A PROSPECTIVE COMPARATIVE STUDY BETWEEN CONVENTIONAL AND LAPAROSCOPIC CHOLECYSTECTOMY

H S Chan, X F Ha, P J L L Ooi, P Mack

ABSTRACT

A prospective, comparative study was made between 371 patients undergoing laparoscopic cholecystectomy and 100 patients undergoing conventional cholecystectomy. Post-operative pain was assessed subjectively by a single observer using a visual analog score and objectively by assessment of parenteral analgesic used. Patients who underwent laparoscopic cholecystectomy required significantly less analgesia (46.7mg vs 223.9mg mean pethidine dose, $p < 0.01$) and were observed to have mobilised earlier and had a shorter mean post-operative stay (3.5 days vs 5.9 days, $p < 0.01$). Laparoscopic cholecystectomy objectively reduces post-operative pain significantly and should be the new standard for treatment of gallstones.

Keywords: *early mobilisation, postoperative pain, minimal access surgery.*

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INTRODUCTION

Since Langenbuch performed the first cholecystectomy in 1882[1], the operation has remained the standard method of surgical treatment of gallstone disease. A century later, Phillipe Mouret of France, in 1987, revolutionised the treatment by introducing the technique of laparoscopic removal of the gallbladder[2]. This new operation has rapidly gained worldwide popularity mainly because of its reduced pain, earlier mobilisation and shorter hospital stay[3-5].

The basis of these claims were made when laparoscopic cholecystectomy was compared to open conventional cholecystectomies, using historical controls[3,6]. The use of historical controls is unsatisfactory as these do not take into consideration the benefits of advances made in the intraoperative and perioperative care for patients. There are few reports that compared open cholecystectomy and laparoscopic cholecystectomy that were performed on during the same period[7,8]. To date there has been only two reports of a prospective randomised trial of open and conventional cholecystectomies[9,10]. In the first published randomised trial by Barkun et al, they compared laparoscopic cholecystectomies with mini-cholecystectomy. They showed that patients who underwent laparoscopic cholecystectomy had a significantly shorter hospital stay and period of convalescence. They also showed that this group of patients also had a faster rate of return to normal activities. In the second prospective study[10], McMahon compared the two forms of cholecystectomy and found that laparoscopic cholecystectomy resulted in a shorter hospital stay, less postoperative dysfunction, and quicker return to normal activities. However, it was found also to be more costly.

We performed a prospective comparison between conventional open cholecystectomy and laparoscopic cholecystectomy over the same period to objectively document the observed subjective benefits of laparoscopic cholecystectomy that have been claimed.

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METHODS

Over a 16-month period between January 1992 and April 1993, 371 patients underwent laparoscopic cholecystectomy in the Department of Surgery, Singapore General Hospital. These cases were entered into a predesigned protocol and compared with 100 cases of conventional open cholecystectomies performed during the same period. These 100 cases of open cholecystectomies included those done by surgeons who had no experience with laparoscopic cholecystectomy plus those that were converted from laparoscopic to open cholecystectomy because of technical difficulties, eg adhesions, abnormal or unclear anatomy.

The indications for cholecystectomy in all the cases were symptomatic gallstones. Almost all the patients had gallstones confirmed by ultrasound (95%), and the rest were diagnosed by a plain abdominal X-ray or oral cholecystogram. All patients had serum liver enzymes (bilirubin, serum transaminases and alkaline phosphatase) measured. Preoperative endoscopic retrograde cholangiopancreatogram was performed in patients who were likely to have concomitant choledocholithiasis, and these included patients with elevated serum bilirubin and alkaline phosphatase levels, a dilated common bile duct seen on ultrasonography or patients with sonographic evidence of stones in the biliary tree. Patients with acute inflammation of the gallbladder were excluded.

