

Management of Gall Stones: The Current Perspective

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In the UK, 1 in 3 women and 1 in 5 men will at some time develop gallstones¹. Ten percent of the adult population of USA (i.e., 20 million) have gallstones and 1 million new cases are diagnosed each year². At least, two thirds of them have no symptoms and are detected during investigations for unrelated conditions or at necropsy³.

Who should receive treatment

Let us discuss the symptomatic patients first. Three studies are specially helpful in answering the question; "should symptomatic patients receive treatment"? Gilliland and Traverso analysed the results of 670 patients who underwent cholecystectomy between 1982 and 1987⁴. Biliary colic was the primary symptom in 91% of patients. Dyspepsia, fatty food intolerance, flatulence and other non specific symptoms occurred in 5% of patients. Atypical pain in variable locations was present in 4% of patients. Follow-up (mean 45 months) showed that 88% of patients were free of symptoms following cholecystectomy. Patients with biliary colic or non specific pain were more likely to have relief of symptoms than patients with non specific symptoms. Dyspepsia was the commonest residual symptom. It was concluded that cholecystectomy should be performed in symptomatic patients as it is highly selective in long term relief of the symptoms especially biliary colic.

Another study, from Sweden, analysed 150 patients with symptomatic gallstones who refused surgery. Twenty-seven percent of these required emergency operation for complications within 2 years⁵.

McSherry et al from New York followed 267 similar patients with a mean follow-up of 83 months.

They showed that symptoms intensified in 48% of patients whereas only one became asymptomatic⁶. Hence it is sensible to offer treatment to patients with symptomatic gallstones.

But should the asymptomatic patients be treated? William Mayo suggested that there was no such thing as an innocent gallstone⁷. Was he right? Again three studies are helpful in drawing conclusions. In 1983, Gracie and Ransohoff et al presented the result of 123 faculty members at the University of Michigan (11 men 13 women) patients with asymptomatic gallstones with a follow-up ranging from 11 to 24 years. They found that only 13% developed biliary pain, while complications developed in 2%. Overall only 18% became symptomatic. Moreover, operative morbidity or mortality did not increase in patients who eventually required cholecystectomy⁸. This study is often criticized because the population was primarily white males and because over a quarter of the group underwent prophylactic cholecystectomy an average of 2-3 years after the diagnosis.

McSherry et al have used the information from a health maintenance organisation⁶. One hundred thirty-five patients were followed for nearly 5 years. Only 10% developed symptoms and 7.4% underwent biliary tract surgery. Over the same period, 18.5% of patients died of non-biliary tract diseases. In a report from Duke's University of 139 patients, only 11% of patients developed biliary symptoms over a 5 year follow-up period⁹. Furthermore, the threat of developing gall bladder carcinoma seems to have been over emphasized. In 1984, Weiss et al calculated that cholecystectomy would have to be performed on 200 Caucasian women, with gallstones, to prevent one gall bladder carcinoma¹⁰.

So we conclude that patients with asymptomatic gallstones should not be treated. However, there are exceptions. In patients with diabetes mellitus, emergency surgery associated with increased operative morbidity and mortality¹¹⁻¹³. In the elective setup, however, diabetes does not increase the operative risk^{11,12,14} As a result, many surgeons support the use of cholecystectomy in diabetics regardless of

their symptoms. Another example is higher risk of gallbladder carcinoma in female native Americans with gallstones and patients with porcelain (calcified) gallbladder with or without stones where prophylactic cholecystectomy is recommended¹⁵.

Conventional cholecystectomy

Over 500,000 cholecystectomies are performed each year in the USA costing 8 billion dollars (2.5% of the country's total health care expenditures)². The first cholecystectomy was performed by Carl Langenbuch in July, 1882. His assertion that "the gallbladder needs to be removed not because it contains stones but because it forms them" is as pertinent today as it was over a hundred years ago¹⁶. The first successful removal of common bile duct stone was performed in January, 1890 by Courvoisier¹⁷. Management of the common bile duct stone is controversial and would not be discussed in this article.

Since Langenbuch, open cholecystectomy remained the gold standard for the treatment of all gallstones for a century, Hermann has calculated that roughly 20% of patients with symptomatic biliary disease develop acute cholecystitis, whereas, 5-10% of these patients will develop a complication such as jaundice, cholangitis or pancreatitis¹⁸. It has been suggested that upper abdominal discomfort, heartburn, bloating and other vague symptoms are not related to gallstones and that routine ordering of ultrasound in a patient with dyspepsia is not warranted¹⁹. This must be viewed with the fact that there is considerable morbidity and significant mortality associated with open cholecystectomy. Even recent reviews have reported complication rate of open cholecystectomy to be over 20%, including infections in more than 10%²⁰. The patients may need 7 to 10 days in hospital and 2-3 months' convalescence before returning to full activity, although some patients are well enough to be discharged within 2 days²¹. In one series of over 900 patients, 30 day mortality was 0.7%. All the patients who died were over 70 years old²².

