CHOLECYSTLITHOTOMY

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The formation of gall stones is a common enough event and they are found in from 8 to 20 per cent. of all necropsies and, over the age of 60, in more than half the female and a quarter of the male post-mortem examinations. While many of these patients are relatively untroubled by their stones, accepting minor dyspepsia as part of the pains of existence, they are nevertheless menaced by them and at any time one or more dangerous complications may arise without warning and at times or places which are, at the least, inconvenient.

The full toll of unpleasant consequences of gall stones is formidable and could be elaborated almost indefinitely.

The indications for surgical interference are much discussed and very different viewpoints can be adopted, varying from those who say that 'the presence of gall stones *per se* does not constitute a valid indication for cholecystectomy'² to those who advocate cholecystectomy whenever gall stones are discovered, and it seems that responsible opinion is moving gradually towards this last standpoint with the greater safety of modern surgery and anaesthesia. W. J. Mayo and Moynihan vehemently denied the innocence of any gall stone, and Walters and Snell⁴ state that the risk of keeping a gall bladder filled with stones seems greater than the risk of cholecystectomy. Maingot³ states 'Once the diagnosis of gall stones is established, surgical treatment in the majority of cases should be advised and instituted as early as possible.' Lahey¹ is of similar opinion: 'We have always been of the opinion that there are no harmless gall stones and that . . . all gall stones should be removed. It has frequently been urged and practised that a proper attitude to take towards gall stones is that operation should not be undertaken until they produce symptoms. If one deals with gall stone patients in large numbers one cannot help being impressed with the fact that this philosophy results in many serious situations and in fatalities which would not have occurred had the operative procedure been undertaken earlier.'

The accepted operation of choice for gall stones is cholecystectomy on the basis that the gall bladder was responsible for the presence of the

stones and is in any case a dispensable viscus, and while such a course is justifiable when in addition the gall bladder is acutely or chronically inflamed or other complications are present, there is a well-founded reluctance to remove it when it appears radiologically or at operation to be capable of reasonable function. This reluctance springs from the well-known consequences of removing a functioning gall bladder and acquaintance with the post-cholecystectomy syndrome in such patients. A patient is usually grateful for the removal of a chronically inflamed gall bladder and the distress it caused him, but too often misses and complains of the loss of one which had been performing a service for him. It should be realized that a functioning gall bladder is not really dispensable and should be conserved unless there are other good reasons for its removal. In fact the best results of cholecystectomy are in those patients in whom autocholecystectomy has already occurred as a result of the loss of mucosal and muscular function from the destructive and fibrosing effects of inflammation, when surgery merely removes a septic focus.

It follows that in selecting those cases of cholelithiasis for surgery the two extremes of opinion are in agreement except in those patients in whom gall stones exist without complications in a gall bladder showing reasonably good cholecystographic function. While it is admitted that the stone represents a potential danger the gall bladder is serviceable and its removal would be likely to induce symptoms not yet experienced by the patient. This fact and the slight operative risk must be balanced against the unknown chance of complications arising as a result of the stones and usually counsels conservatism in such cases.

Nevertheless in these circumstances a third alternative exists, namely the removal of the stones leaving the gall bladder *in situ*—cholecystolithotomy. Such an operation is by no means new and was tried and condemned in the early days of biliary surgery. This was chiefly because it was tried in cases where the gall bladder was irreversibly inflamed and continued as a source of symptoms and further stone formation.

So far as the writer is aware cholecystlithotomy has never been thoroughly tried under modern conditions and confined to those patients in whom the gall bladder function is not demonstrably impaired and in whom the indications for surgery would not otherwise exist.

The rationale for such a procedure is based on the facts (1) that gall stones, particularly the 'metabolic' kinds, are formed and do exist in gall bladders which cannot be distinguished from normal, and (2) that the presence of such stones is very likely eventually to lead to inflammatory changes.

It is often assumed that once a gall bladder has learned the habit of stone formation it is unlikely to reform, but will continue its original vice in the future. This assumption may or may not be justified but should be examined. An analogy exists in the kidney or bladder where stones are commonly dealt with on their merits and while it is recognized that some individuals are confirmed stone-formers, in others the removal of a single stone is followed by no further trouble. In the bladder one has little choice as it is as yet an indispensable viscus, but even in the kidney, despite the existence of a spare, conservatism is the rule in cases of nephrolithiasis.

It may well be with gall stones, as in some cases of renal stone, that we live through a period or in an environment or upon a diet conducive to stone formation and the circumstances giving rise to it may never again occur.