After cholecystectomy, the patients were interviewed in the ward by a single observer on the first and second day. Patients were asked to quantify the pain they observed using a visual analog scale ("1" being no pain, "5" being bearable pain and "10" being the most painful experience that they have encountered.) We attempted to decrease the observer error by getting the patients to be interviewed by a single observer, as pain is very subjective sensation. We also looked at the amount of intramuscular pethidine injections required by the patients in the first two days. (The patients were given either 50 mg or 75 mg of intramuscular pethidine depending on their bodyweight

and age) The amount of postoperative analgesia in the form of intramuscular pethidine was noted in an attempt to give an objective assessment of the amount of pain experienced by the patients. The time taken for the patient to be mobilised, take diet and be discharged from the hospital were recorded.

Operative technique

All patients were admitted one day prior to surgery and all patients received preoperative single dose prophylactic broad spectrum antibiotics.

A four puncture method of laparoscopic cholecystectomy, similar to that described by Drs Reddick and Olsen of Nashville, Tennessee was used[11]. The patients were under general anaesthesia in the supine position. Pneumoperitoneum is achieved either by the "open" technique under direct vision or using a Veress needle. Three additional ports are inserted (10mm port at the subxiphoid region for dissection and two accessory 5 mm ports placed at the subcostal region along the mid-clavicular and anterior axillary line to aid in the dissection). Monopolar electrocautery is used for dissection and haemostasis in all cases. The gallbladder is extracted from the subxiphoid port. Subhepatic drains are used only occasionally.

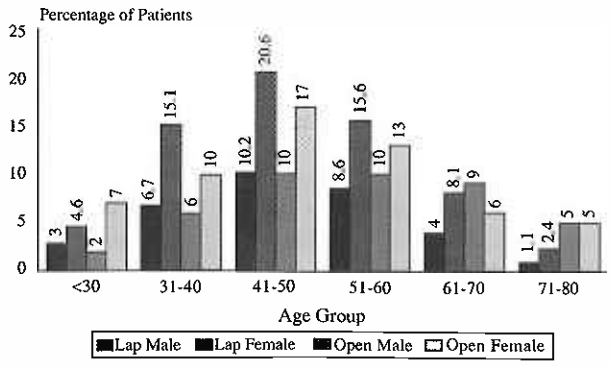
Patients undergoing the conventional cholecystectomies either had a right subcostal (Kocker's) or a transverse incision (mini-cholecystectomy). These were performed by surgeons of a grade similar to those performing laparoscopic cholecystectomies.

RESULTS

The age range for patients undergoing laparoscopic cholecystectomies was 28 to 79 years with a mean age of 47.7 years. There were a total of 246 (66.3%) females compared to 125 (33.7%) males, giving a male to female ratio of 1:1.96. In the conventional cholecystectomy group, there was 42% males, and 58% females with a male to female ratio of 1:1.39 and a mean age of 49.9 years (Fig. 1)

The racial distribution and mode of presentation were similar in both groups. (Table I)

Fig 1 – Age and sex distribution of the patients in the study group



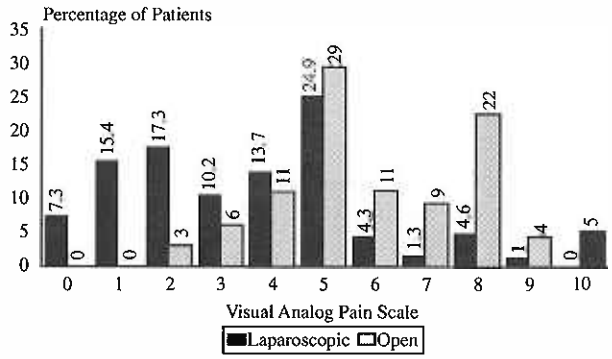
Postoperative pain

Two hundred and thirty-seven patients (63.9%) undergoing laparoscopic cholecystectomy had a visual analog score of 4 or less in the immediate postoperative period, whereas only 20 patients (20%) had a score of 4 or less in the conventional cholecystectomy group. (Fig 2) The mean pain score for laparoscopic cholecystectomy was 3.41 compared to 6.04 in the conventional cholecystectomy group, this difference was significant. ($p < 0.01$) One hundred and ninety-six patients (52.8%) who underwent laparoscopic surgery did not require any injections whereas 85 patients (85%) in the open group required 2 or more injections. (Fig 3) The mean number of injections per patient were 0.75 and 3.36 injections for the laparoscopic and open groups respectively. The mean dose of pethidine was 46.7mg for the laparoscopic group and 223.9mg for the open group ($p < 0.01$).

