

Prospective comparison of ambulatory with inpatient laparoscopic cholecystectomy: outcome, patient preference and satisfaction

A. Sharma^a, J.D. Hayden^a, R.A. Reese^b, P.C. Sedman^a,
C.M.S. Royston^a, C.J. O'Boyle^{a,*}

^a Division of Upper Gastrointestinal and Minimally Invasive Surgery, Hull Royal Infirmary, Anlaby Road, Kingston upon Hull HU3 2JZ, UK

^b Graduate Research School, University of Hull, Kingston upon Hull HU3 2JZ, UK

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Abstract

This prospective study compares inpatient with ambulatory laparoscopic cholecystectomy with respect to outcome, patient preference and satisfaction. In total, 51 inpatients and 42 ambulatory cases were included. Mean operating and total anaesthesia times were significantly shorter for ambulatory patients ($P = 0.010$ and <0.001 , respectively). Post-operative pain scores at 24 h were significantly lower for ambulatory patients ($P = 0.005$) but there was no difference after 48 h. Morbidity included three conversions (one ambulatory and two inpatients), one laparotomy for post-operative bleeding and one percutaneous drainage of a haematoma. There was no significant difference in return to home or work activity between the two groups. Measures of patient satisfaction relating to the admission procedure, amount of information received and hospital environment were significantly higher for ambulatory patients ($P < 0.001$, <0.001 and <0.001 , respectively). The majority of patients (66%) expressed a preference for an ambulatory procedure. In addition to the demonstrated clinical benefits, ambulatory laparoscopic cholecystectomy is preferred by the majority of patients and is associated with significantly higher levels of overall satisfaction.

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1. Introduction

Laparoscopic cholecystectomy (LC) has become the treatment of choice for patients with symptomatic cholelithiasis [1]. The advantages of the approach include reduced post-operative pain, more rapid recovery time, shorter duration of hospital stay, more rapid return to 'normal' activities including work and improved cosmesis when compared with the open operation [2,3]. During the early phase of its introduction, LC was associated with specific complications such as common bile duct injury and bile leakage [4,5]. As LC has become more widely established the incidence of serious complications has reduced and the operation has become sufficiently safe to be performed as an ambulatory procedure [6–18].

We have performed ambulatory LC (ALC) in our dedicated day surgery unit since 1997 and currently over 50% of elective cholecystectomies are performed as day cases. This approach is associated with high levels of overall patient satisfaction [9,12,13,17]. Since patient preferences are becoming an increasingly important factor in planning elective surgery, we performed a 6 month prospective study to determine whether there was a difference in outcome and patient satisfaction following ALC compared with inpatient LC (ILC) performed in the same institution.

2. Methods

All patients undergoing elective LC over a 6 month period who gave written informed consent to take part in the study were included. Patients with a history of cholecystitis, cholangitis, pancreatitis or a common bile duct calculus were not excluded provided appropriate investigations and intervention had been performed preoperatively. Patients

* Corresponding author. Tel.: +44 1482 674289;
fax: +44 1482 586560.

E-mail address: coboy@globalnet.co.uk (C.J. O'Boyle).

who met with established criteria were offered day surgery: American Society of Anaesthesiology (ASA) class I–II, body mass index $<32 \text{ kg/m}^2$, having a responsible adult accompany them home afterwards and living within 50 miles of the hospital. Those who did not meet these criteria or who refused day surgery underwent a routine ILC. The operation was performed either in our dedicated day surgery unit or in the Hull Royal Infirmary main theatre complex under the care of one of three consultant surgeons with a subspecialist interest in minimal access surgery. A standard four port approach (incorporating two 10 mm and two 5 mm incisions) with local anaesthetic infiltration of subcutaneous tissues (with 0.5% bupivacaine) was used. Both intra- and post-operative analgesia and antiemetic medication were administered as necessary to facilitate recovery [19,20].

