HEPATIC DUCT STONES.

WITH REPORT OF A RECENT OPERATED CASE.

BY RAYMOND CUSTER TURCK, M.D.,

OF CHICAGO,

Professor of Anatomy and Operative Surgery, Chicago Post-Graduate Medical School; Adjunct Professor of Surgery, College of Physicians and Surgeons (University of Illinois); Surgeon to the Post-Graduate, Chicago, and Samaritan Hospitals.

A REVIEW of the somewhat extensive literature of gall-stone disease discloses the fact that not more than 70 per cent. of operations for the removal of calculi from the gall-bladder are uncomplicated.

The complications, eliminating carcinoma, adhesions, intestinal obstruction, hepatic abscess, impinging tumors, empyema or gangrene of the gall-bladder, and referring solely to stones in the bile ducts, appear in fully 15 per cent. of the reported operations for gall-stones.

It is unquestionably a certainty that stones are formed in the bile passages as well as in the gall-bladder; most frequently in the cystic and common ducts, very rarely in the hepatic duct, and still more rarely in the small divisions of the hepatic duct, or liver substance. That the formation of calculi in the ducts is dependent upon primary pathology in the gall-bladder, and not altogether upon local abnormal conditions, is an open question, and one which has an extremely important bearing upon the future of gall-stone surgery. It is certain that a neglected case of gall-stone disease offers not only the possibility of the passage of stones from the gall-bladder into the cystic or common duct, there to become lodged and subsequently enlarged, but the further possibility that stones may be directly formed in the bile passages, a possibility which goes nearer and nearer to certainty as the case progresses without surgical intervention.

In operative cases reported, stones had been found in the bile ducts—with or without calculi in the gall-bladder—in order of frequency as follows:

(1) Stones in the cystic duct;
(2) Stones in the cystic and common ducts;
(3) In the common duct only;
(4) In the cystic, common, and hepatic ducts.

A fifth classification should be, stones in the hepatic duct only. I find no reported cases of isolated stone or stones in the hepaticus, and cases of calculi in either the hepatic duct or its primary divisions or small branches associated with stones in the common or cystic ducts, or both, are rare.

Mayo, in his series of 326 operations, mentions having found stones in the hepatic duct in but five cases, all associated with others in the cystic or common ducts.

Ochsner, in reporting forty-eight cases, does not mention stones in the hepaticus.

Mayo Robson, in his report of 305 cases ("Diseases of the Gall-Bladder and Bile Ducts"), cites but four instances of hepatic duct stones, all of which were associated with calculi in the common duct. In Case 236, the common duct was opened and a finger passed into the hepatic duct, stones felt, and removed with the scoop. Case 113, stones were removed from the cystic duct, evidently through the opening in the gall-bladder, and "several crushed in the common and hepatic ducts."

Case 179. Numerous stones in gall-bladder and the three ducts; those which could not be "milked" into the gall-bladder were crushed.

Case 217. Common duct incised and stones removed. Other stones evidently small were felt in the hepaticus, and removed with the small scoop through the opening in the common duct.

Kehr, whose work on "Gall-Stone Disease" is based on 547 operations, makes specific mention of but three instances of stones in the hepatic duct, although he has repeatedly employed hepatic drainage by tube through a common duct opening. He notes a case of a series of stones in the common and hepatic ducts in which the common duct was opened and calculi removed by "tedious extraction." A drainage tube was

placed in the hepaticus. The case did badly after operation; bile, "evil-smelling and muddy," with symptoms of stones still remaining in the hepatic duct. The tube was removed and replaced after irrigation of the duct. The stone which had remained in the hepaticus was removed by the washing process on the fourteenth day, the duct having previously been tamponed with gauze, to move the stone down by pressure of bile from above. Drainage and irrigation of hepaticus continued with eventual recovery. He mentions a second case of large stones in the common, and smaller stones in the hepatic; and a third of stones in the gall-bladder and the three large ducts, in both of which cases the calculi were removed through an incision in the common duct.

Jacobsen notes a case of Thornton's in which 412 stones were found, "a majority lying in a cavity in the liver substance" with large impacted stones in the common duct, and others in the hepatic duct and upward in the liver.

Ross mentions a case of "medium-sized stones lying in a row in the hepatic duct" which "milked" through the cystic duct into the gall-bladder and removed.

Morison reports case of stones in the gall-bladder, common and hepatic ducts; cholecystostomy and choledochotomy were performed, the common duct evidently being the site of latter procedure.

