Occasional Survey

Trends in management of acute cholecystitis

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Abstract

A retrospective review has been carried out of the management of acute cholecystitis in one hospital from 1974 to 1978. The policies and outcome are compared with those of the same centre during 1953-62. In the intervening period there has been a move towards early cholecystectomy. Overall mortality has fallen from 7.7% to 1.6%. The results of early surgery are comparable with those of delayed operations. The data also compare favourably with those of controlled clinical trials and support the adoption of early cholecystectomy for acute cholecystitis in routine practice. The saving of resources, however, may not be as great as is suggested by the results of clinical trials.

Introduction

In 1966 Essenhigh reviewed the management of 429 consecutive cases of acute cholecystitis admitted to the Radcliffe Infirmary, Oxford, over the 10-year period from 1953 to 1962.¹ During that period most cases were managed medically in the first instance. Cholecystectomy was performed after resolution of the acute episode and subsequent radiological confirmation of the diagnosis. Immediate surgery was performed usually for suspected empyema or perforation of the gall bladder. Of these 429 patients, 95 had immediate surgery with an overall operative mortality of 12.6%.

In the same paper Essenhigh reported a small personal series of cases in which immediate laparotomy was performed for acute cholecystitis. Based on this series, and the results of his review,

he recommended immediate surgery for acute cholecystitis. In his personal series, however, there had been a 16% error in the clinical diagnosis of acute cholecystitis, which led him to suggest a period of 24 to 48 hours' observation whenever the diagnosis was in doubt.

Since then, although the management of acute cholecystitis remains controversial,²⁻³ there has been an appreciable shift towards early cholecystectomy. This policy has been supported by the results of four controlled clinical trials³⁻⁶ that have shown comparable results in medically and surgically treated patients. Since data is available from an earlier review in Oxford, we have reviewed the management of acute cholecystitis over the five-year period 1974-8 to compare current management in Oxford with that practised some 20 years previously.

Method

The case notes of all patients admitted to the Radcliffe Infirmary with a diagnosis of acute cholecystitis, or one of its complications, during the five years 1974 to 1978 inclusive were reviewed. Patients were included in the study if they were recorded as having tenderness and guarding in the right hypochondrium, a fever of 37.5°C or above, and an illness lasting more than 24 hours, or alternatively if the diagnosis of acute cholecystitis was made or confirmed at laparotomy.

Over 800 case notes with an *International Classification of Diseases* 8th revision (ICD) code 575 (cholecystitis and cholangitis without mention of calculi) were examined, and 304 of these patients met the above criteria for inclusion in the analysis. An examination of all case notes with ICD codes 574 (cholelithiasis), 576 (other diseases of the biliary tree), and 577 (pancreatitis) for the year 1974 gave no extra yield of cases, and case notes thus coded during the subsequent years covered by the study were not examined. A similarly thorough search of the case records and the same clinical criteria had been used by Essenhigh in selecting cases for the 1953-62 study except that a fever of 37.5°C was not made an absolute requirement for inclusion (D M Essenhigh, personal communication).

Ninety-seven items of information on the presentation, management, and outcome were recorded for each of these 304 cases and stored on a computer file. The Radcliffe Infirmary was the major

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teaching hospital for the Oxford University Medical School and was the only hospital in the city and adjacent area to which acute surgical cases were admitted during this and the previous review period. Consequently, most of these patients' records contained detailed admission notes by students and by house officers for each admission. Many had more than one admission, and this increased the yield of information.

Results

COMPARISON OF THE TWO REVIEW PERIODS

During 1974-8, 304 patients were admitted with acute cholecystitis, an admission rate of 60 a year compared with 43 a year during 1953-62.

Overall hospital mortality has dropped from 7.7% to 1.6% over the 25-year span covered by the two reviews. All five patients who died in the more recent series were over 75, and four of these deaths could be considered unavoidable. The initial management of patients in the two series is shown in table I. A significant shift may be seen towards surgery during the initial admission: from 27% of all patients in the earlier series to 45% in the later series.

TABLE I—Management of patients with acute cholecystitis during initial hospital admission

	1953-62		1974-8	
	No (%)	Mortality (%)	No (%)	Mortality (%)
Emergency surgery	95 (22)	12.6	21 (7)	4.8
Early surgery	—	—	69 (23)	1.4
Surgery after failed medical treatment	22 (5)	4.5	46 (15)	0
Total No of operations on initial admission	117 (27)	11.1	136 (45)	1.5
Conservative management throughout initial admission	312 (73)	6.4	168 (55)	1.8

Over the same period there has been a substantial drop in the number of patients undergoing "emergency" surgery—that is, surgery undertaken within 24 hours of admission because of the patient's condition at presentation. This decrease is to a great extent due to improved diagnosis of acute cholecystitis, since 39% of the patients who had an emergency laparotomy between 1953 and 1962 had an incorrect preoperative diagnosis of acute appendicitis.

