

ciously applied massage will often cause all symptoms to disappear. When such measures fail, operation is indicated; but the results of operation are so uncertain that it should not be too hastily performed. Langenbuch recommends division of the round ligament on the ground that it may be congenitally short, or because a dependent abdomen by pulling on the round ligament may drag down the liver. Several surgeons have reported success following suture of the liver to the costal cartilages, or the liver may be fixed by extensive tamponade introduced between it and the anterior abdominal wall. The lower edge of the liver may be brought out through the peritoneum into a pocket prepared for it (Rydygier's splenopexy).¹

There is an anteflexion of the liver in which the liver turns forward upon its transverse axis. This is also observed in women who have been accustomed to lace their abdomens. The treatment is the same as that described above.

Recently attempts have been made to overcome the ascites which accompanies chronic hepatoptosis or atrophic cirrhosis of the liver by an increase in the collateral circulation between the portal system and the general venous system. Talma recommended stitching the omentum, and if necessary the spleen, to the parietal peritoneum, and a great many operations of this or a similar character have since been performed. There have been some successes and many failures. It is necessary that the cells of the liver should be still capable of performing their function if the operation is to be of lasting benefit. In the German Congress of Surgery, 1902, Bunge reported 79 cases of ascites treated by Talma's method, with 32 cures and 15 improvements, and 32 bad results.²

The best modification of Talma's operation is that suggested by Eiselsberg and Neumann, who carefully rub strip by strip the parietal peritoneum and suture to it the omentum. In this manner the omentum becomes adherent to the anterior abdominal wall throughout a wide area.

¹ These and other methods are described in detail by Bötticher in the Deutsche Zeitschrift für Chirurgie, 1900, vol. lvi., p. 252.

² See also Progressive Medicine, June, 1903, p. 118.

CHAPTER XXV.

SURGERY OF THE BILIARY PASSAGES.

Anatomical and Physiological Considerations.—The position of the gall-bladder and its relations to the external abdominal wall vary greatly. An incision beginning at the lower margin of the ninth costal margin and carried downward along the outer margin of the right rectus muscle directly exposes the normally placed gall-bladder. But the surgeon usually has to do with a pathologically altered gall-bladder, and must be prepared to find it displaced to the right or high up under the liver, or, less often, displaced to the median line, or even to the left side. Rarely the gall-bladder is found situated to the left of the round ligament, although situs transversus does not exist. In one such case the cystic duct opened into a narrow left hepatic duct which joined the normal right hepatic duct near the duodenum. Sometimes the gall-bladder is displaced downward and is found in the lumbar region or in the neighborhood of the cæcum. These changes in position are chiefly due to changes in form and size of the liver, but also to adhesions between the gall-bladder and intestine, by which the gall-bladder is dragged out of its normal position.

The size of the gall-bladder is as variable as its position. If the cystic duct is obstructed by a calculus, the bladder may be dilated until it is as large as a child's head, so that it may be mistaken for an ovarian tumor. It often shrinks, owing to inflammatory processes, until it is no larger than a cherry and is even found with difficulty.

It is unnecessary to describe the anatomical structure of the gall-bladder in detail. For surgical purposes it is sufficient to state that it is made up of a mucous membrane, a muscular layer, and a serous layer. Sometimes its wall is as thin as paper, so that every stitch which is passed into it penetrates its lumen. At other times the wall

FIG. 313.

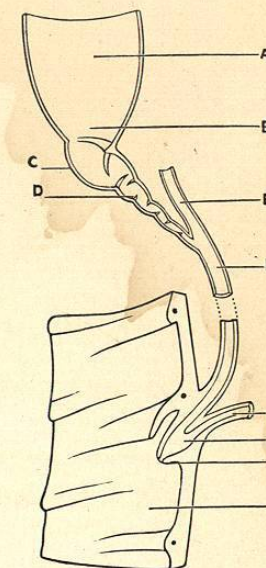


Diagram of the biliary passages: A, B, gall-bladder; C, D, cystic duct with valves; E, hepatic duct; F, common duct; G, pancreatic duct; H, ampulla of Vater; I, biliary papilla; J, second portion of the duodenum. (Testut.)

is nearly half an inch thick and so hard that it can scarcely be cut with a knife.

