Clinical update: early surgery for acute cholecystitis

The frequency of gallstone disease (cholelithiasis) is about 10% in the general population[1] and acute cholecystitis is one of the most common surgical emergencies.[2] Open cholecystectomy was the gold standard for the treatment of symptomatic cholelithiasis until the introduction of laparoscopic cholecystectomy in the late 1980s and early 1990s. During the early years, acute cholecystitis was a contraindication for laparoscopic treatment because of inflammation and oedema, which made laparoscopic cholecystectomy unsafe.[3] Thus acute cholecystitis was treated conservatively in the first instance with intravenous fluids and antibiotics followed by delayed (interval) cholecystectomy, usually 6–12 weeks after the patient's discharge.

Two randomised trials[4,5] in the late 1990s of early versus delayed laparoscopic cholecystectomy in the management of acute cholecystitis showed that the urgent procedure is safe compared with delayed surgery (complication rates in the two trials: 9% and 13% *vs* 8% and 29%, respectively). Additionally, early laparoscopic cholecystectomy was associated with lower rates of conversion to open surgery (21% and 11% *vs* 24% and 23%, respectively), which might happen because of technical difficulty with the laparoscopic procedure that can lead to conventional open removal of the gallbladder. Finally, laparoscopic cholecystectomy reduced total hospital stay (7·6 and 6 days *vs* 11·6 and 11 days, respectively), and is cost effective. This surgical myth was thus demystified.

The initial oedematous phase of acute cholecystitis usually lasts a week and is followed by subacute and chronic inflammation. However, the best time to operate seems to be within the first 48–96 h (the golden period).[6] Laparoscopic cholecystectomy for an acutely inflamed gallbladder is technically more demanding than surgery for acute biliary pain without inflammation (biliary colic), because of inflammatory adhesions and distortion of the biliary anatomy. Many studies report that, if this procedure is done between 48 and 96 h of onset of symptoms, the operative difficulty and conversion rate are less than with delayed surgery or interval cholecystectomy.[7]

A recent Cochrane review[8] of five randomised trials (451 patients) for acute cholecystitis showed that early laparoscopic cholecystectomy (228 patients) was as safe as delayed laparoscopic cholecystectomy (223 patients), with a shorter hospital stay of 3 (range 1·1–5·0) days. No mortality was reported in any of the trials. The definition of early surgery varied between 4 and 7 days of onset of symptoms; delayed surgery took place after 6–12 weeks after symptoms settled. Additionally, there were differences in surgical experience of the operator and the preferred mode of dealing with stones in the common bileduct (table 1), which might have led to variation in the final results of the individual trials. Nevertheless, in overall or subgroup analysis according to either surgical experience or timing of early surgery (within 4 days or after 4 days of onset of symptoms), there were no statistically significant differences between early and delayed cholecystectomy for complications (bileduct injury, bile leak, superficial or deep-seated infection), conversion rates, or length of stay.

Study	Country	Surgeons' experience	Number of patients (ELC/DLC)	Management of CBD stones	Early versus delayed laparoscopic cholecystectomy		
					Conversion rate (%)	Bileduct injury (%)	Hospital stay (days, median)
Davila, 1999	Spain	NA	63 (36/27)	NA	3·7 *vs* 16·7	0 *vs* 2·8	1·6 *vs* 2·7
Johansson, 2003	Sweden	>25 LC	145 (74/71)	Laparoscopic exploration of CBD, postoperative ERCP	31·1 *vs* 29	0 *vs* 1·4	5 *vs* 8
Kolla, 2004	India	Surgical consultant	40 (20/20)	CBD stones as exclusion criteria	25 *vs* 25	5 *vs* 0	4·1 *vs* 6·1
Lai, 1998	Hong Kong	>50 LC	104 (53/51)	CBD stones as exclusion criteria	20·8 *vs* 23·9	0 *vs* 0	7·6 *vs* 11·6
Lo, 1998	Hong Kong	>300 LC	99 (49/50)	Preoperative ERCP	10·4 *vs* 20	0 *vs* 2·2	6 *vs* 11

NA=not available, LC=laparoscopic cholecystectomy, ELC=early laparoscopic cholecystectomy, DLC=delayed laparoscopic cholecystectomy, CBD=common bileduct, ERCP=endoscopic retrograde cholangiopancreatography.

Table 1: **Systematic review of five randomised trials of early versus delayed laparoscopic cholecystectomy for acute cholecystitis[8]**

The length of stay differed between the various studies (table 1), which might reflect heterogeneity of regional medical practice and social perceptions of recovery after operation. Nevertheless, early cholecystectomy consistently reduced hospital stay compared with delayed surgery by simply treating the disease at index admission. This point has important health-economic implications whatever the social setting or medical practice, provided early surgery can be proved to be at least as safe as delayed operation, if not safer.

