

A Comparison of Two Surgical Strategies for the Emergency Treatment of Gallstone Ileus

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ABSTRACT

Introduction: Debate currently exists regarding the appropriate surgical strategy for emergency treatment of gallstone ileus. This relates to the need for definitive biliary tract surgery after relief of mechanical obstruction. Our study reviews treatment by enterolithotomy alone and enterolithotomy combined with definitive biliary tract surgery and fistula closure to determine if there is advantage of one treatment option over the other.

Methods: The clinical, operative and follow-up data on 19 consecutive patients treated by emergency surgery for gallstone ileus from January 1992 to December 2000 was retrospectively reviewed.

Results: There were 15 women and four men, with a mean age of 74.6 (range 62-91) years. Pre-operative diagnosis was made in only nine of 19 patients. Enterolithotomy alone (E group) was performed in seven patients and enterolithotomy with cholecystectomy and fistula closure (E+C group) in 12 patients. In the E group, more patients had significant co-morbidity as identified by poorer American Society of Anesthesiologists (ASA) status, poorer pre-operative status (shock at presentation) than in the E+C group. Operative time was significantly shorter in the E group. However, there were no significant differences in morbidity, and both groups had zero mortality.

Conclusion: Both procedures can be carried out safely and with zero mortality. Relief of obstruction remains the mainstay of treatment. The better surgical option in our series is enterolithotomy alone. It is safe in both low and high-risk patients, and requires a shorter operating time as it is technically less demanding. In the longer term, the remnant fistula also does not appear to lead to further complications.

Keywords: biliary-enteric fistula, emergency surgery, gallstone, gallstone ileus, intestinal obstruction

INTRODUCTION

Intestinal obstruction from gallstones is a rare surgical emergency that presents in the elderly. Peri-operative mortality rates for gallstone ileus remain high at 12-17%⁽¹⁾. The reasons for this have been attributed to two main factors. Firstly, a high percentage of these patients are elderly and have multiple co-morbidities. Secondly, this condition is notoriously difficult to diagnose, often leading to a delay in treatment⁽¹⁻³⁾ with deterioration of the pre-operative status. Debate currently exists regarding the appropriate surgical strategy for emergency treatment of gallstone ileus. This relates to the need for definitive biliary tract surgery after relief of obstruction^(1,4). Enterolithotomy alone can predispose to complications related to the persistence of the biliary-enteric fistula. This includes the possibility of recurrent gallstone ileus⁽⁵⁾, cholecystitis and recurrent cholangitis⁽⁶⁾. On the other hand, definitive cholecystectomy and fistula closure is related to prolonged operating time and a higher mortality rate⁽¹⁾. Opinions and data regarding this are divided and rarity of cases prohibits the conduct of a randomised control study to answer these issues. In our clinical practice, both surgical strategies have been employed. This article reviews both these surgical techniques in a single department to determine if there were advantages of one treatment option over the other.

METHODS

A search of our hospital computerised database revealed 19 patients who were treated for gallstone ileus between January 1992 and December 2000 in the surgical department. There were 15 women and four men, with a mean age of 74.6 (range 62-91) years. All patients underwent surgery as definitive treatment for their condition.

The patients were analysed according to the type of surgical procedure. This involved either an enterolithotomy alone (E) or an enterolithotomy with cholecystectomy and repair of fistula (E+C). Data from hospital records were obtained for:

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- The presence of co-morbidities (including ischaemic heart disease, chronic respiratory conditions, chronic renal failure, diabetes mellitus, malignancy and previous cerebrovascular disease).
- Operative risk assessment as determined by the American Society of Anesthesiologists (ASA) physical classification grade.
- Previous history of biliary tract disease (as determined by history of biliary pain or jaundice; or documented gallstones by ultrasonography).
- Presenting symptoms and clinical findings.
- Factors that could affect outcome (such as presence of shock, time of symptom onset to surgery).
- Radiological findings (including pneumobilia, small bowel obstruction and presence of ectopic gallstone on radiographs or computed tomography).
- Post-operative morbidity (including wound infection, cardiac, pulmonary and renal complications, and intra-abdominal abscess).
- Post-operative mortality (defined as death within thirty days of surgery).

All patients were available for follow-up for a mean period of 24 (range 8-56) months. Categorical data was analysed by Fisher's exact test where appropriate, and continuous data was expressed as median and analysed with the Mann-Whitney U test. Significance level is taken at $p < 0.05$.

RESULTS

Seven patients underwent enterolithotomy alone (E) and 12 patients underwent enterolithotomy with cholecystectomy with fistula repair (E+C). Comparison of patient details in each group are shown in Table I. Differences in ASA status were significant between the groups. Only patients classified as ASA I and II underwent a enterolithotomy with cholecystectomy and fistula repair. Conversely, the majority (6/7) of patients with ASA III and IV underwent enterolithotomy for relief of mechanical obstruction. A history of biliary tract disease was present in 11 patients. Of these, six patients had previous evidence of cholelithiasis on ultrasonography performed prior to presentation for gallstone ileus and two had previous ultrasonographical diagnosis of cholecystitis.