The blood-supply of the gall-bladder is furnished by the cystic artery, a vessel which divides at the neck of the gall-bladder into two branches, one of which extends along the free side of the gall-bladder, and the other along the side of the gall-bladder next the liver.

The gall-bladder is more or less attached to the under surface of the liver, an attachment which is easily separated if it has never been strengthened by inflammatory processes.

There exists in the lumen of the cystic duct several folds called after the name of their discoverer, Heister. Their arrangement prevents in most cases the passage of a probe from the gall-bladder into the common duct. The probe usually passes into the diverticulum of the neck of the bladder rather than into the cystic duct. Indeed, Brewer goes so far as to say that a cystic duct which can be probed is a pathological one. But it does not follow that every duct which has been dilated by the passage of a calculus will allow the passage of a probe.

The cystic duct is often bent at a sharp angle as it enters the hepatic duct. At this point there is situated a lymphatic gland which when enlarged may easily be mistaken for a calculus. Other glands are situated along the common duct and portal vein, and their enlargement in inflammatory processes may mislead the surgeon who is not aware of their presence into thinking that the common duct contains calculi.

Both the cystic and common ducts are easily exposed if no adhesions are present. Adhesions may so change the normal relations that it is difficult for the surgeon to recognize these structures. As the gall-bladder is the guide both to the cystic and the common duct, this should first be found if possible, and followed to the cystic duct. The common duct extends from above downward and inward in the ligament between the liver and duodenum. It is easily exposed without disturbing the accompanying hepatic artery and portal vein if there are no adhesions. In the tissue covering the common duct there are a number of small veins and arteries with free transverse anastomoses which may give rise to troublesome hemorrhage when the common duct is cut into. Another guide to the common duct is the foramen of Winslow. If one passes a finger through this foramen, he can lift forward the common duct and so make it more accessible. Sometimes the foramen is obliterated by inflammatory processes. A third way of reaching the common duct, suggested by Langenbuch, is to locate the pylorus, and with it as a starting-point to search for the common duct. This method of approach is chiefly valuable in case the gall-bladder is so surrounded with adhesions that it cannot be found.

The common duct is conveniently divided into three portions, one of which is situated above the duodenum, one behind the duodenum, and one within the pancreas. The first portion is about 3 cm. (1.2 inches) in length, and is the most favorable part of the common duct for incision. The second portion may be reached after incision of the duodenum and exposure of the head of the pancreas.

There are numerous anatomical variations in the gall-bladder, such as the presence of two gall-bladders, or the absence of the gall-bladder, or obliteration of the cystic or other duct, but their description would occupy too much space. Such marked anomalies are rare.

Opinions differ as to the function of the gall-bladder. Murphy considers it a regulator of the tension within the biliary passages, like the air-chamber in a steam pump; others consider the gall-bladder a reservoir. Doubtless it has some special function, but its removal seems not in any way to affect a person's health or his digestion. If the cystic duct is removed together with the gall-bladder, there is no attempt on the part of nature to re-establish the original condition. If the cystic duct is left when the gall-bladder is removed, it may dilate so as to form a sort of gall-bladder.

Opinions in regard to jaundice vary even more widely than opinions as to the function of the gall-bladder. In diseases of the biliary passages there are two forms of icterus, as pointed out by Riedel: an inflammatory icterus and a lithogenous icterus. The first is due to swelling of the mucous membrane of the biliary passages, and may follow affections of the gall-bladder, since the swelling of the mucous membrane easily extends into the common and hepatic ducts and so interrupts the flow of bile. Lithogenous jaundice is due to obstruction of the common duct by a calculus. Jaundice of the first sort does not last long, and the color of the patient's skin is not deep. Jaundice of the second form may last a long time and be very intense. It is not always easy to differentiate between the two forms. Lithogenous jaundice varies from time to time, and seldom reaches the degree attained when the common duct is obstructed by a tumor. An inflammatory process which extends from the gall-bladder into the common duct involves also the pancreas, so that the jaundice which accompanies the presence of calculi in the gall-bladder is frequently due to obstruction of the common duct caused by a swelling of the pancreas. In acute cholecystitis there is also an acute swelling of the lymph-glands along the cystic and common ducts, and these may easily compress the common duct and produce icterus. Examination of gall-bladders which have been removed for acute cholecystitis shows that the inflammation usually terminates at the neck of the gall-bladder, and while the mucous membrane of the bladder is much swollen, that of the cystic duct is pale and little changed from its normal condition.