In the meta-analysis, with varied models, the authors show that the bileduct injury rate was lower (0·5% *vs* 1·4%), the risk of bile leak higher (3·2% *vs* 0%), and the overall conversion rate lower (20·3% *vs* 23·6%) in the early group than in the delayed group. None of these differences were statistically significant and confidence intervals were wide, in view of the small sample size. Interestingly, 40 patients (17·5%) from the delayed group had emergency surgery (crossover) because of non-resolving or recurrent cholecystitis and 18 (45%) of these converted to the open procedure, which is almost double the rate of conversion for conventional surgery (early or delayed). Additionally, two patients (1%) developed cholangitis while waiting for surgery in the delayed group (although there were no readmissions for acute pancreatitis, another dreaded complication). Finally, other comparative studies showed that early cholecystectomy is a safe procedure, without higher risk of mortality or morbidity, which reduces overall treatment cost, shortens hospital stay, and avoids the problems of failed conservative treatment.[9–12]

Nevertheless, early cholecystectomy has not been adopted routinely. There is no consensus statement, or national or international policy or guideline, for the management of acute cholecystitis. In table 2, we summarise surgeons' preferences or current practice in different hospitals or regions about the timing of surgery for acute cholecystitis.[13–17] In Australia, 55% of surgeons favoured laparoscopic cholecystectomy on the same admission, 28% preferred conservative management followed by interval cholecystectomy, and 17% had no preference.[13] Many said that they would like to operate on acute cases but a conservative approach was followed because of organisational problems, such as unavailability of operating theatres. A Japanese postal survey showed that early cholecystectomy was preferred by 42% of consultants, and almost the same percentage of surgeons routinely managed their patients conservatively and opted for delayed cholecystectomy at a later date.[14] 10% of the surgeons reported that the choice of surgical procedure was made by the doctor in charge. According to these authors, the lack of availability of specialist surgeons and anaesthetists and operating theatres is the main reason why early cholecystectomy is not common in Japan. A survey of 922 patients, over 2 years in nine Japanese teaching hospitals, revealed that early surgery was not done; median overall length of stay was long (31 days) and the main reason was cited as inadequate human resources.[15] In 114 005 laparoscopic cholecystectomies in a US series over 7 years, only 12% of patients had cholecystectomy at the same admission.[16] In a UK cross-sectional study, most general surgeons (89%) preferred interval cholecystectomy, provided that the initial attack of acute cholecystitis settles; only 11% did early cholecystectomy routinely.[17] All these findings show that the adoption of early cholecystectomy remains unpopular.

The waiting time for elective cholecystectomy varies from 4 weeks to 12 months after hospital discharge, and is associated with readmission rates of 12%[18] to 24%.[11] Readmission is for either recurrent gallstone-related symptoms or more serious complications such as acute pancreatitis and obstructive jaundice, which increase overall health-care costs.[11]

Greenwald and colleagues[19] controlled the "when, where, who, and how" treatment variables in the management of patients with acute cholecystitis. After

Reference	Year	Country	Surgery	Surgeons' preference (number)	Patients treated (number)
Askew[13]	2005	Australia	Early Delayed Undecided	59 (55%) 30 (28%) 18 (17%)	NA NA
Yamashita et al[14]	2006	Japan	Early Delayed Undecided	88 (42%) 89 (42%) 34 (16%)	NA NA
Sekimoto et al[15]	2006	Japan	Early Delayed	NA NA	104 (46%) 124 (54%)
Vecchio et al[16]	1998	USA	Early Delayed	NA NA	2346 (12%) 17 916 (88%)
Cameron et al[17]	2004	UK	Early Delayed	32 (11%) 258 (89%)	NA NA

NA=not available.

Table 2: **Current practice of management of acute cholecystitis: early versus delayed surgery**

the start of an institutional protocol for the treatment of these patients, the "when" became as soon as practical after diagnosis, the "where" became a specially equipped and staffed laparoscopic surgery suite, and the "who" became the house staff supervised by surgeons with a special interest in therapeutic laparoscopy. The "how" became the breadth of surgical manoeuvres required to facilitate laparoscopic cholecystectomy in the setting of acute inflammation. The techniques include: early decompression of the distended gallbladder (which allows proper exposure of the triangle of Calot); limited dissection at the junction of the gallbladder and cystic duct (which avoids haemorrhage); routine use of intraoperative cholangiography (which provides invaluable mapping of the biliary tree); use of an extraction bag (which protects from contamination with infected bile and stone); and placement of a closed suction-drain in the gallbladder fossa (which avoids abscess formation in the gallbladder bed). Starting this standardised protocol, the authors improved the percentage of cholecystectomies that were completed laparoscopically, decreased preoperative and postoperative stays, and reduced hospital charges.

