attempt to produce rapid dissolution of stones. While technical success has been reported in experimental models and in a few patients, the procedure, though promising, cannot be evaluated presently yet, on account of lack of clinical data and follow-up.

Lithotripsy: Extracorporeal shock wave lithotripsy (ESWL) can fragment stones within the gallbladder into smaller particles which are then excreted with bile or dissolved in situ by concurrent administration of UDC. The passage of microliths through the common bile duct has resulted in biliary colic in 34% of patients, besides acute pancreatitis, jaundice, cutaneous hemorrhages and even hematuria. Moreover, the gallbladder, being a thin-walled structure, is likely to sustain soft tissue injury whose long-term consequences are not yet known. Mobile floating stones bounce away from shock waves, making lithotripsy ineffective in such cases. In one of the larger series reported, solitary stones disappeared in 84% and multiple stones in 40% of cases within 18 months of treatment, but recurrences on follow-up after successful disintegration have not been communicated. The authors have emphasized that only a small number of patients were found suitable for ESWL, that there was difficulty in predicting the stone which was likely to fragment, and that the cost-effectiveness of this procedure has yet to be worked out. They concluded that cholecystectomy remains at present the correct treatment option for a vast majority of patients with symptomatic gallstones.

Percutaneous Cholecystolithotomy: It is technically possible to empty the gallbladder of small stones by percutaneous transhepatic cholecystostomy and endoscopic extraction. Larger stones can be disintegrated by ultrasound lithotriptor or electrolydraulic probe. The procedure is rather recent with reports of only immediate postoperative success in a small number of cases. While results of long-term follow-up in larger series are awaited, immediate problems due to hemorrhage or extravasation of bile have been recognized.

Cholecystolithotomy and Cholecystojejunalostomy: This procedure converts the extrahepatic biliary channels into a double-barrel drainage system, which from the point of view of rhology is not a very sound arrangement.

It also totally abolishes the functioning of the gallbladder, leaves behind a structurally damaged organ and adds on the problems of biligust anastomosis.

Cholecystectomy has been criticised because of the postcholecystectomy syndrome (PCS) which keeps 4%-40% of operated patients in discomfort. However, an objective evaluation of PCS shows that the problems are not because of removal of the gallbladder but due to (i) missed associated diseases particularly in neighbouring organs, due to poor preoperative evaluation, and (ii) intra-operative mishaps due to poor judgement or technique. In effect, the incidence of PCS is inversely proportional to the competence of the surgical team.

With tremendous improvements in preoperative investigative protocol and the introduction of intraoperative radiology, manometry and specialized operative skill, the postoperative status should be like that of any other major intra-abdominal procedure.

At present, cholecystectomy is the only modality available which safely removes not only the stones in the shortest possible time but also the damaged organ, while providing treatment opportunities for taking care of the pericholecytic abscesses, granulomas, adhesions and internal fistulare frequently found in Indian patients. It should, therefore, be offered as the first choice of treatment for calculous cholecystitis.

References

III. Editorial Comments

The immediate provocation for the proposition that the gallbladder should be preserved in gallstone disease is the proliferation of a large number of non-operative techniques for tackling stones in the gallbladder and bile ducts. This challenge naturally arouses a siege mentality among surgeons, and a great fervour and enthusiasm among endoscopists and radiologists. Is it really time to spurn cholecystectomy and embrace
gallbladder preservation while tackling the offending gallstones with nonoperative techniques? We shall examine this issue below.

Why should the gallbladder be preserved?
Kausik & colleagues contend that the gallbladder should be preserved because of the following reasons:

(a) its removal is associated with a certain mortality, morbidity and long term complications; (b) its removal affords "only incomplete relief of symptoms in a large number of cases;" (c) it is safe to leave the gallbladder in situ; (d) alternative non-surgical modalities of treatment are available; and (e) different surgical options, short of sacrificing the gallbladder, are available. They question the "wisdom of removing a functioning gallbladder for stone disease." Another reason, advanced by others, is the increased risk of colorectal cancer after cholecystectomy. Let us examine each of these reasons.