Laparoscopic cholecystectomy

The arrival of laparoscopic cholecystectomy has revolutionized the treatment of gallstone disease. This provides all the advantages of conventional cholecystectomy with shorter hospital stay (about 2 days), shorter time off work (about two weeks)^{23,24} and substantially less post-operative pain and discomfort. Indeed in the United States, laparoscopic cholecystectomy may be done without an overnight stay in hospital²⁵. Although laparoscope has been in use in gynaecology since 1960s, possibility of laparoscopic removal of gall bladder was first described in Germany in 1985 but was published in an obscure journal. First published laparoscopic cholecystectomy was performed on the first of March, 1987 by Philippe Mouret in Lyons, who was both a general and gynaecological surgeon. Dubois in Paris who was a great advocate of minicholecystectomy, started laparoscopic cholecystectomy from February, 1988²⁶. In June 1988, McKernan and Saye performed the first laparoscopic cholecystectomy using laser to dissect the gallbladder²⁷. However, it was not until April, 1989 when Perrisat from Bordeaux presented a video of the technique to the Society of American Gastrointestinal Endoscopic Surgeons, that the world at large became familiar with the procedure. In 1989, Cuschieri and co-workers in Dundee performed the procedure for the first time in UK (Nathanson & Cuschieri). Thereafter, there was a surge of interest and by 1992, over 60 of cholecystectomies performed in the UK were done by laparoscopic method. There has been plenty of discussion about the potential risks of complications associated with laparoscopic cholecystectomy. This has been found to be untrue. Dazielet al have presented a review of 77,600 patients. They reported that laparotomy for the treatment of a complication was required by 1.2% of patients. Bile duct injuries occurred in 0.6% of cases and these injuries occurred in first 100 cases. Post-operative bile leak was recognised in 0.3% and only 18 of the 33 postoperative deaths resulted from operative injuries²⁸. There is also a definite learning curve. In one study, the incidence of common bile duct injury fell from 2.2% in the initial operations performed, to

0.1% in later operations²⁹.

Minilaparotomy cholecystectomy v/s laparoscopic cholecystectomy

Two randomized trials involving 372 patients have compared laparoscopic and minilaparotomy cholecystectomy. Patients who had laparoscopic method had less postoperative pain and were more satisfied with the appearance of their scar than those who had minilaparotomy^{23,24}.

However, a more recent randomised, prospective, single blind study comparing laparoscopic and small incision cholecystectomy in 200 patients showed that laparoscopic surgery took significantly longer time (median 65 minutes versus 40 minutes) and did not have any advantage in terms of hospital stay (postoperative nights in hospital, median 3 nights for laparoscopic versus median 3 nights for small incision, $p=0.74$), time back to work for employed persons (median 5.0 weeks versus 4 weeks) and time to full activity (median 3.0 weeks versus 3.0 weeks $p=0.15$)³⁰.

The cost of laparoscopic cholecystectomy should be an important factor while making a choice, especially in developing countries. In India, surgeon's fee for laparoscopic cholecystectomy in a private hospital ranges between Rs. 10,000 to Rs. 40,000, whereas that for traditional cholecystectomy is about Rs. 5000³¹. The cost of whole laparoscopic set can be around Rs. 1 million. One also needs to appreciate that in about 4% of patients, the procedure has to be converted to an open

cholecystectomy¹⁹. Complicated forms of cholelithiasis such as the Mirizzi syndrome, chronic fibrosing cholecystitis, necrotising infections and tumors as well as high operative risks are treated better by open cholecystectomy³². A recent article from Germany has shown that in histologically proven acute cholecystitis, the duration of surgery (81 versus 45 minutes), the rate of conversion (12% versus 1.07%) and rate of complications (7.76% versus 2.2%) were all significantly higher in those with acute inflammation than in those without. However, these problems were significantly lower in those operated within 48 hours than in those operated 10 days or more after the onset of disease.

Therefore, surgery within a few days of onset of symptoms is recommended³³. Some authors have warned that the reduction in open cholecystectomy by residents may jeopardise their ability to perform the difficult open case³⁴. Concern has also been shown that with the popularity of laparoscopic cholecystectomy, patients with gallstones may be operated upon who would previously be managed conservatively³⁵. However, a recent American paper has suggested that the indications of cholecystectomy have not changed since the arrival of laparoscopic technique, though more people are undergoing cholecystectomy now for the same indications³⁶. Pneumoperitoneum using carbon dioxide has its disadvantage and therefore, a technique using abdominal wall retraction (AWR) was developed. However, some surgeons have found that field was less clear with AWR³⁷. A survey done by Indian surgeons suggested that the practice of Indian surgeons were against the recommendations of current literature which did not seem to have much impact on them regarding their practice of biliary surgery³⁸. This may also be the case in other developing countries. The continuous improvement in technique of laparoscopic cholecystectomy and its wide acceptance by the patients suggest that further development in this exciting field is required.

