A PLEA FOR CHOLECYSTECTOMY COMBINED WITH CHOLEDOCHOSTOMY IN CASES OF CHRONIC CHOLECYSTITIS ASSOCIATED WITH GALL-STONES.

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In cases of chronic cholecystitis associated with gall-stones, in the absence of any serious complications such as advanced jaundice, it is the practice of many surgeons to explore the biliary passages and then to excise the gall-bladder. All are agreed as to the value of cholecystectomy, but there is considerable divergence of opinion as to what, in fact, constitutes a satisfactory exploration of the bile ducts. Some surgeons maintain that a visual inspection of the ducts combined with palpation is all that is necessary to detect any gross anatomical or pathological changes in the ducts; others perform aspiration also, and their decision as to whether or not the common duct should be incised is guided by the appearance of the bile withdrawn in the syringe. If the bile is muddy, it is presumed that it is infected; if it is clear, that it is normal. Others, again, during the process of cholecystectomy explore the ducts through the open end of the cystic duct.

I maintain that there is only one sure method of examining the biliary passages satisfactorily, and that is by making an incision into the common duct and thoroughly exploring it from within by means of suitable forceps, probes, suction tubes, and so forth. At the completion of such an investigation, external biliary drainage should be effected by means of a suitable T-tube. My advocacy of this systematic routine method of exploration is based upon the following facts:

(1) In fully half the cases the so-called "recurrent" stones in the bile passages are actually stones which have been overlooked at the first or at some subsequent operation.

(2) In spite of the most scrupulous and methodical digital palpation of the ducts, it is often impossible to detect minute calculi, biliary sand, or even large conglomerate masses of soft, pultaceous pigment stones.

(3) Unless the duct is probed, stones impacted in the lower reaches of the common bile duct may be mistaken for indurated pancreatic nodules or inflamed lymphatic glands.

(4) Although visual examination of bile aspirated from the common bile duct will often yield valuable information, it may at times be very misleading. Turbid bile is usually purulent, but clear bile also may be purulent.

(5) The only efficient method of draining the extensive and ramifying intra-hepatic radicles, which are so often concomitantly infected, is by means of choledochostomy.

(6) External biliary drainage affords an opportunity of ascertaining, both by macroscopical, microscopical and chemical investigation, the effects of such drainage of the biliary system. It is, for instance, common to find that the turbid bile which for the first few post-operative days escapes through the T-tube will, after a varying period, become clear and wholesome, indicating that such drainage has been effective and that the T-tube is no longer required.

PLATE 2.

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Cholecystectomy and Choledochostomy

FIG. I. Cholecystectomy and Choledochostomy. The cystic duct, the hepatic duct, and the common bile duct are being displayed by dissecting the peritoneal investment at the right border of the gastrohepatic omentum. Note especially the position of the retractors, and the strip of gauze which has been placed in the foramen of Winslow.

FIG. III. Cholecystectomy and Choledochostomy. The method of tying the cystic artery in continuity.

PLATE 3.

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Cholecystectomy and Choledochostomy

FIG. II. Cholecystectomy and Choledochostomy. This illustration shows the method of tying the cystic duct and exposing the cystic artery. The cystic duct is ligatured and divided before the artery is dissected free. If, however, the artery comes easily into view, this may be ligatured and divided first.

PLATE 4.

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Cholecystectomy and Choledochostomy

FIG. IV. Cholecystectomy and Choledochostomy. The gall-bladder is being freed from its bed.

FIG. V. Cholecystectomy and Choledochostomy. The gall-bladder is used as a tractor, the liver bed is partially sutured at this stage, and the T-tube has been inserted into the common duct.

(7) In my experience no complications, such as stricture of the common bile duct or the re-formation of calculi, can strictly be attributed to the use of a T-tube, and provided that the lower reaches of the duct are patent there is no external discharge of bile when the tube is withdrawn. Convalescence is therefore not unduly prolonged; in fact, it may be shorter and more tranquil than when such drainage is not employed.

(8) It has been the experience of a large number of surgeons, including Judd, Walters, Walton, Lahey and Saint, as well as myself, that the immediate and late results of cholecystectomy *combined with choledochostomy* are infinitely superior to those of cholecystectomy alone, or to those of cholecystostomy, for the type of case under discussion.

