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Laparoscopic Cholecystectomy as a Day Surgery Procedure

R. J. SINGLETON*, G. E. RUDKIN†, G. A. OSBORNE‡, D. S. WATKIN§, J. A. R. WILLIAMS**
Department of Anaesthesia and Intensive Care, Royal Adelaide Hospital, Adelaide, South Australia

SUMMARY

Outcome is presented for 40 consecutive laparoscopic cholecystectomies performed in a public teaching hospital day surgery unit. The unanticipated hospital admission rate on the day of surgery was 17.5% (seven patients) and the majority of these (12.5%; five patients) were due to surgery-related considerations. Two other admissions were due to nausea and vomiting. One patient was admitted to hospital on the second postoperative day with nausea and vomiting. Procedure duration for the day cases averaged 98 minutes (SD25; range 60-167). Recovery room times before discharge averaged 272 minutes (SD 58; range 125-365). Each day surgery patient averaged 3.3 postoperative home visits from community nurses. Most patients (94%) mobilized at home by the second postoperative day and 85% resumed normal activities of daily living by two weeks. At follow-up, 25 patients (76%) stated they were happy to spend the first night at home, but seven (21%) would have preferred to remain in hospital for the first postoperative night. Laparoscopic cholecystectomy can be performed successfully as a day-case procedure, but long operating and recovery room times and potentially high admission rates suggest that these factors should be considered in cost equations for day-case management of this procedure.

Key Words: SURGERY: day, laparoscopic, cholecystectomy, morbidity, outcome

Laparoscopic cholecystectomy is now accepted as a safe and effective alternative to open cholecystectomy[1,2] and compares favourably to the open procedure with respect to mortality, complications and length of hospital stay[3,4,5]. It also is associated with decreased requirements for postoperative analgesia, reduced hospital costs and earlier return to work[3]. These advantages are best demonstrated by surgeons experienced in the technique[2,6].

The procedure has been performed in North America both as an ambulatory surgery procedure[4,7,8] and with patients remaining the first postoperative night in a Post Surgery Recovery Centre[9]. Currently the suitability of laparoscopic cholecystectomy for day surgery is viewed with uncertainty in Australia. Some workers have recommended that patients be hospitalized at least overnight with close monitoring of vital signs[10] while others have commented that in the order of 10% of their patients could have been discharged on the day of surgery "but this was thought to be a little radical, so the patients were kept in overnight"[11].

Laparoscopic cholecystectomy was performed as an in-patient procedure for the first two years from its introduction at our institution. During this time it was observed that many patients undergoing the procedure recovered rapidly and uneventfully. This series therefore was undertaken to investigate the suitability of performing laparoscopic cholecystectomy on a day surgery basis. An attempt was also made to measure the incidence of the minor morbidity associated with day surgery laparoscopic cholecystectomy, and to gain some appreciation of the community implications of this management approach.

PATIENTS AND METHODS

Forty American Society of Anesthesiologists (ASA) Grade 1, 2 and 3 patients undergoing elective laparoscopic cholecystectomy as a planned day surgery procedure were included in this series. Undertaking laparoscopic cholecystectomy as a day surgery procedure was approved by the Human Ethics Committee of our institution, a 600-bed adult public teaching hospital. All patients scheduled for elective laparoscopic cholecystectomy were con-

*F.A.N.Z.C.A., Staff Specialist, Department of Anaesthesia and Intensive Care, The Royal Adelaide Hospital, Adelaide, South Australia.
†F.A.N.Z.C.A., Senior Lecturer in Day Surgery, University of Adelaide, Department of Surgery, The Queen Elizabeth Hospital, Adelaide, South Australia.
‡F.A.N.Z.C.A., Senior Staff Specialist, Department of Anaesthesia and Intensive Care, Royal Adelaide Hospital, Adelaide, South Australia.
§F.R.A.C.S., Visiting Surgeon, Gastro-Intestinal Services, Royal Adelaide Hospital, Adelaide, South Australia.
**F.R.A.C.S., Clinical Director, Gastro-Intestinal Services, Royal Adelaide Hospital, Adelaide, South Australia.

Address for Reprints: Dr R. J. Singleton, Department of Anaesthesia and Intensive Care, Royal Adelaide Hospital, North Terrace, Adelaide, S.A. 5000.

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sidered for day case management. Selection required patient consent, suitable social circumstances and a level of patient fitness no worse than ASA 3, with any pre-existing medical condition stable and optimally controlled. Patients also were required to live no more than one hour's travelling time from the parent hospital and have both responsible adult assistance and a telephone available at home. Patients with a history of previous surgery, cholecystitis, jaundice or pancreatitis were eligible for inclusion, but those with acute biliary infection were not.

All procedures were performed during the morning of admission to the Day Surgery Unit by consultant surgeons experienced in the technique. Patients were unpremedicated and underwent relaxant general anaesthesia. Induction with propofol was supplemented with 1-3 $\mu g.kg^{-1}$ of fentanyl and maintained with 66% nitrous oxide and isoflurane in oxygen. Tracheal intubation was facilitated by the use of either vecuronium or atracurium. Patients with a past history of motion sickness or postoperative nausea and vomiting (PONV) were given droperidol 0.5-1.2 mg IV at induction. All patients received a peri-operative infusion of 1 to 2 litres of crystalloid solution. The surgical wounds were infiltrated with bupivacaine 0.5%.