Early cholecystectomy was performed by choice in 23% of all patients in the recent series. Some surgeons performed acute cholecystectomy in roughly half of all their patients with acute cholecystitis while others rarely performed cholecystectomy as the first line of treatment. Of these early cholecystectomies, 85% were performed by the consultant or his senior registrar/lecturer and the remainder were carried out by a supervised registrar.

The number of patients undergoing surgery because of failed medical treatment has increased substantially. Those surgeons who favoured early surgery seemed more inclined to abandon medical treatment if there was no pronounced clinical improvement after three or four days.

Of the patients who were successfully treated medically, a greater proportion eventually came to surgery in the 1974-8 than in the 1953-62 series (67% v 47%) (table II).

TABLE II—Outcome in patients admitted with a diagnosis of acute cholecystitis and successfully managed by medical treatment. (Percentages in parentheses)

	1953-62 (n = 289)	1974-8 (n = 165)
Subsequent investigations normal	39 (13)	15 (9)
Surgery not advised/operation refused	74 (26)	22 (13)
Not further investigated/defaulted from follow-up	39 (14)	18 (11)
Later elective operation	137 (47)	110 (67)

CHOICE OF TREATMENT IN 1974-8

The initial management of 37 of the 304 patients was dictated by their clinical condition at presentation: 21 required emergency laparotomy for peritonitis or empyema of the gall bladder while 16

were considered unsuitable for surgery, making medical management obligatory. Two of these latter patients died and seven came to surgery at a later admission.

Medical treatment or surgery appears to have been an option in the management of the remaining 267 cases. As several factors such as age, duration of symptoms, and previous or current cardiovascular disease could have influenced this decision we examined a number of these variables in both the medically and the surgically treated groups (table III). A knowledge of pre-existing gall-bladder disease was the

TABLE III—Preoperative data for 267 patients whose clinical condition did not dictate initial management

	Early surgery (n = 69)	Conservative management (n = 198)
Mean age	53	57
Women:men	2.29:1	1.57:1
Average duration of symptoms	3 days	3 days
Previous radiological evidence of gall bladder disease	35%	13%
History of cardiovascular disease	23.2%	24.4%
History of chronic respiratory disease	5.8%	8.1%
History of jaundice	2.9%	1.5%
Jaundice on admission	10.1%	10.6%
Vomited	78.3%	78.7%
WCC > 11 × 10 ⁹ /l	47%	59%

only factor to emerge as having been important in the choice of treatment. Of the patients undergoing early surgery, 35% (24/69) already had radiologically proved gall-bladder disease before admission compared with only 13% (26/198) of those for whom medical treatment was chosen ($\chi^2 = 14.37$; $p < 0.001$).

Forty-six (23%) of the 198 patients who were treated medically did not respond satisfactorily and had an operation during this initial admission. There was consequently a mean delay of 5.5 days from admission to surgery in this group. These 46 patients comprised 29 (38%) of the men but only 17 (14%) of the women who were initially managed conservatively, and this male preponderance is statistically significant ($\chi^2 = 13.25$; $p < 0.001$).

MORBIDITY AND MORTALITY IN THE RECENT SERIES

Table IV shows some of the operative findings together with the morbidity and mortality in the four groups of patients who came to surgery. The mean postoperative morbidity index was calculated for

TABLE IV—Operative findings, morbidity, and mortality for all operations 1974-8

	Early surgery (n = 69)	Later elective surgery (n = 103)	Emergency surgery (n = 21)	Surgery after failed medical treatment (n = 46)
Technical difficulty at operation recorded	26%	17%	30%	33%
Cholecystostomy	0	1%	10%	13%
Operative cholangiogram performed	77%	83%	40%	67%
Common bile duct explored	30%	23%	28%	24%
Calculi removed from common bile duct	19%	15%	19%	19%
Residual bile duct stones	2.9%	1.9%	0	4.3%
Blood transfusion given	13.2%	13.7%	30%	21.7%
Mean postoperative morbidity index	0.50	0.52	1.19	0.85
Pulmonary embolus	1.4%	1.9%	4.8%	0
Mean total hospital stay (days)	13.2	18.4	17.7	18.9
Mortality	1.4%	0	4.8%	0

each patient by scoring one point for each item of postoperative morbidity that was clearly recorded in the case notes; these included wound infection or discharge, chest infection or atelectasis, deep venous thrombosis, and postoperative urinary retention requiring catheterisation.