(9) The death-rate following the combined operation is no higher than that which follows either excision or drainage of the gall-bladder, being about 2 per cent. At the Southend General Hospital Dr. J. H. T. Challis and I had at one time over 40 consecutive cases without a death.

An intensive course of **pre-operative treatment** with the liberal administration of fluids and glucose rich in vitamins A, C and D, judicious blood transfusions, intravenous injections of calcium gluconate, the application of diathermy pads to the liver both as a pre- and post-operative measure, and the daily **post-operative** introduction of bile into the rectum, together with a well-administered anæsthetic, using cyclopropane whenever possible, and also meticulous hæmostasis during operation, all play their part in the production of these uniformly gratifying results.

Technique.

Although the technique of cholecystectomy and choledochostomy, as of most abdominal operations, is rapidly becoming standardized, I have found the following points to be of considerable importance and worthy of careful observance.

A large tripartite inflatable rubber bag, or the bridge of an ordinary operating table, should be placed under the lower ribs and adjusted so as to throw the epigastric region well forward. At the same time the whole operating table should be tilted downwards towards the feet at about 20 degrees from the horizontal, the object of this being to displace the viscera downwards and forwards and to bring the gall-bladder and bile passages nearer to the surface and to render them more accessible.

There is usually a choice of two incisions, a right paramedian which is employed for thin patients with a narrow costal angle, and Kocher's oblique, right, sub-costal incision. In making the latter incision the right rectus muscle should be completely divided between the middle and lower tendinous intersections, whilst in severing the lateral abdominal muscles great pains must be taken to spare the large ninth dorsal nerve, although the smaller eighth is almost invariably cut. Kocher's incision gives excellent access to the gall-bladder and biliary passages, and is one which is used almost exclusively in certain surgical clinics. Provided the wound is carefully sutured there is no fear of post-operative hernia; in fact, the scars from such wounds are usually very sound and particularly neat. For secondary operations upon the bile ducts this incision is unequalled, enabling the ducts to be approached laterally or obliquely, which is of great advantage to the surgeon when there is a large number of adhesions present.

Success in gall-bladder surgery depends largely upon a wise choice of incision, good illumination, and a clear view of the operative field which can only be obtained by methodical and efficient retraction.

After the abdomen has been opened and its contents explored to determine the total pathology, any adhesions which exist between the gall-bladder and the stomach, duodenum, colon or omentum are divided. A large roll of gauze (which may be as long as 10 feet or more) is now carefully packed into Morison's pouch, above the hepatic flexure and transverse colon, and then to the left to hide the pylorus. The fundus of the gall-bladder is next seized with ring forceps or a large non-toothed hæmostat, and is drawn downwards, forwards and upwards through the wound so as to enable the Deaver retractors to be placed in their correct positions. The first retractor is slipped in between the gauze roll and the neck of the gall-bladder, and retracts the duodenum and pyloric portion of the stomach firmly downwards and slightly to the left. The other retractor keeps the stomach and the left lobe of the liver away from the operative field. These retractors are handed to an assistant whose sole duty it is to keep them in position throughout the whole operation.

If the gall-bladder is distended it should be aspirated with a large-bore needle attached to a suction apparatus or to a Record syringe.

Before exposing the biliary ducts, a strip of gauze is inserted into the foramen of Winslow by means of a pair of long dissecting forceps in order to prevent blood and infected bile from gaining entry into the lesser sac after the common duct has been opened. The cystico-duodenal fold, or, if this is absent, the free edge of the gastro-hepatic omentum just below Hartmann's pouch, is carefully torn through with dissecting forceps, as is also the anterior leaf of peritoneum investing the common hepatic duct, the cystic duct and the common bile duct. This stripping should be carried out deftly, daintily and cautiously so as not to injure the mesh-work of small veins overlying the biliary passages (Fig. I, Plate 2).

At this stage of the dissection the common hepatic duct, the cystic duct and the common bile duct should be well displayed and demonstrated to the assistant. Some surgeons then carry the dissection a stage further and display the cystic artery before proceeding to excise the gall-bladder. I prefer, however, to isolate and clear the cystic duct of its fatty envelope, and to scrutinize, the method in which this duct joins the common ducts and to trace it upwards into the neck of the gall-bladder before an aneurysm needle, threaded with No. 1 chromic catgut or preferably with a silk ligature, is passed underneath the duct. The duct is then ligatured about an eighth of an inch away from its junction with the common hepatic and common bile ducts. When this ligature is tied, another one is applied in a similar manner, but a little further out nearer the gall-bladder. This second ligature is left long and clipped with a hæmostat, and is used both as a tractor and also as a means of ready recognition of the stump of the cystic duct during the subsequent steps of the operation (Fig. II, Plate 3).

