Patient recovery following cholecystectomy through a 6 cm or 15 cm transverse subcostal incision: a prospective randomized clinical trial

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Summary: The effect of incision length on patient recovery following cholecystectomy has not been investigated previously. In this study, 30 patients with symptomatic gallstones were randomized to cholecystectomy through a 6 cm or 15 cm transverse subcostal incision. Postoperative hospital stay was significantly shorter in the 6 cm incision group (median 3 days vs 5 days; $P = 0.0069$ Mann–Whitney U -test). In the 6 cm group analgesic requirements were reduced (median 2.5 vs 4.5 intramuscular opiate injections per patient) and recovery of depressed postoperative pulmonary function (FVC and FEV1) was faster (3% difference between groups on day 1 and 7% on day 3), although these differences did not achieve statistical significance. These results suggest that the length of incision may influence patient recovery following elective cholecystectomy. This has important implications as surgery carried out through shorter and less traumatic incisions may offer a cost-effective alternative to laparoscopic cholecystectomy. Moreover, some surgeons may find mini-laparotomy cholecystectomy easier to adopt than laparoscopic techniques.

Introduction

We have previously shown that cholecystectomy can be performed safely through a 5 cm transverse subcostal incision.¹ Although the type of incision for cholecystectomy has been shown to influence patient recovery and hospital stay,² incision length has never been investigated in this context. The aim of this study was to compare patient recovery following cholecystectomy carried out through either a 6 cm or 15 cm transverse subcostal incision in a prospective randomized clinical trial.

Patients and methods

Ethical Committee approval was granted from the respective hospitals to undertake this study. Informed consent was obtained from 30 consecutive patients with symptomatic gallstones to randomize them to cholecystectomy through either a 6 cm or 15 cm transverse subcostal incision. Randomization took place on the morning of operation by opening a previously sealed envelope containing a

card with a clearly typed allocation. Patients with pre-operative evidence of common bile duct stones were excluded from the study. No other exclusion criteria were used.

The length of the intended wound was accurately measured with a sterile ruler and the skin marked prior to incision. Cholecystectomy through a 6 cm transverse subcostal incision was performed as previously described.¹ The rectus muscle was divided along a length corresponding to the skin incision. All patients in both groups had operative cholangiography and all operations were performed by an experienced registrar assisted by a consultant. Operative time was defined as the period from skin incision until the completion of skin suturing and therefore excluded anaesthetic time.

Pulmonary function data (forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1)) was collected pre-operatively, on the morning following operation, and on the third postoperative day (or at discharge if earlier). All pulmonary function tests were performed by an independent observer who was blind as to the operative procedure performed. Other recovery parameters assessed comprised analgesia requirements and hospital stay. Analgesia was delivered intramuscularly as required (morphine tartrate

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Accepted: 30 March 1992

10 mg, cyclizine tartrate 50 mg/ml) to all patients and was supervised by the nursing and resident junior medical staff. Patients were discharged from hospital when they satisfied all of the following criteria: (a) independently mobile around the ward; (b) able to tolerate full diet; (c) required oral analgesia for pain; and (d) free from any complications. The decision to discharge the patient was made consistently by one of two registrars (J.R.McG. in Glasgow and E.W.M.McD. in Dublin).

Results

Patient characteristics were similar in the two groups (Table I). The 6 cm transverse subcostal incision required extension for proper identification of anatomical landmarks in three patients, two of whom had acute cholecystitis and one abnormal anatomy. One patient in the 15 cm subcostal group required choledochotomy for removal of common bile duct stones.

Median postoperative hospital stay was significantly shorter for the 6 cm group at 3 days (range 1–10 days) compared with 5 days (range 3–8 days) for the 15 cm group. The observed difference between the groups was therefore 2 days with a 95% confidence interval of 1–3 days ($P = 0.0069$; Mann–Whitney U -test). Hospital stay averaged 2.5 days for the 6 cm group when those in whom the incision was extended were excluded. Postoperative pulmonary function was slower to recover in the 15 cm group with a 3% difference between groups on postoperative day 1 and 7% difference on postoperative day 3 (Figure 1) but these differences did not achieve statistical significance. Similarly, although analgesic requirements were less in the 6 cm group with a median of 2.5 intramuscular injections per patient compared with 4.5 in the 15 cm group the difference was not significant (NS). Operation time (mean $\pm$ S.D.) was shorter in the 6 cm group at 62 ± 22 minutes vs 69 ± 17 minutes for the 15 cm group (NS). Complications in both groups were minimal. In the 6 cm