Clinical parameters and operative data of the patients are shown in Table II. The mean duration of symptoms prior to surgery was 6.8 days. Pre-operative diagnosis of gallstone ileus was only made in nine of 19 patients. Eleven patients had a previous history of gallstone disease. Seven patients (37%) had evidence of pneumobilia and small bowel obstruction on abdominal radiographs. Two patients had computed tomography

Table I. Patient details, co-morbidities and American Society of Anesthesiologists physical status.

	E group (n=7)	E+C group (n=12)	Total (n=19)	p
Age (years)	76.1	73.7	74.5	n.s
Sex				
Male	6	9	15	
Female	1	3	4	
Previous biliary disease	4	7	11	n.s
ASA grade				
I and II	1	12	13	<0.05
III and IV	6	0	6	<0.05
Co-morbidity				
Diabetes	3	6	9	n.s
Ischaemic heart disease	4	5	9	n.s
COLD	2	3	5	n.s
Previous CVA	1	0	0	n.s
Cancer	1	3	4	n.s

Key:

E: Enterolithotomy, E+C: Enterolithotomy and cholecystectomy with fistula repair, ASA: American Society of Anesthesiologists, COLD: chronic obstructive airways disease, CVA: cerebrovascular accident, n.s: not significant

Table II. Clinical parameters.

	E group	E+C group	p
Duration of symptoms (days)	7.14	6.58	n.s
Presence of shock	4	0	<0.05
Heart rate (beats/min)	105	96	n.s
Systolic BP (mmHg)	90	137	<0.05
Hb (g/dL)	13.2	14.3	n.s
Leucocytes	13.5	12.7	n.s

Key:

BP: blood pressure, Hb: haemoglobin, n.s.: not significant

Table III. Operative data and complications.

	E group	E+C group	p
Operative time (min)	70	178	<0.05
Post-op ICU stay (n)	6	4	n.s
Early morbidity	4	7	n.s
Chest infection	2	3	
AMI	1	1	
Wound infection	1	2	
CVA	0	1	
Re-operation	0	0	n.s
Mortality (30 days)	0	0	n.s
Late complications	1	1	n.s
Incisional hernia	1	1	
Cholecystitis	0	0	
Cholangitis	0	0	
Gallstone ileus	0	0	

Key:

ICU: intensive care unit, AMI: acute myocardial infarction, CVA: cerebrovascular accident, n.s.: not significant.

(CT) of the abdomen performed that demonstrated gallstone ileus. Intra-operative diagnosis was achieved in the other ten patients. All of the patients that were in shock in the pre-operative period underwent only an enterolithotomy. All patients in the E+C group were stable in the pre-operative period. The mean duration of time of admission to surgery is 2.3 days.

Intra-operatively, the commonest site of obstruction was in the ileum. Two patients were diagnosed with Bouveret's syndrome, as the site of obstruction was in the first part of the duodenum. All patients had a cholecystoduodenal fistula identified except for one patient in the E+C group with a cholecystogastric fistula. The operative time was significantly longer ($p < 0.0001$) in the E+C group, compared to the E group. In the post-operative phase, ten patients required management in the intensive care unit. Early and late morbidity rates and mortality rates are charted in Table III. None of our patients experienced a recurrent gallstone ileus. There were no post-operative deaths in our cohort.

DISCUSSION

The term gallstone ileus, coined by Bartolin in 1654, is really a misnomer as impaction of one or more gallstones in the lumen of the bowel leads to a true mechanical obstruction. The route of entry from the gall bladder into the gastrointestinal tract is usually through a cholecysto-enteric fistula and the site of obstruction is related to the size of the stone in relation to the size of the lumen of the bowel. This usually occurs in elderly patients with preponderance in females. This is also a feature within our patient cohort.

We have also found this condition to be notoriously difficult to diagnose. Previous series have yielded a diagnosis in 43% to 73% of patients^(1,6) pre-operatively with more than 50% of cases discovered only at laparotomy⁽¹⁾. The pre-operative diagnostic rate in this series is 47%. Moreover, the diagnosis is frequently delayed, with the mean time to diagnosis after hospital admission being 2.3 days. There was an antecedent history of gallstone disease in 11(58%) patients. This is not surprising as there is no reliable test that can lead a surgeon to the correct diagnosis of this condition. The role of radiological studies to detect Rigler's triad⁽⁹⁾ of aerobilia, ectopic gallstones and bowel dilatation is suggestive but is by itself infrequent and not absolutely diagnostic. The use of upper gastrointestinal contrast studies can demonstrate a gallstone or biliary enteric fistula more definitively but is rarely used in our clinical practice. The role of CT has gained wide acceptance for the evaluation of small bowel obstruction⁽¹⁰⁾ and this has been shown to be accurate for diagnosis of gallstone

ileus⁽¹¹⁾. In two of our patients, this was the mode of diagnosis in the pre-operative phase. As CT is increasingly used for early diagnosis in small bowel obstruction, it may allow larger numbers of gallstone ileus to be identified pre-operatively.