Data was collected prospectively using a proforma filled in by the operating surgeon and analysed on an intention to treat basis using SPSS for Windows release version 11.5.0 (Chicago, IL). Post-operative pain and nausea scores were recorded by the recovery room staff. Criteria for admission for day surgery patients included: conversion to open cholecystectomy, post-operative bleeding, excessive pain, nausea or vomiting, failure to void urine or be fully ambulatory after the operation. All patients underwent a telephone interview at 24 and 48 h, and at 6 weeks postoperatively. Inpatients were similarly interviewed on the ward or by telephone to obtain this data. During the 6 week interview, information regarding readmission to hospital, attendance at the general practitioner or accident and emergency department and return to normal activities was obtained. Patients completed a questionnaire detailing satisfaction with the hospital atmosphere, admission procedure, the quality of pre- and post-operative information received and whether they would have preferred a day case or inpatient operation.

3. Results

Of the 93 patients studied, 51 had conventional ILC and 42 underwent ALC. The median age (range) of the ALC group was significantly lower than for ILC (44 (27–69) year versus 61 (20–86) year, $P < 0.001$). The mean (S.D.) body mass index was also significantly lower for ALC compared with ILC patients (25 (3) kg/m^2 versus 28 (6) kg/m^2 , $P = 0.008$). The male:female ratio was 10:32 for ALC versus 16:35 for ILC ($P = 0.419$). There were similar numbers of ASA II patients in both groups (12 ALC versus 16 for ILC, $P = 0.310$).

Outcome measures between the two groups were compared and are shown in Table 1. Mean (S.D.) operation time and mean (S.D.) total anaesthesia time were significantly lower among day cases (35 (12) and 48 (15) min) compared with inpatients ((42 (15) and 68 (18) min), $P = 0.010$ and <0.001 , respectively). Conversion to open cholecystectomy was necessary in one ALC patient (2%) and two inpatients (4%, $P = 0.573$). The median (range) duration of hospital stay for the ALC group was 8.5 (6–504) h versus 26

Table 1
Clinical outcomes of inpatient versus ambulatory laparoscopic cholecystectomy

	ILC (n = 51)	ALC (n = 42)	P-value
Operation time (min)	42 (15)*	35 (12)*	0.010 [‡]
Anaesthesia time (min)	68 (18)*	48 (15)*	<0.001 [‡]
Conversion to open operation	2 (4)	1 (2)	0.573 [†]
Pain score after 24 h	5 (0–9)**	3 (0–10)**	0.005 [§]
Pain score after 48 h	2 (0–7)**	2 (0–9)**	0.117 [§]
Nausea & vomiting score	0 (0–2)**	0 (0–5)**	0.920 [§]
Duration in hospital (h)	26 (16–504)**	8.5 (6–504)**	<0.001 [§]
Attendance to general practitioner or casualty during recovery	9 (18)	8 (19)	0.862 [†]
Return to home activities days	18 (2–52)**	14 (2–35)**	0.497 [§]
Return to work days	25 (7–52)**	25 (10–70)**	0.823 [§]

Values are expressed as absolute numbers (%), mean (S.D.)* or median (range). (**) Statistical analysis was performed using Mann–Whitney *U*-test, (§) Chi-square or (†) Fisher's Exact test or (‡) independent samples *t*-test where appropriate.

(16–504) h for inpatients ($P < 0.001$). One patient in each group had a prolonged length of stay of 21 days (504 h). A 75-year-old male inpatient underwent an exploratory laparotomy for post-operative bleeding and eventually made an uneventful recovery. A 64-year-old female ALC patient underwent percutaneous drainage of a haematoma and had a similar outcome.

