

Ambulatory Laparoscopic Cholecystectomy Outcomes

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ABSTRACT

Background: Outpatient laparoscopic cholecystectomy is an established practice in the United States, but it is not well established in the United Kingdom, and evidence of experience is scarce. The aim of this study was to evaluate the effect of ambulatory laparoscopic cholecystectomy on postoperative morbidity and possible cost savings. We tried to elucidate possible predictors of unplanned admission and readmission rates after discharge.

Methods: This study was conducted in 2 phases. The first phase involved 112 patients and was a retrospective analysis from January 2002 to July 2003 (19 months). The second was a prospective study involving 86 patients from August 2003 to April 2005 (21 months). Consultants, associate specialists, or higher surgical trainees performed the surgeries in a dedicated outpatient procedure unit. The study ended 6 weeks after the operation.

Results: Hospital mortality was zero. Overall, 29 (15%) patients required unplanned admissions. Three (1.5%) patients required conversion to open cholecystectomy. Other causes included simple observations (7), wound pain (6), nausea and vomiting (6), suction drain (2), urinary retention (2), operation in the afternoon (2), and shoulder pain (1). Of the patients discharged, 7 (3.5%) required readmission after the initial discharge. Five of the 7 readmissions were wound related and treated conservatively. Two patients underwent laparotomy.

Conclusion: Ambulatory laparoscopic cholecystectomy appears to be safe, feasible, and cost-effective with a low

conversion rate. The unplanned admission rate can be reduced by better training, criteria for discharge, and improvement in anesthesia. This will have implications for surgical training and healthcare resources.

Key Words: Ambulatory laparoscopic cholecystectomy, Training, Morbidity, Outcome.

INTRODUCTION

Ambulatory care settings worldwide have dramatically shifted the inpatient surgical services to outpatient settings. Laparoscopic cholecystectomy has been the procedure of choice for symptomatic cholelithiasis around the world. Postoperative recovery time and the length of hospitalization have decreased significantly since routine cholecystectomy changed from an open to a laparoscopic procedure.¹ Early positive results of ambulatory laparoscopic cholecystectomy, by Reddicke and Olsen in 1990,¹ fueled its further growth, and it is now well accepted as a safe, cost-effective procedure for symptomatic gallstone disease. Various studies have documented the safety, feasibility, cost-effectiveness, and patient acceptability of this operation as an out patient procedure.¹⁻⁹ Despite these results, it has only been practiced sporadically at centers in the UK and is not well established. Laparoscopic cholecystectomy has been routinely performed at this hospital, and patients have traditionally been admitted and discharged after an overnight stay. With the creation of a dedicated outpatient unit, ambulatory laparoscopic cholecystectomy (ALC) has been practiced since January 2002. The objective of this study was to evaluate postoperative morbidity and unplanned admissions, as well as readmissions following ambulatory laparoscopic cholecystectomy. We also tried to evaluate the cost savings of this procedure.

METHODS

From January 2002 to April 2005 (40 months), 253 patients underwent laparoscopic cholecystectomy in the Department of General Surgery. Fifty-five patients had their gallbladder removed as an inpatient, and 13 patients under-

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went bile duct exploration. ALC was offered to 198 of 253 well-motivated patients (79% day cases). The study was split into 2 phases (**Figure 1**). The first phase was a retrospective analysis of 112 patients from January 2002 to July 2003 (19 months). All medical records were reviewed to document patient characteristics, perioperative details, unplanned admissions, and readmission rates. The second phase was a prospective study involving 86 patients from August 2003 to April 2005 (21 months). Data were collected prospectively for these patients.