There are also acute inflammations in the biliary passages which, although not accompanied by the formation of calculi, may require surgical treatment. Such inflammation may be limited to the gall-bladder (cholecystitis) or to the larger ducts (cholangitis), or it may spread to the finer radicles of the biliary tract (diffuse cholangitis). The inflammation may be serous, fibrinous, purulent, gangrenous, or diphtheritic, and produce accordingly varying symptoms. There is a very acute form of cholecystitis which without perforation may set up general peritonitis. Gangrene of the gall-bladder is rarely observed

on account of its free blood-supply, not only through the cystic artery, but also through vessels which reach it from the liver. As long as the inflammation is confined to the gall-bladder the shape of the liver is not affected. In cholangitis the liver may be considerably enlarged. In cholecystitis pain and tenderness are limited to the region of the gall-bladder. The pain is often mistaken for gastric pain even though it is situated in the right hypochondrium. It may be severe and colicky in character, and extend to the back and right shoulder-blade. In cholangitis the pain is more diffuse, spreading over the whole region occupied by the liver. In cholecystitis jaundice is absent or slight. In cholangitis it is usually well marked. Fever is present with either disease, and in cholangitis it often assumes a septic or pyæmic character. Under the influence of inflammation the gall-bladder dilates; its muscular structure, and especially that of the neck, becomes hypertrophic, the serous coat thickens, and as a result there is a more or less palpable tumor, usually at the outer margin of the rectus muscle, whose lower outline is circular or elongated. Above, the tumor blends with the liver. If adhesions have not formed between the gall-bladder and the liver, there will be considerable motion of the organ from side to side, and sometimes from front to back. It will always resume its original position as soon as pressure is removed. It clearly moves with respiration, and it cannot be held down during expiration as can a floating kidney or a tumor of the stomach or intestine or omentum, all of which may move with respiration. The tumor formed by the distended gall-bladder may be so great that it is easily mistaken for hydronephrosis, cyst of the ovary, or echinococcus cyst of the liver. It contains either a pure serous fluid or a mucopurulent or purulent or even gangrenous fluid. Aspiration of the gall-bladder to determine the nature of its contents is under no circumstances justifiable.

According to the light of our present knowledge, inflammation of the biliary passages is due to the introduction into them of bacteria. It is hardly probable that a foreign body can produce inflammation without bacterial aid, although foreign bodies undoubtedly favor bacterial infection. Examples of foreign bodies are cherry-pits, parasites (such as echinococcus and round worms), and biliary calculi. Traumatism also plays its part in inflammation of the gall-bladder. There have been repeated instances in which some severe exertion has been followed by pain in the region of the gall-bladder, and in which at operation some time afterward there have been found extensive adhesions due to an acute cholecystitis or pericholecystitis. In some of these cases gall-stones may have existed at the time of the injury, but in others the inflammation developed without their aid. There are an acute cholecystitis and a purulent cholangitis which occur after typhoid fever, or cholera, or dysentery, or pyæmia, or gangrenous carcinoma of the gall-bladder, etc. Typhoid germs have been found in the contents of a gall-bladder some years after the patient has recovered from typhoid fever.

In all these inflammatory conditions cholecystotomy—that is, the

opening and suturing of the gall-bladder in the abdominal wound—may be indicated. In suppurative cholangitis drainage of the hepatic duct best relieves the liver of the infected bile. Such treatment will only succeed in case the finer bile-ducts are not involved. It is not yet determined whether the leucocyte count is a reliable indication as to the severity of the inflammation. This in purulent conditions varies from 15,000 to 40,000.

Tuberculosis and actinomycosis of the biliary passages are very rare diseases.

Surgical aid is occasionally demanded on account of traumatism of the gall-bladder or the biliary passages. Operation is much more frequently demanded on account of cholelithiasis and its sequelæ.

CHOLELITHIASIS.