Risk of cholecystectomy
Mortality rates for simple elective cholecystectomy range from 0.2% to 2% in large series.1 Early postoperative morbidity has been reported in 5-1% to 9-4% of patients.3 Late sequelae like postoperative biliary strictures occur in about 0-25%4 and retained common bile duct calculi in 2-7% of patients.5 The argument in favour of the operation is that exposure to these risks is justifiable in view of the widespread applicability and unsurpassed success rates of the procedure. These patients have been provided a permanent cure, which none of the currently available non-operative modalities offer. Cholecystectomy is the only option available today to patients with pigment gallstones who form 25% to 30% of patients coming to cholecystectomy in the West6 and probably a larger proportion in our country. As Sahi and Mahendra point out, complications of gallstone disease like mucocele, empyema, pericholecystic abscesses and biliary-enteric fistulas, which are not uncommon in our patients, can only be tackled surgically. Finally, one has to accept that successful practitioners of the art of cholecystectomy are easily available in most medical centres.

Postcholecystectomy syndrome
After cholecystectomy, 30% of patients experience persistent or fresh symptoms which are mild, and 5% suffer severe distress which is usually due to an organic pathology, like bile duct stones or stricture. The term postcholecystectomy syndrome has been indiscriminately applied to a large variety of symptoms that persist, recur or arise anew in patients after cholecystectomy.7 Most patients with minor persisting symptoms probably suffer from associated functional bowel disorders undiagnosed before surgery.8 Thus, as argued by Sahi and Mahendra, it would be unfair to attribute these symptoms to cholecystectomy per se.

Is it safe to leave the gallbladder in situ?
Follow-up studies two to eleven years later in patients who have undergone endoscopic sphincterotomy for choledocholithiasis with their gallbladder in situ, showed that recurrent biliary tract symptoms were noted in only 8% to 11% of patients, and only 2-7% to 7-5% required cholecystectomy.9-11 A single case with carcinoma of the gallbladder occurring in the gallbladder in situ after sphincterotomy is reported12 among the several thousand patients reported so far in literature. These data, however, refer to frail, elderly patients who had a short life expectancy and were considered unfit for surgery. It may not be correct to extrapolate results of long term sequelae in the elderly to younger and fitter patients with longer life expectancy. Furthermore, sphincterotony probably protects patients with gallbladder in situ from biliary complications since many of them spontaneously pass their gallbladder stones after the procedure. Thus, the analogy of the safety of preserving the gallbladder in sphincterotomized, elderly patients may not be acceptable for all categories of patients.

Alternative non-surgical modalities for choledocholithiasis

Oral gallstone dissolution therapy: Oral bile acid therapy has found a niche for itself and the use of better selection criteria along with newer compounds undoubtedly has improved the outcome of therapy13. However, this form of therapy remains applicable to no more than 30% of patients with cholesterol gallstones.14 While stones dissolving in 38-64% of patients over treatment periods of one to two years, recurrence over the next 5 years15 was noted in about 50%. Thus, oral bile acid therapy cannot be considered the first choice treatment for all patients.

Extracorporeal shockwave lithotripsy: Stone fragmentation has been successfully combined with oral bile acid therapy to dissolve the fragments, although gallbladder contraction plays an important role in clearing the fragments. This treatment can again be available to only 28-30% of patients with gallstones who meet the basic criteria for dissolution therapy. Thus, Sackmann et al16 screened 100 patients before selecting 565 patients (58%) for this therapy. Although clearance of the gallbladder was achieved in 91%, the side effects observed included biliary colics (33%), cutaneous petechiae (14%), transient gross hematuria (5%), and acute pancreatitis (1-2%). Their early follow-up data suggest that gallstone recurrence rates might be no different from the 10% per year seen with standard oral dissolution regimens.17 An alternative approach practiced is to offer lithotripsy to all comers, including those with calcified and probable pigment stones, without putting them on oral dissolution therapy; one thus depends on the chance function of the gallbladder to mechanically clear the fragments. Preliminary results with this strategy have not been encouraging (Burhans HJ, personal communication) To achieve better results with this seemingly more applicable strategy, improvement of gallbladder emptying by pharmacologic manipulation or by ablating the papillary sphincter may be necessary.