All patients with symptomatic gallstone disease, with no evidence of CBD calculi and who met the selection criteria were offered ALC. Patients who had a common bile duct stone were initially offered an endoscopic retrograde cholangiopancreatography and booked for ambulatory laparoscopic cholecystectomy if considered suitable. Systematic preoperative liver function tests and hepatic ultrasonography were performed. All patients were assessed at a preoperative assessment clinic before the operation. A fully trained surgeon was responsible for confirming the indications and eligibility for outpatient surgery after discussion with the patient. Only patients belonging to ASA grade 1 & 2 were included in the initial study, and a few dedicated patients with ASA grade 3 (12 in all) were considered at a later stage of the study. Another criterion for inclusion was that a responsible adult would be present with the patient for a 24-hour period postoperatively. Patients who presented as an emergency with acute cholecystitis and underwent cholecystectomy on their initial admission were excluded from the study. Patients at significant risk of requiring conversion to an open operation, such as those with previous upper abdominal surgery, were also excluded.

All patients were scheduled for outpatient laparoscopic cholecystectomy in this hospital's purpose-built outpatient unit. Patients were admitted to the hospital on the morning of the operation, and every effort was made to accommodate them that morning, with the intention of discharging them in the evening. Consultants, associate specialists, and specialist registrars under supervision performed all surgeries. Preoperative cholangiography was not required in any of the patients. Surgery was performed with the patient under general anaesthesia and intubated.

Standard 4-port video-laparoscopic cholecystectomy was performed. Hasson's method of access was used for CO₂ insufflation. All patients received preoperatively a single dose of broad-spectrum antibiotic and infiltration of local anesthetic to the wound. The anesthetic technique used for these procedures depended on the anesthetist responsible for each surgical session. Induction was with propofol, and intubation was facilitated with rocuronium. Maintenance included N₂O/O₂ and an inhalational agent. Opiate and anti-emetic usage varied. All patients received either 8mg of ondansetron or 1mg of granisetron. Cyclimorphine was the most common opiate used, although pethidine was utilized in a significant number of cases. All patients received either diclofenac or parecoxib unless there was a contraindication to nonsteroidal anti-inflammatory drug use. At the conclusion of surgery, muscle relaxation was reversed using a neostigmine and glycopyrrolate combination. In recovery, IV analgesic continued with the intraoperative opiate as required. The patients were discharged before 8 p.m., with a responsible adult who could look after them for the first 24 hours, along with leaflets explaining the relevant postoperative advice and encouraging the patients to visit their own

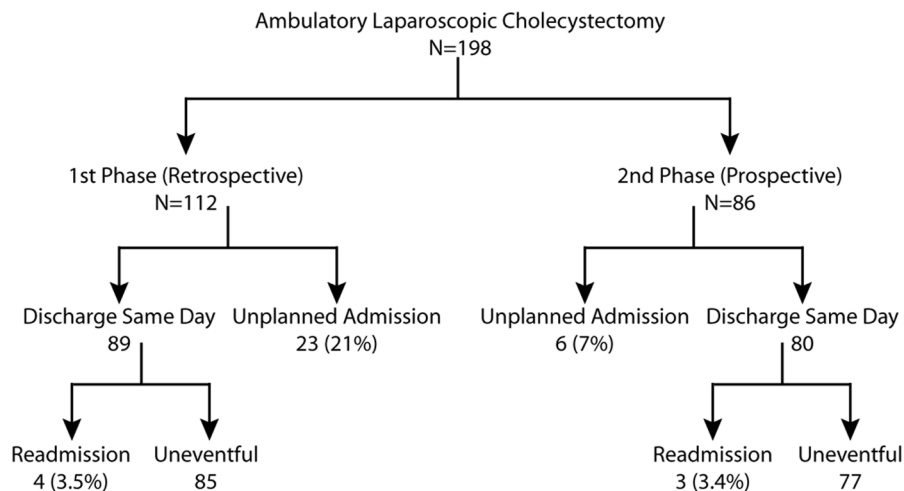


Figure 1. Flow chart of patients (Phases 1 and 2).

physician if they felt it were necessary. All patients were given a supply of a combination of codeine and paracetamol plus a nonsteroidal antiinflammatory drug for 48 hours. Patients who did not meet the discharge criteria, and those whose operation was converted to an open procedure, were admitted. The study ended 6 weeks after the surgery, with follow-up at the routine surgical clinic.