Origin of Biliary Calculi.—Calculi are rarely found in young individuals. They are commoner in middle life, and they are frequent in later life. Women, especially if they have borne children, are more often affected than men (5:1). If a number of adult cadavers are examined, every tenth one will be found to contain calculi.

FIG. 314.



FIG. 315.

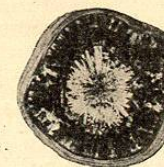
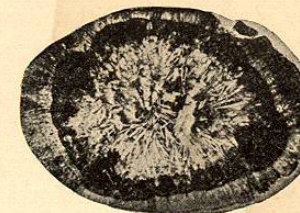


FIG. 316.



Gall-stones in section, natural size. (Naunyn.)

A biliary calculus may be composed of (1) pure cholesterin, (2) stratified cholesterin, (3) pure or mixed bilirubin and calcium salts, and (4) calcium salts. The size and number of calculi vary between wide limits. A solitary calculus is usually about the shape and size of a hazelnut or a walnut. (Figs. 314–316.) The size of the calculus and the amount of pain are in no wise intimately related. Accompanying inflammation or infection and the position of the stone in the neck of the gall-bladder or cystic duct or papilla of the duodenum are factors which determine the severity of symptoms far more than the size of the calculus. If several calculi lie in contact, their surfaces show facets. The color of a calculus is usually yellowish or brownish or black, but one which is composed of pure cholesterin is light and almost transparent. Sometimes the nucleus is a foreign body (an intestinal worm, a fruit kernel, part of a distoma hepaticum). Calculi have been known to form about silk threads which worked their way into the gall-bladder after operation.

Calculi rarely develop in any portion of the biliary tract except the gall-bladder. Their formation is favored by any influence which

obstructs the flow of bile, such as clothing, pregnancy, absence of abdominal respiration, muscular atony of old people, sedentary life, infrequent meals, etc. Riedel assigns to heredity an important part in their formation. Benecke believes they are favored by atheromatous degeneration and gout. Krauss ascribes importance to rich diet and luxurious living. Albers believes they are commoner among the poor, and Boucharde says there is an especial calculous diathesis.

It is beyond doubt that the formation of biliary calculi is favored by obstruction to the flow of bile. A catarrh of the biliary passages, and especially of the bladder, precedes their formation, and this catarrh is due, according to modern views, to an infection set up by bacteria which enter the biliary tract from the intestine (*bacterium coli*, typhoid bacilli, etc.). Fournier examined 100 biliary calculi and found living or dead bacteria in the centre of 38 of them.

Pathological Anatomy.—Calculi may exist in the gall-bladder without giving rise to symptoms as long as the cystic duct is open. In about 95 per cent. of the cases there is this latent period. When an inflammation of the gall-bladder takes place or the calculi come to lie where they interfere with the free flow of bile, the patient suffers from definite symptoms. The effect of the inflammation is to loosen the mucous membrane and produce a transudation of serous or purulent fluid. This inflammation, as already stated, may be serous, seropurulent, purulent, or gangrenous, and may lead to ulceration, perforation, etc. If the cystic duct is permanently closed by a calculus or cicatrix which follows an ulcer, and the inflammation subsides, a sterile hydrophora of the bladder will be the result. If the infection continues, there will develop empyema of the gall-bladder. If the obstruction to the cystic duct is overcome by the passage of the calculus into the common duct or by a loosening of the calculus which was wedged into the neck of the gall-bladder, a cholelithiasis may be recovered from. But in most cases there will be recurrent attacks of inflammation because the presence of the calculus will keep up the infection and the gall-bladder will gradually lose the power to empty itself.