Percutaneous transhepatic choledocholithotomy and lithotripsy
As discussed by Kausik et al, access to the gallbladder via the percutaneous route through the
liver-gallbladder bed has been achieved by several workers. Gallstones have been dissolved with methyl tert-butyl ether (MTBE) within hours or fragmented with an ultrasonic lithotripter and the fragments extracted. However, MTBE dissolves only cholesterol stones and has no effect on pigment stones. In fact, no universally acceptable solvent for black and brown pigment stones is available. Moreover, a recent report of the finding of unexpected dilatation of the common bile duct after MTBE in rabbits and two humans dictates caution.

The high level of skill, technical expertise and infrastructure required for these techniques confine them to specialist centres. Sahi and Mahendra further point out that the number of cases presently reported are too few and their follow-up periods too short to draw any conclusions or realistically assess their place in therapy.

**Cholecystectomy or cholecysto-jejunostomy after removal of calculi**

These procedures have been practised for a long time and their place in the overall management plan for gallstone disease appears clear. They are reserved for patients who either have a very high surgical risk or for those in whom cholecystectomy is technically difficult and hazardous, as with dense adhesions or associated portal hypertension. These procedures may be safe and effective in selected patients and further surgical intervention to remove the retained gallbladder is not necessary. However, this does not make a case for performing these procedures as the first choice treatment in all cases. Sahi and Mahendra voice their conceptual reservations about converting the extrahepatic biliary channels into a double-barreled drainage system.

**Is the gallbladder normal in cholecystolithiasis?**

Kooshaik et al strongly object to the removal of a functioning gallbladder harbouring stones. They appear to suggest that functional is synonymous with "normal". While the arch-villain in the story of gallstone pathogenesis is the liver, secreting supersaturated lithogenic bile, the gallbladder is no innocent bystander; rather it is the arch accomplot. Convincing evidence is available to show that nucleation of cholesterol crystals takes place solely in the gallbladder. The subsequent stages of crystal growth and aggregation, and formation of microlithi and large calculi also proceed apace in the gallbladder. Thus, even though mucosal function is preserved, as reflected by an ability to concentrate oral contrast, this “functioning” gallbladder harbouring stone is in fact diseased.

**Cholecystectomy and colorectal cancer**

Cholecystectomy results in reduction of the bile acid pool with a rise in the proportion of biliary deoxycholic acid. Considerable epidemiologic evidence suggests that bile acids play an important role in the development of colorectal cancer. In a prospective study of 1681 post cholecystectomy patients, an increased relative risk of 1.7 for developing colorectal cancer was shown while an even higher relative risk of 2.1 for right sided colorectal was observed in females. However, equally good epidemiologic studies have failed to uncover any association between the two.

Adami et al prospectively followed up 16,773 patients after cholecystectomy for 11 to 14 years and observed no increased risk for colorectal cancer. Some groups have reported an increased incidence of large bowel cancer in those with a history of cholecystitis rather than cholecystectomy. Thus, at present, this association cannot be considered to be established. Even if such an association is conceded, the relative risk is low.

Where then do we stand? Undoubtedly we are not yet ready to buy the case for preservation of gallbladder in all patients with gallstone disease. Surgery is the only option for the patient with complicated gallstone and the one with noncholesterol stone, if it is at all possible to assess the type of stone prospectively. Surgery is not the course for frail elderly patients and those who have contraindications for major surgery. These patients, along with others who are unwilling for surgery, are the present candidates for non-surgical procedures, although we should appreciate their potential applicability for the present. The statistics regarding safety and efficacy of surgical and non-surgical methods and their long term complications should be presented to undecided patients. Therewith, the patient’s choice should be final. In the bulk of patients there may be scope for trying out non-surgical methods, in the knowledge that recourse to surgery may be necessary should other methods fail or cause complications. The surging tide of newer developments in non-surgical techniques will necessitate constant reappraisal and fresh thoughts.

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