Table I - Patient characteristics and mode of presentation

	Laparoscopic cholecystectomy (n = 371)	Conventional cholecystectomy (n = 100)
Race		
Chinese	83.4%	85%
Malay	6.7%	11%
Indian	7.5%	4%
Others	2.4%	0%
Mode of presentation		
Right hypochondral pain	94%	88%
Dyspepsia	56%	34%
Jaundice	5%	10%
Acute cholecystitis	6%	15%
Asymptomatic	6%	6%

Fig 2 – Comparison of pain in the 2 groups using the Visual Analog Scale



Mobilisation

Two hundred and eighty-four (76.6%) of the patients who underwent laparoscopic cholecystectomy were up and about on the first postoperative day. This compared favourably with the patients who underwent open cholecystectomies where only 12 (12%) were able to sit up in the chair or walk around in the ward. (Fig 4) The mean duration till mobilisation postoperatively

Fig 3 – Amount of pethidine injections required postoperatively in the the 2 groups

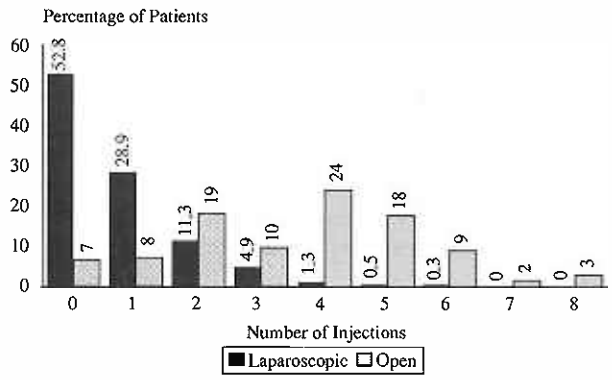
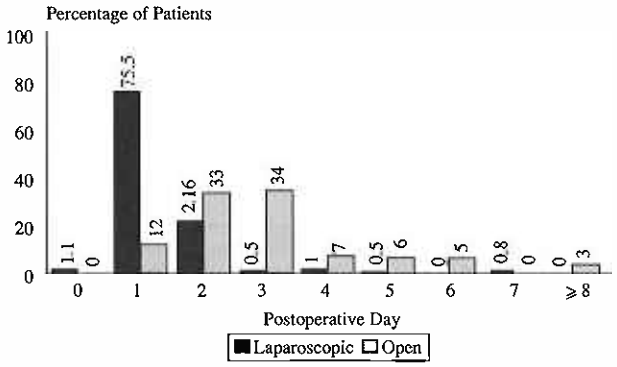


Fig 4 – Postoperative day till mobilisation in the 2 groups

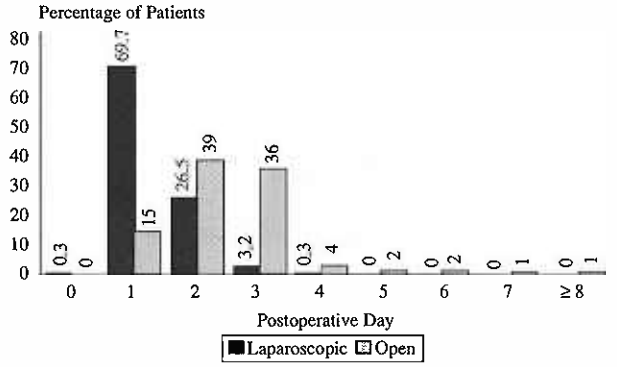


in the laparoscopic group was 1.27 days and in the open group, it was 2.78 days. ($p < 0.01$)

Diet

Two hundred and sixty (70%) patients who underwent laparoscopic cholecystectomy were able to take diet on the first postoperative day compared to 15% in the open cholecystectomy group. (Fig 5) Patients started diet 1.33 ± 0.54 days postoperatively for the laparoscopic group and 2.54 ± 1.2 days postoperatively for the open group. This difference is statistically significant ($p < 0.01$).