The mean total stay in hospital was shortest (13.2 days) for those patients who had early surgery. The emergency surgery group required more blood transfusions and had the highest morbidity and mortality figures. Cholecystostomy was virtually confined to those patients requiring emergency surgery or surgery after failed medical

treatment. Operative cholangiograms were performed in most patients in each group except those undergoing emergency surgery, but the incidence of residual common bile duct stones was not significantly different in the various groups. The operations most often recorded as having been technically difficult were those undertaken after medical treatment had failed, but the differences between the groups in this respect were not striking.

There were no injuries to the bile duct in any of the four surgical groups, but there was one death in hospital in the emergency surgery group (4.8%) and one in the early surgery group (1.4%).

SUCCESSFUL MEDICAL TREATMENT

Of the 165 patients who were treated medically and whose symptoms resolved, 110 came to cholecystectomy at a subsequent admission. The mean interval from the time of admission with acute cholecystitis to surgery in this group was three months (range two weeks to one year). Fifty-four per cent of these patients reported symptoms during that period that were attributable to gall-bladder disease and were sufficient to interfere with their life style. One-third of these symptomatic patients (18%) were readmitted as emergencies because of the severity of their symptoms, and one-third of those readmitted (5.5%) had definite recurrent acute cholecystitis.

Discussion

This review has documented the move towards early cholecystectomy for acute cholecystitis that has taken place in one centre between the periods 1953-62 and 1974-8. The surgical management of acute cholecystitis during the later period matched Essenhigh's recommendations of 1966¹ in that the operations were performed by experienced surgeons after a period of more than 24 hours' observation and when the patient's diagnosis was in little doubt (35% had previous

radiological evidence of gall-bladder disease, a further 35% had a radiological diagnosis made before surgery, and 6% had a palpable mass).

Nevertheless, fewer "emergency" laparotomies were performed for acute cholecystitis in the later period, and the data suggest that this was because of improved diagnosis rather than a decrease in the severity of the disease at presentation. This fall in the emergency laparotomy rate has no doubt contributed to the improved mortality figures, since the mortality rate for emergency surgery in the 1953-62 series was 12.6%. Furthermore, better resuscitation and anaesthesia, the availability of more powerful antibiotics, and perhaps the performance of the surgery by more experienced surgeons probably account for the remainder of the overall fall in mortality to 1.6%.

The inaccuracy of the clinical diagnosis of acute cholecystitis is well recognised.^{7,8} That the Oxford surgeons preferentially selected for early surgery those patients whose gall-bladder disease had already been proved radiologically suggests that a confident diagnosis is an important factor in the decision to operate early during the admission for acute cholecystitis. It remains to be seen whether the introduction of those means of diagnosis of gall-bladder disease that are perhaps more accurate in the acute phase, such as radionuclide imaging⁸ and real-time ultrasound,⁹ will lead to a further increase in early cholecystectomy in Oxford.

Early surgery resulted in an average reduction in total stay in hospital of 5.4 days per patient. Furthermore, early surgery avoided both the excess surgical morbidity experienced by the group who failed to improve with medical treatment and the considerable problem of recurrent symptoms experienced by those who were successfully treated medically and scheduled for delayed elective surgery. Overall the morbidity of early and delayed surgery was comparable. In particular, there was no significant increase in the number of technically difficult

* Temperature >37.5°C, illness lasting >24 hours, and tenderness and guarding in the right hypochondrium

Plan of management for a patient with a putative diagnosis of acute cholecystitis. Urine microscopy and a chest x-ray examination should be performed to exclude right pyelonephritis or pleuropulmonary disease as a cause of the symptoms and signs. The ECG may be abnormal in acute cholecystitis but if there is serious question of cardiac ischaemia then the diagnosis should be reconsidered. If the patient is suitable for early surgery the clinical diagnosis should be supported by radiological, ultrasound, or radionuclide scanning techniques before operation.

operations or of residual common bile duct stones in patients treated by early operation.