RESULTS

Of 253 patients, 198 (79% day cases) underwent ambulatory laparoscopic cholecystectomy during the 40-month study period. All of the 112 patients in the first phase of the study were either ASA grade I or II. There were 90 women (80%) and 22 men (20%) with a mean age of 45 years (range, 21 to 78). Thirty-six (32%) patients were over 55 years of age. Surgery was successfully performed in all the patients without any open conversions. However, 23 patients required unplanned admission for different reasons (Table 1). Six patients insisted on an overnight stay and were discharged the next day. Persistent nausea and vomiting was the cause of admission in 5 patients. Other causes included wound pain,⁵ urinary retention,² operation in the afternoon,² severe shoulder pain,¹ and 2 patients needed admission after the placement of a suction drain. Twelve (50%) of the 23 patients admitted were more than 55 years of age.

In total, 4 (3.4%) patients were readmitted after discharge. Three of these, with wound-related complaints, either hematoma, minor wound infection or wound pain, were treated conservatively. One patient, admitted 10 days after

discharge with a massive lower GI bleed, was found at laparotomy, to have a cystic artery pseudoaneurysm eroding into the transverse colon. He recovered well after undergoing surgery.

Of the 86 patients in the second phase of the study, 72 (84%) were women and 14 (16%) were men 16 to 78 years of age (median, 48). Forty-three were >55 years of age. Twelve well-motivated patients with ASA class III were also considered in this phase of the study in addition to classes II and I. In 3 patients, the laparoscopic procedure was converted to open cholecystectomy due to difficult dissection, not being able to identify the proper anatomy, or abnormal anatomy. An unexpected admission was required for 6 (7%) patients, including 3 who had undergone conversion to an open procedure (Table 2). One patient required admission for analgesia and another for continuous nausea. One of the patients had a history of sleep apnea due to obesity; it was thought it would be prudent to observe him as an inpatient.

Of the 3 patients readmitted after discharge, 2 were treated conservatively for wound-related problems. One patient developed a biliary leak from CBD injury and was admitted 7 days after discharge with biliary peritonitis. Laparotomy revealed a lateral laceration to the common bile duct, which was repaired with t-tube drainage.

DISCUSSION

Laparoscopic cholecystectomy has undergone a revolution since the advent of its being performed as an outpatient procedure. With continuing pressure on health service resources, there has also been a drive to reduce in-hospital stays and to increase the efficiency of procedures. The Audit Commission report¹⁰ of 1990 encouraged

Table 1.
Unplanned Admission and Readmissions
(January 2002–July 2003)

	Number
Reason for Admission (median=1 d; N=23)	
Simple observation	6
Wound Pain	5
Nausea/Vomiting	5
Suction Drain	2
Urinary Retention	2
Operation in the afternoon	2
Severe shoulder pain	1
Reason for Readmission (N=4)	
Wound related	3
Leaking cystic artery pseudo-aneurysm	1

Table 2.
Unplanned Admission and Readmissions
(August 2003–April 2005)

	Number
Reason for Admission (median=1 d; N=6)	
Open conversion	3
Simple observation (obesity with sleep apnea)	1
Wound Pain	1
Nausea/Vomiting	1
Reason for Readmission (N=3)	
Wound related	2
Bile leak	1

the expansion of outpatient procedures, and laparoscopic cholecystectomy fulfills this niche and has been performed in several centers with success. With an increase in outpatient procedures, it is necessary to evaluate the conditions in which admission for overnight stays could be kept to a minimum, although realizing that the “holy grail” of no admissions is, realistically, unobtainable.