Author's Case. Referred by Dr. R. C. Cupler, to whom I am indebted for details of preoperative history and after treatment.

Mrs. R., German, aged forty-one years, weight something over 200 pounds; disposition decidedly neurotic. Family history negative; no remembrance of any relative suffering from cholelithiasis. Has had six children, four living at present. Patient had always been in good health with exception of the ordinary diseases of childhood, including scarlet fever, until twenty years of age, when her first child was born. A few months after labor she was seized with severe abdominal pains; a physician was called and morphine administered. The pain was relieved, but on the following day the patient suffered from anorexia, nausea,

and vomiting, and noticed a coloring of the skin (jaundice). Like attacks of colic followed each succeeding pregnancy with some few seizures between.

During the two years previous to operation she had many attacks of colic with no jaundice, and had a constant pain under the right scapula. Had a troublesome cough for past five years, at times a brisk hæmoptysis, nocturnal dyspnœa, shortness of breath on exertion. Had facial neuralgia and migraine at times for the past fifteen years. For the shoulder pain, hemicrania, and abdominal pains, she had been taking daily from two to six neuralgia pills with morphine. During the attacks of colic, pain was apparently in epigastrium, radiating to right scapula. Had been troubled with insomnia. Menstrual history negative; no abortions or miscarriages; bowels only occasionally constipated.

Physical examination revealed large pendulous abdomen, wall extremely obese. Liver somewhat low, not sensitive on pressure or percussion. No points of abdominal tenderness except centre of epigastrium; no tenderness over gall-bladder, with apparently no pain on deep palpation or "prodding."

Chest. Respiration, 10; chest barrel-shaped, with widened intercostal spaces; slight expansion on deep inspiration. Resonance increased, upper line of liver-dulness low. Heart-dulness indistinct; heart sounds generally weak. Breath sounds enfeebled. Sibilant râles.

Bimanual examination of pelvis revealed enlarged and tender left ovary, uterus retroflexed, cervical tear, perineal floor relaxed.

Hæmorrhoids present. Few palpable inguinal, axillary, or cervical glands. Skin moist and clear. Pulse, 90, regular, soft. Temperature, 99° F. Urine showed indican only.

Diagnosis. Gall-stones, probably involving common duct as principal trouble; based on clinical history.

Operation made under chloroform anæsthesia, July 26, 1902. Incision parallel to rectus downward from tip of tenth costal cartilage. Fat two to three inches in thickness. Straight incision through muscles and peritoneum. Immediately upon dividing the peritoneum, the gall-bladder presented in upper angle of the wound, and was easily delivered. It was fully six inches in length and much distended. Palpation revealed three stones,—two floating about, and one apparently blocking the entrance to the cystic duct.

Deep palpation showed the cystic and common ducts apparently clear. Surrounding tissues and viscera normal. A concretion, size of a pigeon's egg, was felt high up under the liver in the gastrohepatic omentum. On account of the great depth, due to the thick abdominal wall and the location of the concretion, I was unable at this stage to determine its exact locality and relations.

The stone blocking the cystic duct was readily milked into the gall-bladder. This stone evidently acted as a "Fenger ball-valve," and to it I attribute the retention of bile in gall-bladder and the subsequent distention.

The abdominal cavity was carefully walled off with gauze packs, the gall-bladder surrounded with pads, opened and emptied of bile. The three stones, each the size of a marble (weight, thirty-five grains) and with six facets, were easily removed with the scoop. Bile was clear and without odor. No sign of cholecystitis.

After clearing the gall-bladder, it was thoroughly washed out with normal salt solution, wrapped in clean gauze, and drawn out and over the upper angle of the wound.

The abdominal incision was then lengthened downward until about eight inches in length through skin and fat, and five inches through muscle and peritoneum,—parenthetically, this I believe to be an important point in the technique of abdominal surgery. There being no particular value or strength in the skin and superficial tissues, the length of the external incision is immaterial. In operating upon an obese patient, by making a long incision through skin, superficial fascia, and fat, with these tissues well retracted, the operator has practically a thin wall to work upon, and a short incision through the deep fascia, muscle, and peritoneum will suffice.

With the incision enlarged, the liver was lifted up, colon retracted downward, and stomach and duodenum carried downward and to the left as far as possible, thus placing some traction on the gastrohepatic omentum.

