautery. Any calculi which it contains are extracted with forceps or a curette.

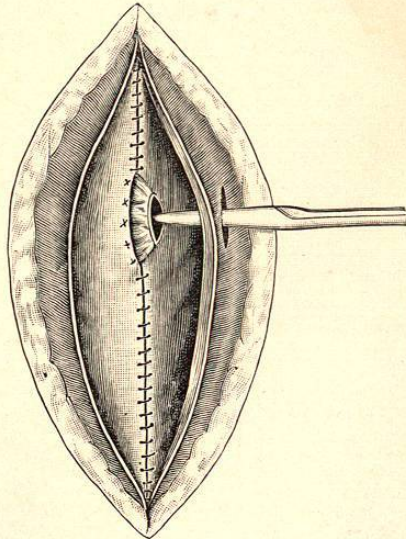
2. In completing a cystostomy in one operation it is important to see that the contents of the gall-bladder do not escape into the peritoneal cavity, for they are generally infectious. For this purpose compresses wrung out in salt solution are placed on all sides of the gall-bladder, and its contents are aspirated by a good syringe. Infection can thus be avoided. If the gall-bladder is very large, it can be more easily drawn forward, and if the liver is also movable, aspiration will be unnecessary. The gall-bladder can be brought out through the abdominal wound, opened with a scalpel, and its contents caught in a basin. If aspiration is employed, it is followed by an incision. A silk thread is passed through each side of the wound in the gall-bladder for the purpose of tension. Sometimes the contents of the gall-bladder are so thick and tough that they cannot be aspirated.

FIG. 324.



Cholecystostomy. Fixation first and then incision. 1, serocutaneous suture to keep the gall-bladder open; 2, lateral fixation; 3, angular fixation. (Terrier.)

FIG. 325.

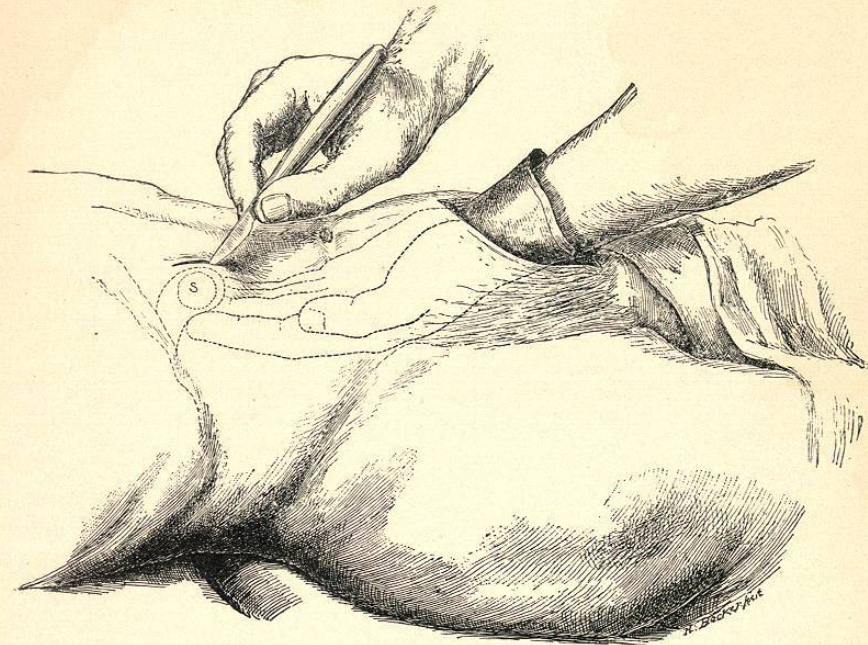


Cholecystostomy. Incision first and then fixation. Peritoneum sutured. (Pantaloni.)

An incision is then made and the thick, stringy bile sponged out. One should be careful not to soil the fingers with this infectious material. Irrigation is for the same reason inadvisable. The cavity of the gall-bladder is wiped dry with strips of gauze and the cystic duct is palpated from the peritoneal cavity. If it contains a calculus, this should be removed at once, since its later removal is far more difficult. On this account it is better not to suture the gall-bladder in the wound before opening it, as is recommended by Terrier. (Fig. 324.) Manipulation of the calculus from within the peritoneal cavity will aid in its extraction. If this fails and the gall-bladder is to be preserved, the cystic duct must be opened and the calculus removed. (See paragraph 3.) In certain cases, either on account of local or

general conditions of the patient, this exposure of the ducts is impracticable, and the surgeon must content himself with simple cystostomy. The opened gall-bladder is then to be sutured to the parietal peritoneum and deep fascia (Fig. 325), never to more superficial tissues, and a fair-sized soft rubber tube should be left in it. Pro-lapse of the mucous membrane of the gall-bladder may produce a permanent fistula. If the incision is sufficiently large to render this likely, it may be partially closed by sutures. The position of the gall-bladder in the abdominal wound should be such that there is no tension on the sutures. Kehrer prefers silk to catgut, leaving the ends of the sutures long so that they can be removed in ten days. If they

FIG. 326.



Method of incising the gall-bladder for calculus during a laparotomy. (Kelly.)

find their way into the gall-bladder, they may lead to the formation of new calculi. It is often difficult in cutting out these sutures to be sure that no portion of the silk remains. A good way to avoid this is to tie a long piece of silver wire in each suture. Tension upon this wire will make it easy to cut the suture itself, and not merely to cut off its ends. The portion of the abdominal wound not occupied by the gall-bladder is closed by silk sutures which pass through all its layers. A large aseptic dressing is applied, through which the rubber tube passes and enters a bottle containing a 3 per cent. solution of carbolic acid.