Median pain scores after 24 h were found to be significantly lower in patients who had undergone ALC compared with ILC (3 (0–10) versus 5 (0–9), $P = 0.005$). However, there was no statistically significant difference after 48 h (2(0–9) for ALC versus 2(0–7) for ILC, $P = 0.117$). There were no significant differences in median post-operative nausea or vomiting scores between the two groups (0 (0–5) versus 0 (0–2), $P = 0.920$). Eight patients (19%) who underwent ALC required overnight admission. Of these, one patient had required conversion to open cholecystectomy to control bleeding. A further five patients had required insertion of an intraperitoneal drain during surgery due to generalised oozing of blood and were admitted as a precaution. Two other patients required admission for nausea control and cardiac monitoring of new onset ectopic beats, respectively. Eighteen patients (seven ALC and 11 from the ILC group) had intra-abdominal drains inserted during LC due to oozing of blood. Drains from two of the ALC cases were removed after 4 h and the patients were discharged. The remaining five patients were admitted for observation and discharged the following day after removal of the drain and a satisfactory haemoglobin result.

Seventeen patients (18%) attended their general practitioner or the casualty department during the recovery period complaining of pain, 'trapped wind' or nausea. They com-

Table 2
Patient preference and satisfaction following inpatient compared with ambulatory laparoscopic cholecystectomy

	ILC (n = 51)	ALC (n = 42)	P-value
Prefer day surgery	24 (47)	37 (88)	<0.001 [†]
Prefer inpatient admission	27 (53)	5 (12)	<0.001 [†]
Reason given for preference			
Safety	22	2	
Pain control	2	1	
Better sleep	1	0	
Away from children	2	0	
No reason expressed	0	2	
Admission procedure score	7 (5–9)*	9 (6–10)*	<0.001 [§]
Environment score	7 (4–9)*	9 (5–10)*	<0.001 [§]
Information given score	8 (6–9)*	9 (4–10)*	<0.001 [§]

Values are expressed as absolute numbers (%) or median (range). (*) Statistical analysis was performed using ([†]) Chi-square or ([§]) Mann–Whitney *U*-test where appropriate.

prised eight ALC cases and nine from the ILC group ($P = 0.862$). Two ALC patients and one ILC case were readmitted for overnight hospital stay on the 4th post-operative day with severe pain, which settled with conservative management. There was no significant difference in return to home activities or work between the two groups (Table 1).

Overall, 61 (66%) patients expressed a preference for a day surgery approach. Among the 42 ALC patients, 37 (88%) claimed to prefer a day case procedure versus 24 from 51 (47%) inpatients ($P < 0.001$). Of the 27 (53%) inpatients who preferred an overnight stay, 22 gave safety as their main reason. Other reasons included better pain control, better sleep quality and being able to recover free from the responsibilities of children at home (Table 2). Of the five (12%) ALC patients who expressed a preference for an overnight stay, two volunteered safety and one gave pain control as reasons for their preference. Questionnaire scores related to satisfaction with treatment, i.e. the quality of the admission procedure, hospital environment and information supplied were significantly higher for the ALC group compared with the inpatients (Table 2).

4. Discussion

There is increasing evidence supporting the role of LC in the ambulatory setting [6–18]. In addition to the confirming the benefits of LC over open surgery, we have provided further support for the procedure in terms of patient preference and satisfaction. In this study, we have demonstrated the anticipated outcomes after ambulatory LC observed elsewhere. These include a low conversion rate of 5% or less, a same-day discharge rate of over 80% and low readmission rates following discharge [8–16]. There were no deaths, bile duct injuries, bile leaks or retained ductal calculi observed during this investigation. Our operating times are lower than many other reports [12,15,16] even though over a half of our

ALC were performed by supervised higher surgical trainees [21]. The reduced operating time compared with other studies may reflect our practice of performing selective cholangiography and endoscopic intervention prior to attendance for elective LC. Keeping the operating time as low as possible is associated with a lower incidence of admission following ALC [15].