The field was again thoroughly walled off by gauze pads, which together with the viscera were held in place by long retractors.

A careful examination showed the common duct clear; the cystic duct was palpated from its origin downward to its union

with the common duct, and proved to be free from calculi. The large concretion proved to be a stone in the hepatic duct, lying with its lower extremity about half an inch above the junction of hepatic and cystic. The duct was apparently sacculated, the stone being freely movable upward and downward for the distance of half an inch, and could also be rotated on its long axis. There was no impaction and evidently no obstruction to the biliary current. The hepatic duct was not enlarged below the stone, and was clear above.

It was found impossible to "milk" the stone downward, and an attempt to crush the calculus proved ineffectual. At the anterior border of the lower end of the stone appeared a sharp, knife-like edge, over which the tissues were very thin, and showing that perforation was imminent.

An incision was made through the omentum and duct wall directly down upon the stone, keeping a trifle to the right to avoid possible injury to the hepatic artery or portal vein. The stone was then delivered lower end foremost. The stone was non-faceted, hard, but not particularly heavy, weighing 250 grains, and measuring in length one and three-fourths inches and three and one-fourth inches in circumference.

Because of the condition of the biliary passages, I did not think hepatic drainage necessary or advisable, so proceeded to suture the duct. Lembert sutures were placed in the duct wall at the extreme upper and lower angles of the incision. These, when tied with the ends left long, served as traction sutures, and held in long forceps by an assistant greatly facilitated the remainder of the sewing. The wound in the duct was closed with interlocking sutures (*i.e.*, author's interlocked Halsted stitch) of fine catgut, a small, fine curved needle being used. Over the line of union thus formed the peritoneum was closed by a continuous right-angled Cushing suture of 00 catgut. Field of operation wiped clean and packing removed. Two inches of upper portion of gall-bladder were then cut away, and cut edges of the viscus sutured to the parietal peritoneum in the usual manner with interrupted sutures of catgut. Remaining peritoneum closed by continuous suture. Muscle and fascia united with interrupted catgut. A rubber drainage tube was placed into the gall-bladder, iodoform gauze being wound about the tube from the peritoneal level outward. Skin and superficial tissues closed with silkworm gut,

and a dressing of fluffed gauze, rubber dam through which the tube emerged, and combination pads applied.

Upon awakening from the anæsthetic, patient complained of much pain, which was constant for forty-eight hours, when it became intense, with abdomen distended, tympanitic, and very tender. Pulse, 140; temperature, 103° F. The tube was elevated, it evidently having caused some pressure pain. Hot turpentine stupes constantly applied to abdomen. Insertion of rectal tube was followed by return of good deal of flatus. Patient improved in every way the following (third) day. Tube drained freely. Bile clear and sweet; daily dressings; on the sixth day the tube was removed and iodoform gauze drainage substituted. Uneventful course, with daily dressings for five weeks, when patient left hospital. Small sinus remained, discharging small amount of bile. The sinus closed during the sixth week, but on the second day following the closure patient had a severe attack of colicky pain, which lasted several hours. The sinus opened spontaneously with an expulsion of bile sufficient to saturate dressings and clothes. The sinus was gently curetted and healed promptly. There has been no further trouble, discomfort, or pain. The patient is now (January, 1903) in excellent condition, and complains only of a cough, which is not so distressing as before operation, and an occasional attack of nocturnal asthma.

In my work upon some hundreds of cadavers, in many of which gall-stones were present, I recall but one instance of calculi in the hepaticus, either alone or associated with stones in the other passages. In that subject a large isolated stone was found in the hepatic duct during the course of a demonstration of the operation of choledochotomy at the Post-Graduate Laboratory, by Dr. Paul Gronnerud, who has kindly furnished me with the following description:

"Subject, female cadaver about forty years of age; death due to pulmonary tuberculosis.

"Region of liver and gall-bladder apparently normal, no adhesions or sign of disease of contiguous viscera. The gall-bladder was empty and small; a probe was easily passed from the gall-bladder through the cystic duct, demonstrating no stricture or obstruction of that passage. Palpation and later dissection

showed the choledochus normal and unobstructed throughout its course. There was no sign of inflammatory changes in the gall-bladder, cystic or common ducts. The hepatic duct, however, contained a single stone, situated immediately above the junction of the hepatic with the cystic ducts. The stone was movable—upward, downward, and to each side—for a short distance. It was contained in a pouch-like enlargement of the hepaticus, and evidently had not offered obstruction to the flow of bile.