Alternative to cholecystectomy

With high complication rate and significant mortality, it is not surprising that alternatives to cholecystectomy have attracted lot of interest. Considerable postoperative discomfort, hospitalization for about one week and loss of work for upto one month, has also contributed towards clinicians' desire to find gentler and more efficient form of therapy. Furthermore, upto 47% of patients continue to complain of some persistent symptoms and dyspepsia after cholecystectomy³⁹.

Endoscopic drainage

Having successfully treated stones in the common bile duct by endoscopic sphincterotomy, techniques were developed to intubate the gall bladder endoscopically. However, these proved difficult as it is rarely possible to negotiate the cystic valves of Heister.

Percutaneous cholecystostomy

Attempts to gain access to gall bladder and to inject solvent to dissolve gallstones by percutaneous, transhepatic insertion of catheter proved time consuming and technically difficult. For draining an acute empyema of the gall bladder, however, percutaneous drainage could be life saving and relatively non-invasive⁴⁰.

Percutaneous cholecystolithotomy

Percutaneous cholecystolithotomy is a technique which proved successful in removing gallstones. However, it requires insertion of larger catheters into the gall bladder and a drain has to be left in the gall bladder for 10 days to allow the gall bladder to heal around it so that after removal bile does not leak into the peritoneal cavity. Leahy et al have carried out this procedure under direct vision and local anaesthesia⁴¹. whereas Jago has done this procedure under laparoscopic control⁴². The major disadvantage of this procedure is that up to a third of these patients are subject to the formation of new stones in the gall bladder within three years and about half of these patients have gallstone recurrence within five years of cholecystolithotomy⁴³.

Dissolution therapies

In about three quarters of patients, gallstones are composed of cholesterol; in the remainder they are composed of bile pigment with or without calcium. Various methods have been tried with variable success to dissolve the cholesterol stones in a functioning gall bladder. These include oral dissolution therapy mainly with bile salts, extracorporeal shock wave lithotripsy and direct contact gallstone dissolution therapy. All of these have selection criteria and require a functioning gall bladder. They are used either alone or in combination with each other.

Oral dissolution therapy

Dissolution therapy with bile acids was first used in 1970⁴⁴. Two bile acids, Chenodeoxycholic acid and Ursodeoxycholic acid have been used. First one causes diarrhoea, skin rash, changes in LFTs, an increase in low density lipoprotein cholesterol and hepatotoxicity and the second one is expensive. Therefore, a combination of two is often used and this is at least as effective as either agent alone⁴⁵. Selection criteria include radiolucent (soluble cholesterol as opposed to insoluble pigment stone) stones measuring less than 15 mm (preferably <10 mm) and a functioning gall bladder on oral cholecystogram or ultrasound scanning after fatty diet showing an emptying gall bladder. Less than 30% of patients fulfill these criteria. But if patient's compliance, obesity and the presence of radiolucent pigment stones is taken into account, this figure falls to 10%. CT scanning may improve selection by assessing calcification and distinguishing pigment stones from cholesterol stones in a better manner⁴⁶.

Extracorporeal shock wave lithotripsy (ESWL)

ESWL was first used for kidney stones in 1980⁴⁷ and for gallstones in human being in 1986⁴⁸. The stones fragmented by ESWL need to pass through valves of Heister, the common bile duct which has no peristalsis and the sphincter of Oddi. Emptying of gall bladder is a slow and incomplete procedure and in patients with gallstones, is significantly impaired⁴⁹⁻⁵⁰. For this reason, adjuvant therapy in the form of bile acids is usually given. The selection criteria used for ESWL is usually similar to that for bile acid therapy, hence only 15% qualify⁵¹. However, this selection criteria has recently been challenged⁵². Fragmentation rates of 75—90% have been achieved, followed by complete clearance in 90% of patients in 12-18 months. The results are best with solitary stones which occur in 5% of population.

Advantages of cholecystectomy over alternatives

The obvious advantage of cholecystectomy over these options include: the obvious fact that most patients are relieved of their symptoms, especially if they present with biliary colic or cholecystitis; limited applicability of dissolution therapy (10- 15%); after prolonged period of up to two years, only half the selected patients have successful dissolution, the risk of further stone formation estimated up to

50% in 5 years if dissolution therapy is discontinued⁵²; the entity of acalculous gall bladder, the possibility of pain or symptoms coming from a diseased gallbladder in which gallstones may coexist incidently; and the risk of carcinoma of gall bladder, whose prevalence is between 1-2% of all open cholecystectomies⁵³⁻⁵⁵. Management of gallstone remains an exciting challenge. With so many treatment options, one needs to tailor the management towards individual patient. During the last 10 years, it has been one of the most discussed topics among surgeons and it will remain so in the foreseeable future.

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