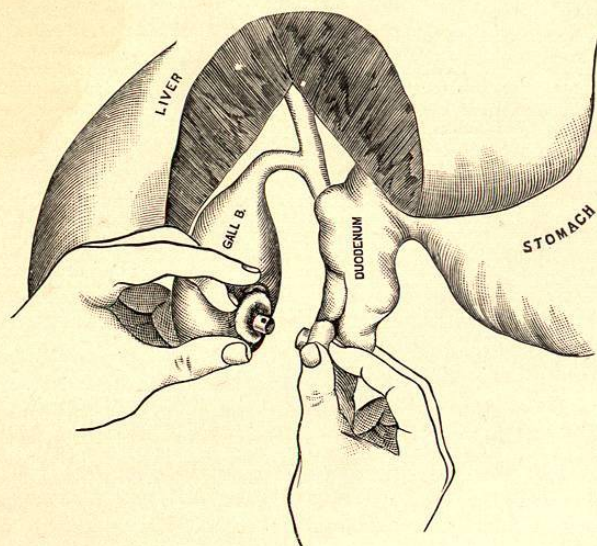
Kelly has suggested a quick method of incising the gall-bladder

for a calculus recognized during a laparotomy for some other purpose. (Fig. 326.)

3. Cysticotomy, or incision of the cystic duct, presupposes a free exposure of the duct. The incision should be made directly down upon the calculus. In the extraction of the latter, injury of the walls of the duct should be avoided. Rather than risk this the incision should be prolonged. The incision is closed by a suture which passes through the serous and muscular layers only, as incrustation may take place upon any thread which reaches the lumen of the duct. Cysticotomy should invariably be followed by cystostomy, and gauze tamponade at the same time will still further insure the safety of the patient.

4. Cholecystectomy, or removal of the gall-bladder, was first performed by Langenbuch in 1882. The abdomen is opened by the

FIG. 327.



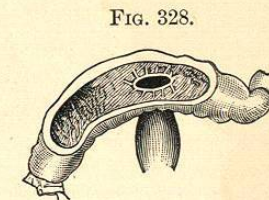
Cholecystenterostomy with Murphy button.

wave incision above described, and any adhesions between the gall-bladder and intestine or omentum are divided. The removal may be begun at the fundus or at the cystic duct, according to circumstances; usually the latter method is preferable. The cystic duct is seized with a curved clamp so that no fluid may escape from the gall-bladder. The cystic duct is then surrounded by an abdominal pad to prevent the unnecessary escape of bile from the common duct, and divided. The fundus of the gall-bladder is seized with a strong clamp, and the serous coat of the liver is divided with a U-shaped incision and the gall-bladder pulled from its bed. This extirpation is not difficult in most cases. If the tissue of the liver is torn, it should be sutured.

Both branches of the cystic artery require careful ligation, if post-operative hemorrhage is to be avoided. It is unwise to include the arteries and the cystic duct in a single ligature. They should be tied separately. The gall-bladder may be removed before it is opened; or if the difficulties of such a procedure are great, or fistulas exist, it is better to open the bladder, wipe it dry, stuff it with gauze, and separate it from the liver. In any case it is better not to close the abdominal wound completely, but rather to tampon the stump of the cystic duct or wound in the liver, for one can never be certain that there will be no hemorrhage or that the ligatures of the stump of the cystic duct will not give way.

A portion of the gall-bladder may be resected; for example, its under surface. The cystic duct should then be ligated and the remnant of the gall-bladder which remains should be thoroughly cauterized with the Paquelin cautery. Kottmann leaves a portion of the neck of the gall-bladder, a procedure which has little to recommend it. Mayo removes the mucous membrane of the gall-bladder as far as that of the cystic duct, leaving the other coats of the organ in position.

5. Cystendysis, or the so-called ideal operation of Courvoisier, consists in opening and emptying the gall-bladder, closing it by a serous and muscular suture and a second serous suture, and then closing the abdominal cavity. None of the stitches used should enter the lumen of the gall-bladder lest incrustation follow. This operation is not suited to any case of cholelithiasis.



Gall-bladder and duodenum fifteen months after cholecystenterostomy. (Kappeler.)

The risk of the "ideal" method consists in the possible rupture of the suture and the escape of bile into the peritoneal cavity. Its object is, of course, to avoid a permanent fistula which may follow drainage of the gall-bladder. Czerny modifies the operation by stitching the sutured gall-bladder into the abdominal wound, so that if it ruptures the bile will escape outward rather than into the peritoneal cavity. According to Kehr's views, the principle of this operation is wrong. The drainage of the gall-bladder is in no sense dangerous, nor does it annoy the patient if the dressing is properly arranged. Moreover, when the flow continues for a long time the common duct is usually obstructed, and drainage under such circumstances is necessary. If a purely mucous discharge continues, the cystic duct is obstructed, and here again cystostomy is preferable to Czerny's operation of cystendysis. Most gall-bladders which are operated upon are inflamed and free drainage is beneficial. It is easy for a surgeon to overlook a small calculus in the cystic duct, especially if the mucous membrane is swollen. If the gall-bladder is sutured and the suture holds, the calculus will be driven into the common duct by the gradually increasing secretion in the gall-bladder, obstruction of the common duct will result, and the condition of the patient will be considerably worse than before.