"Upon opening the common duct, a probe could be passed beyond the stone into the right and left divisions of the hepaticus.

"The calculus was smooth, hard, and round, non-faceted, and somewhat larger than a common marble. Could not crush the stone or force it downward. Post-mortem rigidity of the duct wall probably prevented the latter procedure. The calculus was removed through an hepatic duct incision, which was closed by interlocking sutures. There were no further concretions in the hepatic duct, its branches, or in the liver. A small amount of biliary sand was, however, found in the liver substance."

The conditions found will be seen to closely resemble those in my own operative case, with the exception that in the cadaver there were no stones in the gall-bladder and no dilatation of that viscus. In both instances the common duct was patent.

While it is undoubtedly true that in a majority of cases of stones in the hepatic duct the condition is due to an obstructed or impacted common duct, thereby forcing stones which have formed in and passed from the gall-bladder upward, these cases of isolated hepatic stones add their modicum of proof to the hypothesis of the local formation of calculi in the bile passages.

A consideration of hepatic duct stones inevitably brings out prominently three points, namely, (1) that the possibility of such locality of calculi should not be overlooked; (2) methods of operative technic, and (3) the question as to whether or not the presence of stones in the bile ducts is dependent upon a pathological gall-bladder or pathological conditions within that viscus.

The operation of incising the abdominal wall and immediate suture of gall-bladder to the parietal peritoneum, without

first carefully examining, not only the cystic, common, and hepatic ducts, but the contiguous viscera and tissues, and, in the light of recent disclosures, the vermiform appendix as well cannot be too strongly condemned.

The rarity of calculi in the hepatic ducts apparently justifies the standard text-books in omitting more than mere mention of the operative technique of this condition; a majority of works omit the subject altogether.

Richardson, in Park's "Surgery," states that "operations upon the hepatic and common ducts are indicated when stones are impacted in either, and cannot be removed by dilatation of the cystic duct, or by reasonable efforts at crushing" after incision, closure of the ducts by suture.

Mayo Robson states that "if a gall-stone be found in the hepatic duct, it may be reached by opening the common duct and passing scoop or forceps through this opening."

Kehr describes a like procedure. Robson, however, has been fortunate in having been able to crush stones *in situ*. I believe that the hepatic duct as readily admits of successful operative procedures as the common or cystic. Its anatomical position, however, presents technical difficulties which may be surmounted by a long straight incision through the abdominal wall, upward traction on liver, and a clear field provided by proper placing of packs, and use of long retractors.

In cases of hepatic calculi, (1) an attempt should be made to "milk" the stones through the cystic duct into the gall-bladder; (2) "reasonable efforts should be made to crush the stones," though the advisability of this procedure may be questioned in cases of numerous stones, on the ground that small pieces might remain in the duct and form the nucleus of further concretions. (3) In cases of calculi in both common and hepatic ducts, if the stones are small, an incision in the common duct will admit of the removal of the stones from both passages, the upper stones being brought down by scoop or forceps. (4) Direct incision of the hepatic duct should be made in cases where it is found impossible to "milk" or crush the stones; where it is apparently impossible to force the calculi down into the common duct, and in cases of large isolated stone.

After incision of the hepatic duct, the vitally important question as to suture or drainage must be decided by the exigencies of each individual case, and just in this connection the question of the formation of calculi being dependent wholly upon pathological processes within the gall-bladder only has a most important bearing. There is no doubt but that the common or hepatic duct may be closed with perfect success in certain cases; but I should hesitate to close either the hepatic or common duct when numerous stones have been removed from these ducts, even should cholecystectomy be performed. In cases of cholangeitis, drainage of the hepaticus always! and whenever, according to Kehr, the bile is "evil-smelling and muddy."

It seems safer to assume that stones may be formed in the bile ducts independently of gall-bladder influences; and arguing upon that assumption, unless the case is undoubtedly uncomplicated, or one with a few or a single large stone in the ducts, with no sign of cholangeitis, and with the bile clear, simple drainage of the gall-bladder, removal of mucous membrane, and cholecystectomy may all prove insufficient, and drainage of the hepatic duct by tube through a direct incision or common duct opening should be instituted.

Kehr's large experience impels him to say, "Advance will only be made in the operative treatment of gall-stone disease when we treat the cystic, common, and hepatic ducts as we now do the gall-bladder, viz., open and drain."