Following surgery, pain scores were significantly lower with ambulatory LC after 24 h but the difference was not sustained after 48 h. This may reflect the larger body habitus and differences in analgesia requirements of the inpatients or could be related to the multimodal approach to analgesia and antiemesis adopted by the day surgery unit that has previously been shown to be of benefit [19,20]. Others have reported similar outcomes without adherence to a strict anaesthetic protocol [18]. It is more likely that the higher nurse to patient ratio adopted by the day surgery unit provides more effective support for pain and emesis control.

Interestingly, none of the patients who were admitted directly from the day surgery unit required pain control. However, three patients were readmitted with pain on the 4th post-operative day. This pain settled with an appropriate adjustment in analgesia. The duration of hospital stay among ambulatory patients was similar to other studies [8–10]. Even among the inpatients, who were significantly older and with a higher body mass index, the median duration of stay was only 26 h. The relatively short and uncomplicated stay for this group suggests that many of them might have been candidates for ambulatory surgery. In the future, we could consider broadening our selection criteria for consideration of ALC.

We had several admissions from the day surgery unit following insertion of a drain during the operation. Although this is not our routine practice, similar numbers of drains were used in both groups. They are usually removed after 4 h if the condition of the patient and drainage was satisfactory or withdrawn the following morning in those staying overnight. The day surgery patients with drains were admitted mainly as a precaution but none of them suffered serious sequelae. With hindsight, these patients may have been suitable for discharge directly from the day surgery unit, albeit with a longer duration of stay. Our admission rates following ambulatory LC were in the region of 20% which is in concordance with other series [13–15], however, they could probably have been lower if some of the drains had been removed earlier.

Ambulatory patients scored significantly higher than inpatients for satisfaction in all three components of the questionnaire. They preferred the admission procedure, day surgery unit environment and the amount of information received prior to surgery. In the study by Lillemoe et al. [12], over 75% of patients reported their day surgery operation as ‘good’ and Mjaland found 95% of patients described their experience as ‘excellent’ [9]. Others have found that although 84.5% of patients were ‘satisfied’ with the procedure, there were concerns expressed about the quality of informa-

tion received [13]. Our dedicated day case unit is separate from the main hospital and is run by skilled and well motivated staff with established protocols for patient admission, information, discharge and follow up [21]. All of the patients are provided with written and verbal instructions about the procedure beforehand. It has been demonstrated that such material decreases patient anxiety and contributes to a feeling of well being [22]. We believe that when performed in a suitable environment, ambulatory LC can be done safely and will be acceptable to patients. On the other hand, the lack of a dedicated unit has been shown to deter patient acceptance of day case operations [18].

A significantly higher proportion of inpatients said they would prefer an inpatient operation. The majority of patients who expressed a preference for an inpatient procedure cited safety as their reason. Although there is likely to be a substantial selection bias in these questionnaire responses, those patients who express a preference for in hospital care on the basis of safety could represent a group in whom pre-operative education may help to modify their preference towards day case surgery.

We found no significant difference between the two groups with regard to motivation to return to 'normal' activities. Patients in either group resumed home activities weeks and work within 3 or 4 weeks. This is similar to the outcome reported by McLaughlan and Macintyre for all LC patients [23] but not as good as is reported in other series [17].

This study has demonstrated that when a dedicated day surgery unit is utilised, there are significant benefits to be gained in terms of outcome and patient satisfaction when performing LC in the ambulatory setting. We recommend that where appropriate expertise and resources exist, this approach should be adopted routinely since the majority of patients prefer it.