A pair of curved artery forceps is then applied to the cystic duct about one-eighth of an inch away from the second ligature and close to the neck of the gall-bladder, and after the duct has been lifted upwards it is cautiously divided with a knife, scissors, or the point of a diathermy needle or cautery. A very careful search is now made for the cystic artery, and sometimes for the right hepatic artery or the main trunk. The cystic artery may be in an anomalous position or there may be more than one artery. Usually, however, it springs from the right branch of the

hepatic artery, close to the neck of the gall-bladder, in a position somewhat posterior to the cystic duct. It should be dissected out with meticulous care and traced to a point where it is clearly seen to enter the wall of the gall-bladder. Here it is underrun by an aneurysm needle threaded with silk, and ligatured in continuity as close as possible to the gall-bladder (Fig. III, Plate 2). I consider silk or thread preferable to catgut for tying this important artery.

I feel sure that many so-called "liver deaths" or unexplained fatalities following a straightforward cholecystectomy are due to ligature of the main hepatic artery or its large right branch in mistake for the cystic artery.

After the artery has been severed, the loose peritoneal reflection on either side of the gall-bladder is divided with a knife or a diathermy blade (Fig. IV, Plate 4). Sometimes I have adopted Wilkie's method of infiltrating the loose peritoneum around the gall-bladder with normal saline or dilute novocaine solution, thereby producing a diaphanous sodden wheal which makes the separation a simple and bloodless procedure, and greatly facilitates the suturing of the margins of the liver bed.

When about two-thirds of the gall-bladder has been dissected free from its bed, the raw surface is obliterated by a series of closely-applied interrupted sutures of thick plain catgut, while the gall-bladder itself is used as a tractor to keep the liver in a forward position well up in the wound (Fig. V, Plate 4).

The common bile duct is now isolated and the area around is packed off with mackintosh squares, while two stay sutures are introduced opposite to one another through the anterior surface of the common bile duct about one-eighth of an inch or more apart, and about one-third of an inch below the insertion of the cystic duct. These stay sutures should be lifted upwards while a small nick is made with a sharp-pointed knife between the sutures and through the taut anterior wall of the common bile duct. When the duct is opened the bile which wells up is immediately aspirated by a metal suction tube. The opening in the duct is then gradually enlarged until it is about half an inch in length.

At this stage the ducts are once more systematically palpated and their contents are expressed or worked towards the opening which has just been made. If any calculi are felt they can usually be coaxed towards the incision in the duct and removed with forceps. If there is much biliary sand or mud, the ducts should be irrigated with warm saline by means of a small rubber catheter which is attached to a large Record syringe. Graduated Liston sounds or gum elastic bougies are passed downwards to ascertain whether the papilla is patent, and if this is found to be so the lower reaches of the duct, the ampulla, and the papilla itself receive a gentle stretching. It is sometimes very difficult to be sure whether the point of the sound is, in fact, in the lumen of the duodenum, but by gently rotating the instrument while the other hand palpates through the anterior wall of the duodenum, satisfactory information may be obtained. Desjardins' forceps are then passed upwards into the common hepatic duct and into the main branches of this duct in an endeavour to grasp any calculi which may be lurking in hidden recesses. The forceps are then passed downwards into the duodenum and gently withdrawn with the blades slightly open to ensure further dilatation.

When the duct has been satisfactorily dilated, a small rubber catheter is once more passed downwards through the papilla into the duodenum, and saline is again injected. If it seeps up into the wound this will imply that the point of the

catheter has not negotiated the terminal portion of the duct, and further attempts will be necessary until there is no doubt that the saline is flowing freely into the duodenum.