In the case of the gall bladder and according to the Aschoff theory of stone formation, crops of mixed stones arise as a result of obstructive attacks, leading to acute inflammation, the pus from which, upon decompression, particulates and provides the nuclei for a batch of stones. In this sense and when, as is usually the case, the obstructive attack is due to a cholesterol solitaire impacted in Hartmann's pouch, the stone-forming habit is due to, and could have been avoided by the removal of, the solitaire prior to such incidents.

We are not, therefore, concerned with mixed stones as these usually indicate an already diseased gall bladder; but in this way metabolic stones may lead to mixed or combination stones which are therefore theoretically preventable by cholecystlithotomy in such cases, but this is less important than the fundamental question as to whether a gall bladder once having formed a pure cholesterol stone will form another after the removal of the first. This question has never been answered and can only be settled by an extensive clinical trial.

The operation of cholecystlithotomy is a relatively minor one in which damage to ducts and other vital structures would be unlikely and in any case does nothing irreversible; it preserves a

useful gall bladder and should not lead to post-operative functional biliary disturbance.

Walters and Snell in a discussion of cholecystostomy versus cholecystectomy express surprise at the good results of merely removing stones, saying 'In a series of more than 300 patients with obstructive jaundice due to choledocholithiasis . . . and whom we have followed for almost 10 years subsequent to operation, we have been much impressed by the fact that cholecystostomy and removal of obstructing stones from the common duct was followed by surprisingly few instances of recurrence either of cholecystitis or cholelithiasis.' These patients include many whose gall bladders were severely diseased and in whom the chance of further trouble would seem to have been much higher than in those whom we would regard as suitable for cholecystlithotomy. Their procedure was carried out in preference to cholecystectomy as these patients were thought to present a poor risk, chiefly because of the associated jaundice and necessity for choledochostomy.

Metabolic-cholesterol stones are found in small numbers. Many of those eventually requiring removal show only one original cholesterol and numerous batches of subsequent mixed stones, or alternatively a solitary cholesterol stone in an otherwise relatively normal gall bladder is not unusual. This stone often reaches a large size indicating its age, and yet there are no others which means that the large stone was formed perhaps five or ten years ago and since that time the gall bladder has shown no other lapse and seems to lend support to the idea that its origin was an isolated and not to be repeated incident. Furthermore, when more than one pure cholesterol stone exists, and there are seldom more than five, it is almost a rule that they are all of a size and no doubt dating back to a single incident in the past. Broods or schools of pure cholesterol stones are practically never found.

It is difficult to dissociate the formation of cholesterol stones from alterations in blood cholesterol, and although our ignorance is profound and, in most cases, no deviation from normal levels is ever found or proved, the higher incidence of stones in diabetes and the frequent reference of symptoms to a previous pregnancy is suggestive, though the importance of pregnancy is much disputed. If the hypercholesteremia of pregnancy is the incident responsible for cholesterol stone formation it is a passing incident and does not justify the condemnation of the gall bladder that succumbed to such a stress. With parturition the stone-forming tendency may well have passed (at least until the next pregnancy).

As pure cholesterol stones are found in 25 per cent. of all cases of gall stones and most instances

of mixed stone formation show an antedating cholesterol solitaire, and mixed stones themselves provide 65 per cent. of all cases of gall stones, the importance of the initial cholesterol stone and of its removal become apparent.

The argument in the case of pigment stones does not really apply as there is often a haemolytic tendency which persists after the removal of such stones. The only possibility of such a procedure might arise when splenectomy has been carried out in cases of acholuric jaundice, though the excessive haemolysis is not necessarily abolished. Such patients may form pigment stones in the common duct even after cholecystectomy.

If a case can be made out for removing the stones from an uncomplicated gall bladder, how are these patients to be found and how selected? Since almost by definition the stones may not be causing symptoms they may only be discovered by accident. Since also they are not radiopaque they can only be seen by cholecystography which, in any case, is only done at the prompting of symptoms suggestive of gall bladder disease. Nevertheless, in the work of a busy hospital and in the process of attempting to sort out the various abdominal complaints, numerous normal cholecystograms are returned and there is no shortage of those cases showing a gall bladder of good concentrating and contracting power but with the negative filling defect of stones. Another and large group consists of those who are having undoubted symptoms though of a mechanical rather than inflammatory nature, that is true biliary colic with similar cholecystograms. These are the main sources of such cases and even when it is probable that the stones are the cause of mild symptoms cholecystectomy is not often advised in view of the excellent gall bladder function. Even when severe colic demands interference, cholecystectomy is usually the result, irrespective of the normality of the gall bladder. These are just the cases for removal of the stones provided that the gall bladder appears healthy at operation. Another source of suitable cases, though not nearly so numerous, occurs at laparotomy when no other disease exists and stones are found in a normal looking gall bladder.