Figure 1 Vital capacity (top) and forced expiratory volume in 1 second (bottom) in patients undergoing cholecystectomy through a 6 cm and 15 cm transverse subcostal incision. (Data are expressed as a percentage of pre-operative levels.)

group, one patient developed urinary retention postoperatively and a further patient had atelectasis with a basal effusion which responded to physiotherapy. One patient in the 15 cm group developed a postoperative pneumonia requiring systemic antibiotics. No other complications were noted.

Discussion

Patients randomized to cholecystectomy through a 6 cm transverse subcostal incision had a

Table I Patient characteristics

Group	6 cm (n = 16)	15 cm (n = 14)
Age	46 (27–74)	51 (38–73)
M/F ratio	1:4.33	1:2.5
Respiratory disease	2 (12%)	—
Cardiovascular disease	1 (6%)	—
Pancreatitis	—	1 (7%)
Obese*	5 (31%)	4 (28%)
Acute cholecystitis	5 (31%)	3 (21%)

*As defined in a Royal College of Physicians report.¹¹

significantly shorter postoperative hospital stay and reduced analgesia requirements when compared with a similar group of patients undergoing operation through a 15 cm transverse subcostal incision. Postoperative recovery of pulmonary function and operating times was also faster in the 6 cm group. A postoperative hospital stay of 5 days for the 15 cm group is shorter than one might expect for conventional cholecystectomy and may reflect an advantage of using a transverse subcostal incision. Garcia-Valdecasas and his colleagues demonstrated in a prospective randomized trial that patients undergoing cholecystectomy through a subcostal incision had a significantly shorter hospital stay and more rapid recovery than those operated on through a midline incision.²

Several studies confirm that safety of the mini-laparotomy approach for cholecystectomy. In six recently published series involving almost 1,900 patients, no major complication such as bile duct injury has been reported.^{1,3-7} Moreover, minor complications such as wound or chest infections have been low in these studies.

Laparoscopic cholecystectomy is replacing open cholecystectomy as the procedure of choice for patients with symptomatic gallstones in many centres. There have, however, been no prospective randomized trials comparing it with conventional or mini-laparotomy cholecystectomy. Reddick and Olsen compared mini-laparotomy cholecystectomy with laparoscopic cholecystectomy in a prospective non-randomized trial.⁷ Patients chosen for laparoscopic cholecystectomy were based on their desire to have the procedure, making the results difficult to interpret. Two further studies report a similar complication rate and hospital stay for the two procedures.^{8,9} Return to normal activity was

not assessed in either study and, while return to work is just one aspect of normal activity, a period of between 1–4 weeks out of work for French and American patients following laparoscopic cholecystectomy¹⁰ is similar to that reported in a prospective series of ambulatory mini-laparotomy cholecystectomy, where patients with sedentary jobs were out of work for 4–5 days while those with heavy or manual jobs required 21 days.⁵

The findings of this small study may have important implications for elective gallbladder surgery. We suggest that cholecystectomy through smaller and less traumatic incisions may provide an alternative to laparoscopic cholecystectomy with the added benefits of reduced instrumentation and operating costs. In addition, surgeons familiar with conventional cholecystectomy may find it easier to adapt to a mini-laparotomy approach.

In view of the rapid expansion of laparoscopic surgery we believe that there is an urgent need to scientifically evaluate minimally interventional gallbladder surgery. For this reason, having demonstrated the potential benefits of a mini-laparotomy approach, we have prematurely abandoned this study and embarked on a prospective randomized controlled comparison of mini-laparotomy and laparoscopic cholecystectomy.

Acknowledgements

The authors would like to thank Dr Gordon Murray, Reader in Medical Statistics, University of Glasgow, for his advice on statistical analysis, the Departments of Respiratory Medicine in the Western Infirmary, Glasgow, and St Vincent's Hospital, Dublin, for collecting the pulmonary function data, and Mrs Isobel Fergusson for typing the manuscript.

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