References

- [1] Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy: the new "gold standard"? *Arch Surg* 1996;127:917–21.
- [2] Reddick EJ, Olsen DO. Laparoscopic cholecystectomy. A comparison with mini lap cholecystectomy. *Surg Endosc* 1989;3:131–3.
- [3] McMahon AJ, Russell IT, Ramsay G. Laparoscopic and mini laparotomy cholecystectomy: a randomized trial comparing post-operative pain and pulmonary function. *Surgery* 1994;115:533–9.
- [4] McMahon AJ, Fullarton G, Baxter JN, O'Dwyer PJ. Bile duct injury and bile leakage in laparoscopic cholecystectomy. *Br J Surg* 1995;82:307–13.
- [5] Bauer TW. The consequences of a major bile duct injury during laparoscopic cholecystectomy. *J Gastrointest Surg* 1998;2:61–6.
- [6] Saunders CJ, Leary BF, Wolfe BM. Is outpatient laparoscopic cholecystectomy wise? *Surg Endosc* 1995;9:1263–8.
- [7] Voitk A. Establishing outpatient cholecystectomy as a routine. *Can J Surg* 1997;40:284–8.
- [8] Lam D, Miranda R, Hom SI. Laparoscopic cholecystectomy as an outpatient procedure. *J Am Coll Surg* 1997;185(2):152–5.
- [9] Mjaland O, Raeder J, Aasboe V, Trondsen E, Buanes T. Outpatient laparoscopic cholecystectomy. *Br J Surg* 1997;84:958–61.
- [10] Narain PK, DeMaria EJ. Initial results of a prospective trial of outpatient laparoscopic cholecystectomy. *Surg Endosc* 1997;11:1091–4.
- [11] Zegarra RF, Saba AK, Peschiera JL. Outpatient laparoscopic cholecystectomy: safe and cost effective? *Surg Lap Endosc* 1997;7(6):487–90.
- [12] Lillemoie KD, Lin JW, Eng M, Talamini M, Yeo C, Sbyder D, et al. Laparoscopic cholecystectomy as a "true" outpatient procedure: initial experience in 130 consecutive patients. *J Gastrointest Surg* 1999;3:44–9.
- [13] Fleming WR, Michell I, Douglas M. Audit of outpatient laparoscopic cholecystectomy: Universities of Melbourne HPB Group. *Aust N Z J Surg* 2000;70:423–7.
- [14] Calland JF, Tanaka K, Foley E, Bovbjerg VE, Markey DW, Blome S, et al. Outpatient laparoscopic cholecystectomy: patient outcomes after implementation of a clinical pathway. *Ann Surg* 2001;233:704–15.
- [15] Lau H, Brooks DC. Predictive factors for unanticipated admissions after ambulatory laparoscopic cholecystectomy. *Arch Surg* 2001;136(10):1150–3.
- [16] Lichten JB, Reid JJ, Zahalsky MP, Friedman RL. Laparoscopic cholecystectomy in the new millennium. *Surg Endosc* 2001;15(8):867–72.
- [17] Siu WT, Leong HT, Law BK, Onsieng SM, Fung KH, Li AC, et al. Outpatient laparoscopic cholecystectomy in Hong Kong: patient acceptance. *Surg Lap Endosc Percut Technol* 2001;11(2):92–6.
- [18] Blatt A, Chen S. Day-only laparoscopic cholecystectomy in a regional teaching hospital. *Aust N Z J Surg* 2003;73:321–5.
- [19] Michaloliakou C, Chung F, Sharma S. Preoperative multimodal analgesia facilitates recovery after ambulatory laparoscopic cholecystectomy. *Anesth Analg* 1996;82:44–51.
- [20] Liberman MA, Howe S, Lane M. Ondansetron versus placebo for prophylaxis of nausea and vomiting in patients undergoing laparoscopic cholecystectomy. *Am J Surg* 2000;179:60–2.
- [21] Jain PK, Hayden JD, Sedman PC, Royston CMS, O'Boyle CJ. Extensive experience with ambulatory laparoscopic cholecystectomy: training, economic, and patient benefits, in press.
- [22] Caplan G, Board N, Paten A, Tazelaar-Molinia J, Crowe P, Yap SJ, et al. Decreasing lengths of stay: the cost to the community. *Aust N Z J Surg* 1999;69:433–7.
- [23] McLaughlan GJ, Macintyre IM. Return to work after laparoscopic cholecystectomy. *Br J Surg* 1995;82:239–41.