Indications

Cholecystolithotomy is indicated when:

1. The stones are invisible on straight X-ray but show as filling defects in a gall bladder well outlined by cholecystography. These are mainly cholesterol stones.
2. The gall bladder is apparently normal. It is seen to concentrate and contract well in the cholecystogram and at operation appears thin-walled, blue and with a normal looking mucosa.

3. The patient's symptoms, if any, are mainly of colic indicating a mechanical rather than an inflammatory cause.

The Operation

This consists of a suitably placed incision to give access to the entire duct system. The gall bladder is then inspected and if recognizably diseased a cholecystectomy is the proper procedure. The inspection may include a visualization of the mucosa after opening the fundus. In this way certain cases of cholesterosis and even early papillomata will be discovered which present no external evidence. If the gall bladder is apparently healthy the cholesterol stones should be removed. In order that this should succeed the gall bladder and also the common duct must be left completely clear of particulate matter. Attention is first paid to the common duct which is palpated from porta hepatis to duodenum and, in the presence of suspicious features, opened and thoroughly investigated with probes, forceps and irrigations and, if necessary, operative cholangiograms. The indications for choledochostomy are the usual ones—namely:

1. A past history of jaundice.
2. A thickened or dilated duct.
3. Palpably suspicious objects in or near the duct.
4. A cystic duct wider than the stones in the gall bladder.
5. A thickened pancreas.

Having declared the main ducts stone free and, when choledochostomy is necessary, having inserted a T-tube in the usual way, it is important to be sure that no stones pass down the cystic duct during gall bladder manipulations. This can be ensured by the application of a gentle bull-dog clamp to the cystic duct at its junction with the common bile duct. The fundus of the gall bladder is now secured with three Babcock forceps set in a ring, a suction trocar and cannula inserted through the centre and the gall bladder thus emptied of bile. The cannula is withdrawn and a generous opening made in the fundus to allow of adequate inspection of the lumen. This can be irrigated with saline from a Carrel-Dakin syringe in order to clear the last traces of bile. Obvious stones are picked out. Hartmann's pouch and the cystic duct are the most difficult areas to be sure about, but these are in any case thin-walled gall bladders, and external palpation is usually adequate. The cystic duct can be gently probed, but failure to pass along it should not be interpreted as an obstruction as owing to tortuosity and mucosal valves it is not often possible to probe its entire length. The patency of the duct is established by finally removing the bull-dog and observ-

ing the flow of bile into the gall bladder. If doubt remains, operative cholangiograms may be required. When the cystic duct and gall bladder are cleared the opening in the fundus is inverted and closed with two layers around an emerging soft tube of small calibre—similar to those used for the common duct. The tube is actually stitched into the gall bladder but does not extend further than an inch or so into its lumen. The tube is brought through its own separate opening in the abdominal wall after dressing the omentum around its point of emergence. There is no necessity to stitch the gall bladder to the parietal peritoneum.

The tube is allowed to drain freely until the track is walled off, for two or three days, and may then be clamped off and kept so in the absence of symptoms or leakage, which may indicate an obstruction of the ducts. It can be removed after a week when the catgut has been absorbed and a final cholangiogram shows a normal biliary system. The track closes in a day or two.

Summary

1. A plea is made for the removal of cholesterol stones at a time before they have given rise to the multitude of serious complications for which they may be blamed.

2. It is suggested that the formation of chole-

sterol stones is not necessarily the life-long vice of any particular gall bladder but may well be the result of an incident which may never recur.

3. It is believed that the reluctance to advise cholecystectomy before the onset of complications arises from the known disadvantages of losing a functioning gall bladder.

4. It is suggested that cholecystectomy is not necessary in such cases. The stones can be removed by cholecystlithotomy and the gall bladder given a clean slate and a chance to go straight.

5. This operation is simpler and less dangerous than cholecystectomy but to be successful must leave no stone, however small, in the biliary system.

6. The propensity for such gall bladders to form new stones will only be certainly known following an extensive trial of this conservative procedure.

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