Because the incidence of gallstone ileus is low, uniform management of this surgical emergency has not been clearly defined. Debate exists with regard to the treatment of choice^(1-4, 6-8). This relates to the need for definitive biliary tract surgery. There are advocates for both enterolithotomy alone to relieve obstruction with biliary tract surgery at a later date (two-stage procedure) as well as at the same sitting (one-stage procedure). The principal goal in management of gallstone ileus is quick effective relief of mechanical bowel obstruction, and enterolithotomy alone fulfils this in the shortest possible time. This approach avoids the need for exploration of the fistula and reduces the length and complexity of the procedure. Most fistulas can close spontaneously if left alone. In the largest review of historical data of published reports from 1953 to 1993⁽¹⁾, a lower mortality rate of 11.7% was found in the enterolithotomy group, compared to 16.7% for those that underwent a one-stage procedure. However, advocates of a definitive procedure cite the risk of complications that arise from a persistent fistula as the main reason for definitive surgery. Although this is more tricky and technically demanding, it reduces the occurrence of recurrent gallstone ileus, cholecystitis and cholangitis. A cholecysto-colonic fistula is one such situation where definitive treatment of the fistula is preferred. More recently, others^(6,7) have published data supporting a one-stage procedure where mortality rates as low as 6% were reported.

In our institution, 12 enterolithotomies with cholecystectomies and fistula repairs (E+C) and seven enterolithotomies alone (E) were carried out and reported in the present series. Significantly, no 30-day mortalities occurred in either group of patients. This is a significant improvement on previously reported data. We have not had a preference for either surgical procedure in our practice. Patients that underwent both procedures were comparable in demographic data. However, there are three significant differences between the groups. These are the ASA grade of the patients, the presence of hypotension in the pre-operative phase and the operative time in each treatment arm. All 12 patients that underwent a one-stage procedure (E+C group) were of ASA I and II and none of the patients were documented to be hypotensive in the pre-operative phase. The mean operative time was also significantly longer at 178 minutes. Conversely, six out of seven

patients in the enterolithotomy group (E group) were of ASA III and IV, and four out of seven were hypotensive in the pre-operative phase. In this group, the mean operative time was also significantly shorter at 70 minutes.

The patients that underwent enterolithotomy alone were of poor pre-operative status (in shock) or had multiple co-morbidities as assessed by the ASA grading. This represents a group of higher risk patients that benefit from relief of mechanical obstruction without undergoing a prolonged operation. The other 12 patients that had a one-stage procedure represent a group of lower risk patients that had less co-morbidity and were not in shock in the pre-operative period. These patients had been adequately resuscitated and were able to tolerate a definitive procedure at the same sitting without increased mortality. Although age was previously demonstrated to be a major determinant in survival⁽¹²⁾, this has not manifested in our series.

The data from our study can be criticised as it is neither prospective nor randomised and being a rare condition, the case series is small. However, it suggests that it is a patient's general condition, as reflected by the ASA status and adequacy of resuscitation as reflected by the presence of hypotension, that helps to dictate which surgical procedure is best suited for each patient. From this approach, we have managed to achieve a zero mortality rate. Whether an enterolithotomy alone actually carries a lower mortality rate than a one-stage procedure is difficult to determine as we had good results with both procedures. Other factors that may have contributed to the good results over previous reported data include the improvements in peri-operative anaesthetic and intensive surgical care.

None of our patients developed recurrent gallstone ileus or cholangitis on follow-up in the enterolithotomy group. It appears that enterolithotomy alone is sufficient treatment for gallstone ileus and in our

experience, recurrent complications have not manifested. However, it is also necessary to take into consideration the well-reported long-term complications of a remnant fistula. We have not seen these in our series. This could be a result of the absence of cholecysto-colonic fistulas as well as a different biliary stone type in our population.

Overall, there are no significant differences in morbidity or outcomes between enterolithotomy alone and a one-stage procedure. As gallstone ileus is a rare condition, surgeons will only encounter a handful of cases in their clinical experience. Relief of obstruction remains the mainstay of treatment and the better surgical option in our series is enterolithotomy alone. It is safe in both low and high risk patients and requires a shorter operating time as it is technically less demanding. In the longer term, the remnant fistula also does not appear to lead to further complications.

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