Thus establishment of a treatment protocol and guidelines for the management of acute cholecystitis on the basis of audit consequences and research conclusions is now a major priority. Hospital Episodes Statistics shed some light on the scale of the problem in England.[20] Of 48 064 cholecystectomies (in 2004–05), only 11% were done as an emergency procedure, with a mean waiting time of 138 days and median length of hospital stay of 2 days. In the same period, there were nearly 5613 admissions for acute cholecystitis, the patients staying in for a mean of 8 days and occupying nearly 35 000 bed-days. If most patients had had early cholecystectomy, the health service in England would have saved at least 25 000 bed-days a year. Measures to implement early surgery for acute cholecystitis, such as availability of radiological investigations, theatre time, and experienced surgeons, should be urgently addressed in view of the current literature favouring this strategy both in terms of patients' benefit and savings in healthcare costs.

*Stylianos Germanos, Stavros Gourgiotis, *Hemant M Kocher*
Upper GI & General Surgery, Leighton Hospital, Leighton, Cheshire, UK (S Germanos); and Barts & The London HPB Centre, The Royal London Hospital, London E1 1BB, UK (S Gourgiotis, HMK)
hemant.kocher@cancer.org.uk

HMK is funded by a Department of Health National Clinician Scientist Fellowship. S Germanos and S Gourgiotis declare that they have no conflict of interest.

1 Bates T, Harrison M, Lowe D, Lawson C, Padley N. Longitudinal study of gallstone prevalence at necropsy. *Gut* 1992; **33:** 103–07.
2 Schirmer BD, Winters KL, Eldich RF. Cholelithiasis and cholecystitis. *J Long Term Eff Med Implants* 2005; **15:** 329–38.
3 Wilson P, Leese T, Morgan WP, Kelly JF, Brigg JK. Elective laparoscopic cholecystectomy for "all-comers". *Lancet* 1991; **338:** 795–97.
4 Lai PB, Kwong KH, Leung KL, et al. Randomized trial of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Br J Surg* 1998; **85:** 764–67.
5 Lo CM, Liu CL, Fan ST, Lai EC, Wong J. Prospective randomized study of early versus laparoscopic cholecystectomy for acute cholecystitis. *Ann Surg* 1998; **227:** 461–67.
6 Kolla SB, Aggarwal S, Kumar A, et al. Early vs delayed laparoscopic cholecystectomy for acute cholecystitis: a prospective, randomized trial. *Surg Endosc* 2004; **18:** 1323–27.
7 Peng WK, Sheikh Z, Nixon SJ, Paterson-Brown S. Role of laparoscopic cholecystectomy in the early management of acute gallbladder disease. *Br J Surg* 2005; **92:** 586–91.
8 Gurusamy KS, Samraj K. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Cochrane Database Syst Rev* 2006; **4:** CD005440.
9 Papi C, Catarci M, D'Ambrosio L, et al. Timing of cholecystectomy for acute calculus cholecystitis: a meta-analysis. *Am J Gastroenterol* 2003; **99:** 147–55.
10 Giger U, Michel JM, Vonlanthen R, Becker K, Kocher T, Krahenbuhl L. Laparoscopic cholecystectomy in acute cholecystitis: indication, technique, risk and outcome. *Langenbecks Arch Surg* 2005; **390:** 373–80.
11 Somasekar K, Shankar PJ, Foster ME, Lewis MH. Costs of waiting for gallbladder surgery. *Postgrad Med J* 2002; **78:** 668–69.
12 Bhattacharya D, Senapati PS, Hurle R, Ammori BJ. Urgent versus interval laparoscopic cholecystectomy for acute cholecystitis: a comparative study. *J Hepatobiliary Pancreat Surg* 2002; **9:** 538–42.
13 Askew J. A survey of the current surgical treatment of gallstones in Queensland. *ANZ J Surg* 2005; **75:** 1086–89.
14 Yamashita Y, Takada T, Hirata K. A survey of the timing and approach to the surgical management of patients with acute cholecystitis in Japanese hospitals. *J Hepatobiliary Pancreat Surg* 2006; **13:** 409–15.
15 Sekimoto M, Imanaka Y, Hirose M, Ishizaki T, Murakami G, Fukata Y. Impact of treatment policies on patient outcomes and resource utilization in acute cholecystitis in Japanese hospitals. *BMC Health Serv Res* 2006; **6:** 40.
16 Vecchio R, MacFayden BV, Latteri S. Laparoscopic cholecystectomy: an analysis of 114 005 cases of United States series. *Int Surg* 1998; **83:** 215–19.
17 Senapati PS, Bhattacharya D, Harinath G, Ammori BJ. A survey of the timing and approach to the surgical management of cholelithiasis in patients with acute biliary pancreatitis and acute cholecystitis in the UK. *Ann R Coll Surg Engl* 2003; **85:** 306–12.
18 Cameron IC, Chadwick C, Phillips J, Johnson AG. Management of acute cholecystitis in UK hospitals: time for a change. *Postgrad Med J* 2004; **80:** 292–94.
19 Greenwald JA, McMullen HF, Coppa GF, Newman RM. Standardization of surgeon-controlled variables: impact on outcome in patients with acute cholecystitis. *Ann Surg* 2000; **231:** 339–44.
20 HESonline. Primary diagnosis and main operations 4 character tables 2004–5. http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=192 (accessed Nov 30, 2006).