It is important to recognize the difference between studies that have evaluated outpatient cases, which relates to discharge on the same day of the procedure without requiring an inpatient bed, and other studies that include patients admitted overnight but discharged within 24 hours. In our study, we analyzed only those who were discharged on the same day of admission (before 8 pm). Whilst discharge the next day (within 24 hours) is admirable, and suggests good early mobilization, it still fails to satisfy the Audit Office criteria of true outpatient procedures.¹⁰

Unplanned admission after outpatient surgery is an indicator of quality assurance.¹¹ All discharged patients in our study were reviewed at 6 weeks. The unplanned admission rate, whilst initially high at 21%, fell to a much more respectable 7% (overall 15%) in comparison with that of other centers, which varied from 3% to 39%.^{1,12–17} The causes of postoperative morbidity were similar in both phases (**Table 3**) except that 3 patients (1.5%) had to have their laparoscopic procedure converted to an open procedure in the second phase, and this did not occur in the

first phase. Conversion rate is comparable to reported rates of 1.8% to 6.7%.^{12–15}

A drop in admission, from 21% to 7%, in the second phase is significant and needs to be analyzed further. Six patients were admitted for simple observation in the first phase. This was purely at the discretion of the patient; either they felt they were not fit enough to go home or there was low confidence amongst the nursing staff. This was evident in the second phase of the study when only one patient was admitted for observation as he had sleep apnea syndrome. Patients admitted for pain, nausea, or vomiting were also significantly reduced. Whilst there was not a universal anesthetic protocol, each patient received a preoperative opiate, NSAID, and antiemetic. We could not correlate the significant number of patients admitted with pain, nausea, and vomiting with any of the anesthetics or antiemetics used. Patients who were over the age of 55 years did not have a higher incidence of admission than those of a younger age group, contrary to the perception from the first phase of the study. Only 2 unplanned admission patients were aged above 55 years in the second phase, and both of them were ASA grade III. Previous reports emphasized the duration of procedure as one of the predictors of unplanned admission. In our study, the total operative time ranged from 16 minutes to 89 minutes (median, 35).

The readmission rate of 3.5% compares well with a range of 0% to 8% reported by other authors.^{12–17} Admission would not have greatly changed the course of these patients, nor would it have prevented these complications from happening. However, biliary leak (7 days postop) would have been picked up earlier if the patient had been admitted. This patient and the patient with a pseudoaneurysm of the cystic artery (10 days postop) were readmitted a week after initial discharge. Even if they had been operated on as an inpatient, they could have been discharged before the complication became evident. A patient with massive gastrointestinal bleeding deteriorated fairly rapidly and collapsed after admission. There was no clinical evidence of an aortic aneurysm, the possibility of angio-enteric fistula having been considered. Esophago-gastroscopy performed with the patient under anesthesia did not reveal any active upper gastrointestinal bleed. Emergency laparotomy was performed. At operation, the large clotted blood was noted at the gallbladder fossa, and some blood-stained fluid was present in the abdomen. The proximal transverse colon was adherent to a large mass of clotted blood in the gallbladder fossa. Following evacuation of the blood clot, there was brisk bleeding from the cystic artery stump proximal to the clips. The end

Table 3.

Results From Phases 1 and 2 January 2002–April 2005 (N=198)

	Number
Reason for Admission (Median=1 d; range 1–3 d; N=29 [15%])	
Open conversion	3
Simple observation	7
Wound Pain	6
Nausea/Vomiting	6
Suction Drain	2
Operation in the afternoon	2
Urinary retention	2
Severe shoulder pain	1
Reason for Readmission (N=7 [3.5%])	
Wound related	5
Leaking cystic artery pseudo aneurysm	1
Bile leak	1

of the vessel was very necrotic. The vessel was undersewn. A hole was identified in the antimesenteric border of the colon where it had been adherent to the organized blood clot. There was no true pseudocapsule around the blood clot to indicate clearly the presence of an organized pseudoaneurysm, and the exact cause of the fistulation into the colon was unclear. Electrosurgical injury to the cystic artery stump was possible during surgery as it was a difficult laparoscopic cholecystectomy. It appeared that the clotted blood mass had eroded into the colon and was responsible for the gastrointestinal hemorrhage. The small defect was oversewn and recovery was uneventful. It is a known fact that most of the early complications after laparoscopic cholecystectomy occur within a week after surgery. We felt that early review, either by nurse-lead telephonic review or review in a surgical clinic, would pick up the complications earlier.