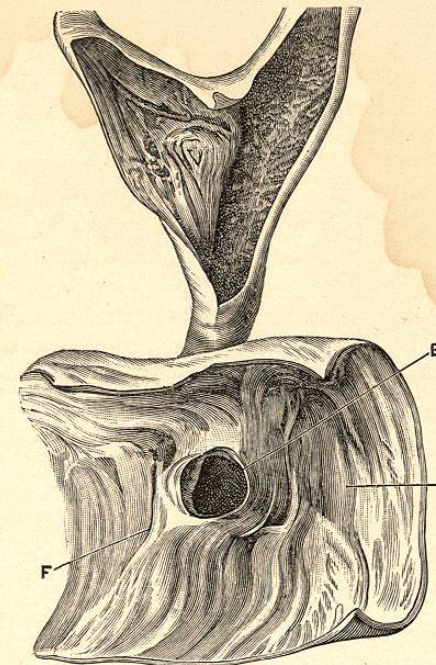
If the cholecystitis spreads to the serous coat of the gall-bladder, a pericholecystitis develops. The adhesions which result, by kinking the cystic duct, obstructing the flow of bile, and favoring the continuance of infection within the gall-bladder, may produce attacks of colic similar to those produced by a calculus even though all calculi have passed through the common duct into the intestine. In pericholecystitis the inflammation may extend to the pylorus and duodenum and produce new symptoms due to stenosis of these organs.

A spontaneous cure of cholecystitis by the complete discharge of calculi through the cystic and common ducts into the duodenum rarely occurs. A cure may rarely be effected by adhesions between the gall-bladder and intestine (duodenum, colon), perforation and discharge of calculi into the intestine. In rare cases the gall-bladder perforates into the stomach, urinary bladder, vagina, pelvis of the kidney or an ovarian cyst. Rupture of the gall-bladder and discharge through

the umbilicus are more often seen. Spontaneous cure which occurs in such a manner is apt to remain incomplete unless it is completed by the surgeon.

While the first effect of inflammation is to dilate the gall-bladder, its later effect is to contract it, and when once contracted it cannot again be dilated. Its walls are changed into cicatricial tissue, and then may even calcify. The cystic duct, whose calibre is normally very small, may become dilated by the passage of a calculus, and its muscular coats hypertrophy if a calculus remains in it for some time. If the calculus is finally passed, the duct contracts once more, or the scar following ulceration may obliterate it. These pathological changes may transform a normal tortuous duct into a perfectly straight passage.

FIG. 317.



Biliary calculus, E, lodged in the ampulla of Vater; seen from within the opened duodenum, F. (Baillie.)

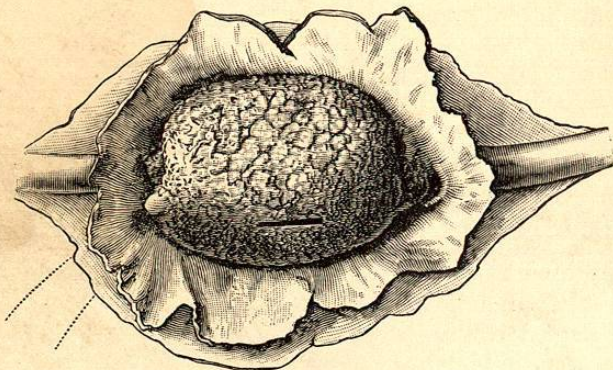
As long as a calculus remains in the gall-bladder or in the cystic duct jaundice is not likely to appear. This is true of 90 to 95 per cent. of the cases. Nor is the liver enlarged, except that the portion immediately over the gall-bladder may be stretched into a tongue-shaped lobe which has been confounded with movable kidney.

As soon as the calculus has passed from the cystic duct into the common duct jaundice develops and continues until the calculus passes through the papilla into the duodenum, or until the duct in which the calculus lies dilates and the flow of bile is again possible. The patho-

logical changes produced by a calculus in the common duct (Fig. 318) are essentially the same as those produced in the gall-bladder, viz., swelling of the mucous membrane and ulceration, although the latter rarely leads to cicatricial obliteration of the duct because the steady stream of bile prevents the walls from growing together. Frequently the common duct dilates to such an extent that the finger may be passed into it. Perforation may take place from the common duct into the stomach or duodenum, which gives a sort of spontaneous cure. A calculus which has lodged in the papilla (Fig. 317) is very apt to set up a fistula between the common duct and duodenum.

Inflammation in the common duct may extend to the tissues in its neighborhood, and it may produce thrombophlebitis, thus interfering with the circulation through the liver. It may easily lead to diffuse suppurative cholangitis and hepatic abscess. The inflammation may extend to the pancreas, giving rise to chronic interstitial pancreatitis, although a calculus in the common duct is more likely to produce

FIG. 318.