Fig 5 - Postoperative day till patients were able to take diet



Discharge

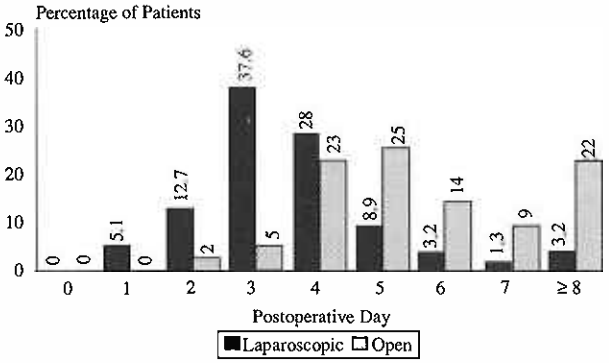
Two hundred and five (55%) patients in the laparoscopic group were discharged by the 3rd postoperative day. However, only 7 (7%) patients in the open group were discharged by the 5th postoperative day. (Fig 6) The mean discharge time was 3.54 days postoperatively in the laparoscopic group and 5.59 days in the open group. This difference is statistically significant ($p < 0.01$).

DISCUSSION

Symptomatic gallstones disease is one of the most common surgical problems. Conventional cholecystectomy has been the standard mode of treatment until recently. A significant drawback to the conventional cholecystectomy is that it is followed by at least a few days of hospitalisation, need for potent analgesia and a prolonged period of up to several weeks away from work to recover from surgery. Fortunately, with the introduction of laparoscopic cholecystectomy, these problems may be a thing of the past.

Laparoscopic cholecystectomy has replaced conventional cholecystectomy as the procedure of choice in the treatment of symptomatic gallstones. However the promotion of this technique

Fig 6 – Day of discharge of the 2 groups



was driven more by consumer demand and the manufacturers of laparoscopic equipment rather than by the good results demonstrated in early clinical trials.

A randomised controlled trial is the best method for evaluating new treatments including surgical operations. However, some may contend that it is no longer possible to carry out a randomised controlled trial comparing laparoscopic and conventional cholecystectomies [12,13]. This is because of the difficulty in accruing patients to enroll in the open cholecystectomy arm of the trial when the benefits of laparoscopic cholecystectomy have been so well publicised. Furthermore, most surgeons now already have a preference for the laparoscopic method of removing gallstones in uncomplicated cases. Hence there will be a certain amount of bias involved in the selection of patients on the part of the surgeons. Because of these limitations, we performed a prospective trial using concurrent cases of laparoscopic and open cholecystectomies, where the choice of surgery was dictated by the surgeon based on his ability to perform and his preference for the procedure.

We performed this study to try and analyse the potential benefits of laparoscopic cholecystectomy compared to open cholecystectomies, specifically looking into the amount of pain experienced, and time to mobilisation in the two groups. A decrease in the pain and discomfort after laparoscopic cholecystectomy was seen clearly in the comparative pain scores using the visual analog scale. Postoperative pain as quantified by the requirement for intramuscular pethidine injections, was also significantly less after laparoscopic cholecystectomy when compared with the open group. Furthermore, the observation that 52.8% did not require any injections after laparoscopic cholecystectomy, bears testament to the minimal discomfort that they experience.

The decrease in pain experienced by the patient undergoing laparoscopic cholecystectomy is most likely due to the absence of the muscle cutting incision that is used in the open conventional cholecystectomy.

With the reduced pain, almost 70% of the patients after laparoscopic cholecystectomy can be mobilised and can take diet on the first postoperative day. This earlier return to normality would perhaps herald a trend to performing laparoscopic cholecystectomy as a minimal stay procedure and in today's atmosphere of cost containment in health care, the freeing of hospital beds is an important advantage of laparoscopic cholecystectomies.

Although we did not look into return to work, we can assume that with earlier discharge and less pain experienced by the laparoscopic group, the patients were also more likely to return to useful economic activity earlier.

With this prospective comparative trial, we have shown that laparoscopic cholecystectomy significantly reduces post-

operative pain and hospital stay and allows for earlier mobilisation and feeding of patients, and should be the new standard of treatment for gallstone disease.

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