A further change that occurred between these 2 periods was the introduction of a checklist for use by the nursing staff. It was observed that, in the first period, the nursing staff were being asked to assess patients' fitness for discharge, having received no formal training, and fulfilling a role which, in this hospital, had been reserved for medically qualified staff. During the change, a major investment was made in educating nurses about their new role, and a checklist was drawn up to facilitate the nurses in this decision-making. Patients were discharged from the outpatient unit if they were tolerating oral fluids or a light diet, or both, with minimal nausea or vomiting, had passed urine, had adequate pain control and were ambulatory. A discharge letter was faxed to a referring general practitioner with operative details and recommended postoperative care. Consequently, this led to a marked reduction in the number of admissions for nausea and simple observations. Other studies have highlighted the effectiveness of a preoperative visit,⁵ and our study again shows that, with stringent preoperative assessment, low numbers of unplanned admissions can be obtained.

The empowerment of the nurses yielded further rewards as the nurses decided to set up a team to allow follow-up of the patients. Up to August 2005, all the patients discharged were cared for by their own physician until their review in the routine general surgical clinic, 6 weeks after the operation. In September 2005, Telephone Nurse Interview Care Service (TONICS) was set up to review each case on Day 1 and then at 6 weeks following discharge. This proved to be an unqualified success, with only one person requesting a formal outpatient appointment, thereby freeing more of these appointments for new referrals or necessary reviews. It suggests that these patients

do not require aggressive postoperative nursing care, after discharge, and that the availability of general practice or accident and emergency service may suffice instead of the costlier district nurse visit. Studies have shown that this is the case as long as a coherent and coordinated system of care is in place.⁹ Indeed, it may even be that patients prefer a telephone call to a home visit.¹⁸

Training has become an important issue as the government strives to ensure that the National Health Service fulfils its service commitments, often to the detriment of training the next generation of medical staff. It is vital that trainees are exposed to all aspects of patient care so as to be fully aware of ambulatory surgery and its place in the surgeon's armory. It would seem wise, though, to limit involvement to more experienced trainees so as to have minimal impact on the service commitment and the admission rate. It is also possible that the collection of certain cases in one fixed service may, in fact, be beneficial to the trainee, as it would provide a definite area in which the trainee could focus and develop the practice, especially in the climate of the New Deal and European Working Time Directive.³

Much has been debated about the financial impetus in the move to further outpatient procedures. A cost analysis was undertaken in our trust, which showed that, while the actual operative costs were similar, the real saving came because it was cheaper to carry out the outpatient procedures in their totality compared with elective admissions, and both these mechanisms of laparoscopic cholecystectomy were markedly cheaper than emergency admission. The average cost of the elective inpatient laparoscopic cholecystectomy was £1793 compared with £1174 for outpatient cases (Finance Dept., Causeway Hospital-Year 2002/2003). This would be in keeping with other studies that showed that there was a potential reduction in costs of 11% to 25% per patient.³

CONCLUSION

Outpatient laparoscopic cholecystectomy is safe, feasible, and desirable in the majority of patients, with few changes to current practice, and has become established practice at our institution. For the admissions to be kept to a minimum, the procedures should be performed by experienced staff, patients should be given pre-emptive antiemetics, and analgesics, and experienced staff should be given the task of evaluating the discharge criteria. If this were established nationally, it would impact not only patient waiting times but also would result in significant cost savings.

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