Calculus developing in the common bile-duct. (Doyen.)

serious results than one in the gall-bladder or cystic duct. Chronic obstruction of the common duct is often produced by a single calculus. In acute attacks there are frequently several lying one behind the other in the duct. The number of calculi in the gall-bladder may be very great, but it is by no means rare to find only a single calculus.

The colic which is characteristic of calculi has been variously ascribed to inflammation and to contraction of the muscles of the gall-bladder set up by irritation of the calculus. The former theory seems the more rational, and the possibility of inflammation should certainly be borne in mind by every physician who is called upon to treat a patient with biliary colic. This is not the place to discuss in detail the many complications of cholelithiasis, such as hepatic cirrhosis, nephritis, hepatic abscess, acute hemorrhagic endocarditis, meningitis, pulmonary abscess, pyæmia, etc. Carcinoma of the gall-bladder is almost certainly due to irritation of the mucous membrane by a biliary

calculus. The head of the pancreas may become so thickened as the result of inflammation extending to it from the biliary tract that it is changed to a firm tumor. Other local results of cholelithiasis are acute pancreatitis, disseminated fat-necrosis, and suppuration in the lesser peritoneal cavity.

The evil effects of more chronic inflammation are shown in Figs. 317 and 318.

Symptoms.—It follows from the varied pathological conditions which occur in cholelithiasis that the symptoms of this disease must be equally varied. Indeed, as long as the bile passes freely through the cystic duct into and out of the gall-bladder there need be no symptoms. If the cystic duct is obstructed, secretion will accumulate in the gall-bladder and hydrops will result. If the contents of the gall-bladder become infected, there will be symptoms of cholecystitis (tumor of the gall-bladder, pain, fever, circumscribed peritonitis). The more intense the infection, the more severe the general symptoms will be. Inflammation in a contracted gall-bladder does not give rise to palpable tumor. When the infection passes over, the tumor and other symptoms may entirely disappear, but usually there will be renewed attacks of inflammation with pain, etc. A calculus in the gall-bladder does not ordinarily produce changes in the liver, but such changes occur when the calculus enters the common duct. To the symptoms already mentioned there will be added jaundice, which if long continued produces cirrhosis of the liver and acts injuriously upon the blood-vessels (hemorrhages in cholæmia). A calculus in the gall-bladder does not usually produce fever. Fever is a common symptom when the calculus is lodged in the common duct, and there are often, too, disturbances of the function of the stomach and intestine (vomiting, loss of appetite, constipation or diarrhœa). Chronic obstruction of the common duct may so reduce the strength of the patient and produce such a cachexia that it is difficult to decide whether the obstruction is due to calculus or to carcinoma.

There are several points in connection with the diagnosis of cholelithiasis which are of such practical importance that it is worth while to group them together:

1. Jaundice is wanting in most cases of biliary colic since the latter is due usually to inflammation of the gall-bladder which does not involve the common duct. The idea that a calculus does not cause pain until it has left the gall-bladder is a mistake. Most attacks of colic are caused by calculi or inflammatory processes within the gall-bladder itself.

2. A calculus in the common duct, even though it is as large as a walnut, need not cause jaundice, because the duct dilates with the entrance of the calculus and bile may flow past it into the intestine.

3. The pain in biliary colic varies from a slight oppression to the most intense suffering. It may, however, be wholly absent both in empyema of the gall-bladder and in chronic obstruction of the common duct.

4. Examination of the patient in many cases gives only a negative result, and especially so if the gall-bladder is contracted, as it is apt to be in chronic obstruction of the common duct. The passage of biliary calculi at stool is a rare occurrence, because in most cases the calculi remain in the gall-bladder. Their entrance into the biliary passages is far less frequent than is generally supposed.

5. Perforation from the gall-bladder into the intestine may take place without pain, and with only slight fever.

6. A calculus may lie quietly in the common duct or hepatic duct without giving rise to symptoms. Even a calculus the size of a walnut may lie in the common duct without causing the patient any uneasiness. It may appear to obstruct the passage completely, and yet as long as there is no infection there may be no trace of jaundice even in the sclerotic coat of the eye.