Firm conclusions on the relative merits of surgery and medical treatment for acute cholecystitis cannot be drawn from a retrospective review. Table V, however, compares data from the 267 patients in our 1974-8 series, whose management appears to have been optional at the time of admission, with data from four recent controlled clinical trials of medical versus surgical management.³⁻⁶ The surgical results are similar, and on the

TABLE V—Comparison of Oxford series 1974-8 with controlled trials of early versus delayed surgery for acute cholecystitis

	Van der Linden and Sunzel ³	McArthur <i>et al</i> ⁶	Lahtinen <i>et al</i> ⁵	Jarvinen and Hastbacka ⁴	Oxford series 1974-8
No of patients	140	32	100	165	267
Mean age	—	49	63	57	56
Women:men ratio	1.1:1	7:1	1.5:1	1:1	1.7:1
Mean hospital stay for early surgery (days)	10.1	13.1	13.0	10.7	13.2
Mean hospital days saved by early over delayed surgery	8.8	11.1	12	7.5	5.4
Mortality					
Early surgery	Nil	Nil	Nil	Nil	1.4%
Initial medical management	Nil	Nil	8%	1.3%	0.5%
Proportion failing to respond to medical treatment	—	13%	14%	13%	23%
Premature readmission for symptoms after successful conservative management	6%	8%	25%	12%	18%
Patients defaulting after successful conservative management	17%	6%	8%	7%	9%
Residual common bile duct stones					
Early surgery	—	—	2%	1.3%	3%
Delayed surgery	—	—	7%	1.3%	2%

basis of these results the authors of all four trials have advocated early cholecystectomy. More patients in the Oxford series "failed" medical management, however, probably because no trial protocol stood in the way of surgery if definite clinical improvement was not evident within three or four days. Prolonged periods of medical treatment were thus aborted so that the average total stay in hospital of the conservatively managed group (18.6 days), and therefore the number of inpatient days saved by early surgery (5.4), were both fewer than the corresponding figures for the two trials that showed the greatest saving of inpatient days.^{5 6}

Clearly the resources saved if early cholecystectomy is accepted as routine policy will depend on local customs and practice and may not be as great as is suggested by the results of clinical trials. Indeed Fowkes and Gunn¹⁰ showed a saving of only 3.7 days when early cholecystectomy was practised in a Scottish hospital, though they pointed out that this represented a financial saving of £156 per patient.

We believe that a policy of early surgery for patients with acute cholecystitis, particularly men, is justified provided that the appropriate surgical experience is available. In the figure we have outlined a plan of management for a patient admitted with a putative diagnosis of acute cholecystitis. We would suggest that an antibiotic effective against the organisms most commonly found in bile (*Escherichia coli*, *Streptococcus faecalis*, and *Klebsiella*) should be given parenterally preoperatively, so that appropriate blood concentrations are maintained during the operation, and for three to five days postoperatively. Cholecystectomy should be carried out whenever possible, although it is important to remember that cholecystostomy may be the procedure of choice in the difficult case, especially for the less experienced surgeon. Peroperative cholangiography should always be performed, and exploration and drainage of the common bile duct carried out if there is evidence of choledocholithiasis. The operation should normally be performed as a semi-elective procedure on a normal operating list rather than as an emergency.

We thank the consultant staff of the Radcliffe Infirmary for their permission to study the records of patients admitted under their care, Mr Iain Kidson, FRCS, for help with computer handling of the data, and the staff of the medical records departments of the Radcliffe Infirmary and John Radcliffe Hospital for their untiring work in retrieving the case notes.

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(Accepted 3 November 1981)

Is it dangerous to store drinking water or home-made wine in white plastic containers?

Since the hazards of vinyl chloride monomer were recognised, considerable attention has been paid by Government and the manufacturers of plastics to the possibility of leaching out of potentially genotoxic monomers from plastic food containers. In particular, a stringent limit on the level of vinyl chloride monomer permitted in polyvinyl chloride intended to come into contact with food is laid down in UK legislation, and the level of this contaminant in food and beverages is now negligible. Furthermore, the situation with respect to all monomers is kept under official review. Apart from monomers, a wide variety of other chemicals are used in minute amounts in the manufacture of plastics. Government regulations

require that materials and articles intended to come into contact with food do not transfer their constituents to food in quantities that would endanger health or affect the organoleptic character of the food. There should be, therefore, no health hazard if water or wine is stored in plastic containers designed for food use. If protracted storage periods are envisaged, however, it would be advisable to consult the manufacturer on the suitability of the container for this purpose. The above assurance would not attach to the use of plastic containers manufactured for non-food uses. Consequently, water or wine stored in containers of the latter type might well pick up tastable chemical taints during storage and although there is no proved health hazard from contamination of this type, it would be prudent to avoid it.—FRANCIS J C ROE, independent consultant in toxicology and cancer research, London.