In cases where the duct is enormously distended, a finger may be inserted through an incision in the duct in order to explore it thoroughly, but cases of this nature are very rarely seen nowadays. Where a calculus is so firmly impacted in the ampulla that it cannot be coaxed upwards to be extracted through the incision in the common duct or forced downwards into the duodenum, it will be necessary to mobilize the duodenum and make an incision through the anterior wall of the gut exactly opposite the point where the stone is impacted. A metal sound is then introduced into the duct and forces the impacted stone upwards so that it lies almost on a level with the incision in the duodenum. An incision is then made over the stone through the posterior wall of the duodenum, and the stone is extracted. Suturing of the wound in the posterior wall of the duodenum, by the method described by Kellogg and myself, may be required, particularly where the stone is large or where it has been necessary to traverse all the coats of the duodenum to reach the impacted stone in the lower portion of the duct. In such cases, after the recalcitrant stone has been extracted a rubber catheter should be passed through the incision in the common duct downwards until the point of the catheter emerges into the duodenum. The catheter is then drawn downwards for another inch or two so that its point lies snugly and loosely against the posterior wall of the duodenum. The anterior incision in the gut is then closed in a transverse manner with a three-tier suture, after which another rubber catheter is inserted through the incision in the common duct in an upward direction towards the right hepatic duct.

The opening in the common bile duct is then closed neatly around these two catheters, after which the cholecystectomy is completed. The ends of the catheters are made to emerge at the top and bottom of the abdominal wound when it is closed, and are immediately connected by means of a glass tube so that the bile can flow from one tube into the other without any difficulty. The catheter which lies in the hepatic duct may at times be allowed to drain bile into a bottle by the side of the patient's bed, while the tube which lies in the duodenum may be used for feeding purposes, such as for the administration of saline and glucose solutions. The duodenal tube undoubtedly exerts a continuous dilatation of the lower reaches of the duct, and thereby prevents stricture formation at this important point.

When it is seen that the bile emerging from the tube inserted into the hepatic duct is clear and the patient is well on the way to recovery, both tubes can quite easily and safely be removed, and provided there is no stricture at the lower end of the common bile duct there will be no escape of bile through the abdominal wound. It is, however, very rarely necessary to resort to opening the duodenum in order to remove impacted calculi, since they can, as a rule, be worked upwards to the incision in the common bile duct and thence be extracted by means of Desjardins' forceps.

In the average case I insert my T-tube and close the duct around it with a series of interrupted sutures so that there is no possibility of leakage around the tube. The long limb of this T-tube, which must be securely anchored to the abdominal wall to prevent it from being inadvertently withdrawn, is led into a small medicine bottle which is fixed to the patient's dressings or to the side of the

bed. It is sometimes difficult to know just how long to leave the T-tube in the common duct. Usually it is not removed if the patient has any pyrexia, if the bile is muddy or malodorous, or if the stools are clay-coloured indicating that the bile is not entering freely into the duodenum. I generally order 4 oz. of bile to be introduced daily per rectum, and this seems to have a most beneficial effect in that these cases have no flatulence, the bowels work naturally after a day or two, and toxæmia (if present) rapidly disappears. Judd records a case in which he left a Kehr T-tube in position in the common bile duct for over a year with marked benefit to the patient who was suffering from a severe form of chronic cholangitis. The longest time for which I have left a tube *in situ* is six weeks in a similar type of case.

The small trough-like portion of my T-tube is made of very soft rubber, and is easily withdrawn without producing any pain, and, what is more, without occasioning any damage to the sutured area in the common bile duct. I know this must be so because after the tube has been removed there has never in any of my cases been an external discharge of bile for more than a day or two at the most, and the immediate and late post-operative results have left nothing to be desired.

Following excision of the gall-bladder, whether the common duct has been drained or not, it is most essential to drain the operative field for at least 48 hours by means of corrugated rubber or a soft, medium-sized rubber tube. To neglect such a precaution in the face of current teaching cannot be too strongly condemned as its omission may court disaster in the occasional case, for, during cholecystectomy, an unseen accessory hepatic duct may inadvertently be severed, which may subsequently flood the peritoneal cavity with bile, eventually giving rise to a fatal peritonitis. Again, some oozing of bile almost invariably occurs from the sutured liver bed, and in cases of jaundice, however mild, large quantities of blood may fill the abdomen or become loculated in the sub-hepatic spaces. In the absence of any outlet for the escape of this blood it is very likely to become infected and produce a localized or generalized peritonitis for which the surgeon is almost entirely to blame.

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