Diagnosis.—In cholelithiasis it is not sufficient to say the patient has calculus; the surgeon should go further and determine the situation of the calculus and note what pathological changes may be present. Such exact diagnosis rests upon:

1. An exact history, including the record of previous attacks.
2. A careful inspection.
3. A thorough examination.

From a well-taken history one can often recognize the different steps in the pathological processes of cholelithiasis. The character of the attacks of colic, of fever, and of jaundice (if present) will often show the extent of the disease.

A careful inspection of the body gives the surgeon a mental picture of the relations of the affected organs so that frequently he can foresee the condition which he finds at operation. Inspection is the first step in the examination of the patient. A distended gall-bladder pushes the abdominal wall forward, and if the patient is thin it may be seen to rise and fall with respiration. If there is inflammation in the gall-bladder or around it, the upper portion of the abdomen may protrude more than the other portions.

Percussion will show whether the tumor which is felt is closely associated with the liver, but the results of percussion are somewhat unreliable. Auscultation is of even less value. A peritoneal friction-sound or clicking of the calculi together in the gall-bladder is rarely heard. Palpation, and especially bimanual palpation, is the most valuable means of diagnosis. The patient lies upon the back with the knees slightly flexed; the surgeon stands at the patient's right side, and places the left hand flat in the right lumbar region and the right hand over the gall-bladder. By pressure with the left hand the liver and gall-bladder are gently forced against the anterior abdominal wall so that they can be felt by the right hand without exciting contraction of the abdominal muscles. The tumor is almost always tender on pressure. This symptom may be wanting in cases of hydrops without infection. The surgeon next tests the mobility of the tumor in order to distinguish it from a wandering kidney. A distended

gall-bladder unless adherent may be pushed out of place, but always returns to its normal position. A movable kidney possesses a characteristic shape and it returns to its normal position with a peculiar little jump. When the colon is distended with air, a movable kidney almost always disappears, and a tumor of the gall-bladder is usually displaced upward. Tumors of the stomach may be recognized by chemical examination of the gastric contents or distention of the stomach with air. An echinococcus cyst which develops in the neighborhood of the gall-bladder may easily be confounded with a tumor of the gall-bladder, although a carefully taken history will show in most cases of echinococcus cyst absence of pain and a slow, steady growth of the tumor, so that a correct diagnosis can be made.

In general the diagnosis of cholelithiasis is easy if the distended gall-bladder is palpable, and there is history of a characteristic attack of pain. As soon as the attack passes over, it frequently happens that no distention of the gall-bladder can be made out even though it is full of calculi, some of which are lodged in the hepatic and common ducts. Tumor of the gall-bladder when present is so characteristic that exploratory puncture should never be made. The fluid in a diseased gall-bladder is usually infectious, and on account of the tension under which it accumulates it is apt to trickle from the opening made by a needle and set up peritonitis. The existence of a tumor of the gall-bladder without jaundice indicates closure of the cystic duct by a calculus, whereas jaundice together with a distended gall-bladder is often due to carcinoma of the pancreas, duodenum, or common duct. If there is no tumor of the gall-bladder and the attacks of colic are not characteristic, the diseases which must be excluded in making a diagnosis are lead colic, renal colic, intestinal colic and fecal obstruction, round ulcer, nervous hepatic colic, etc. Calculi are rarely found in the stools because they are often too large to pass through the cystic and common ducts. If a calculus does pass into the intestine, it may remain for weeks and finally fall to pieces; or, if very large, it may produce ileus. If the gall-bladder is contracted, or if the common duct is permanently obstructed by a calculus, examination of the abdomen may reveal nothing except a more or less tender area behind the right rectus muscle.

The functions of the stomach should be tested and the urine and feces examined in every case. If calculi larger than cherry-stones are found in the stools, it is fair to assume that they entered the intestine through a fistula. In chronic obstruction of the common duct examination of the urine shows the presence of biliary pigments in about two-thirds of the cases. Albumin is also frequently found.

It is difficult to show the existence of calculi by means of the *x*-ray. This has, however, been done in some cases. The diagnosis of acute obstruction of the common duct is so easily made as to require no further discussion. It is worth remarking that the calculus is usually