Patients recovered in a dedicated two-stage recovery area. Patients were nursed supine in the first stage area and were required to have satisfactory vital signs for a minimum of three sets of observations at fifteen-minute intervals and a satisfactory post-anaesthetic recovery score (PARS)[12] before sitting in reclining chairs in the second stage recovery area. Patients were then required to be in second stage recovery for at least 60 minutes with stable vital signs, satisfactory analgesia, minimal nausea and vomiting and be able to walk unaided before being assessed as ready for discharge. Patients with wound drains were reviewed by the surgeon while in second stage recovery and discharge was allowed after one hour's satisfactory observation following drain removal.

Pain scores were recorded with a verbal analog scale (VAS) four times in the recovery area; on arrival in first stage recovery, on entering and after one hour in second stage recovery and when ready for discharge. Analgesia was provided in the first stage recovery area by an intravenous fentanyl pain protocol[13] when pain scores exceeded 5, and oral analgesia was used when required, as soon as the patient was able to tolerate sips of water. The choice of oral analgesia was made by the attending recovery nurse, with oxycodone 10 mg used for persistent severe pain and Panadeine Forte® (paracetamol 500 mg, codeine phosphate 30 mg), Panadeine® (paracetamol 500 mg, codeine 8 mg) or paracetamol 500 mg used for progressively less severe pain. Further oral analgesia was provided in the second stage recovery area by using the same guidelines.

PONV was scored according to the following system: 1 = no symptoms; 2 = symptoms not requiring pharmacological treatment; 3 = symptoms relieved by pharmacological treatment; 4 = symptoms not relieved by pharmacological treatment. PONV scores were taken at the end of each patient's stay in first stage recovery and the most severe PONV score experienced in second stage recovery was also recorded, as was the PONV score at discharge. Details of all recovery anti-emetic medication were recorded. Metoclopramide 10 mg IV was generally used as the first choice anti-emetic, but droperidol (0.6 mg IV) or ephedrine (6-30 mg IV/IM)[14] were also used for this purpose.

At discharge, all patients were supplied with Panadeine®, Panadeine Forte® and oxycodone tablets for analgesia at home, as well as metoclopramide as an anti-emetic.

All patients received a preoperative screening visit at home from the Royal District Nursing Society (RDNS) and review at home on the first post-operative night by a RDNS nurse, except one patient who lived outside the locus of the RDNS service. Postoperative support for this patient was pre-arranged through a family doctor. Information relating to patient vital signs, surgical wounds and treatment required for pain or nausea and vomiting were recorded at the time of the RDNS postoperative visit. This information was faxed to the Day Surgery Unit the next morning for review by the anaesthesia staff. Patients received a second visit from the RDNS on the following morning but the number of subsequent visits depended on the individual nurse's assessment of the patient's needs.

Day Surgery recovery nursing staff telephoned all patients on the first postoperative day and recorded patient requirements for analgesia and treatment for nausea and vomiting. Patients were also asked to rate their management as "very satisfactory", "satisfactory", "unsatisfactory" or "very unsatisfactory". An anaesthetist not involved in the patient's peri-operative care telephoned all patients at approximately two weeks post-surgery and recorded details of analgesia and anti-emetics used beyond the first postoperative day together with information on support required from the family, local doctors, hospital emergency services and the RDNS. At this time patients were also asked further standardized ques-

tions about requirements for home assistance, resumption of normal activities, and any perceived advantages and disadvantages of day case management.

Statistical Analysis

Spearman correlation coefficients were calculated to investigate possible relationships between intra-operative and postoperative fentanyl doses and pain scores on arrival in the recovery room.

RESULTS

Mean patient age was 43.0 years (SD 15.8; range 19-74; N = 40). Twenty-seven patients (67.5%) were female. Twenty-five (62.5%) were ASA 1, 14 (35%) ASA 2 and one (2.5%) was ASA 3. Mean procedure duration for the 38 cases done laparoscopically was 97.7 minutes (SD 25.1; range 60-167). The mean intraoperative fentanyl dose (for all cases except two converted to open cholecystectomy) was 2.71 $\mu g.kg^{-1}$ (SD 0.92; range 1.04-5.49). No other opioid was used during these 38 procedures.

Unanticipated Admissions

There were seven (17.5%) unanticipated hospital admissions on the day of surgery (Table 1). Five of these seven admissions were directly related to surgical considerations. Two procedures were converted to open cholecystectomy and three admissions were precautionary due to intra-operative oozing from the gall bladder bed. The decision to admit two of the three patients who required surgical drainage was made in the operating theatre and the third was admitted after a period of observation in the recovery room after a drain continued to produce small amounts of haemoserous fluid. All three of these patients recovered uneventfully without further surgical intervention. One patient was admitted after experiencing severe pain and PONV in recovery, possibly related to intra-peritoneal spillage of bile and calculi during the procedure. One patient was admitted with refractory PONV after an uneventful procedure.

One 45-year-old female ASA 2 patient was admitted on the second postoperative day with a 24 hour history of mild but persistent PONV which settled during an overnight stay in hospital.

TABLE 1
Details of unanticipated admissions on the day of surgery

Case No.	Age	Sex	ASA Status	Reason for admission
1*	40	F	1	Open cholecystectomy (further biliary tree exploration required)
5**	42	F	1	PONV
10**	36	F	1	PONV/Pain (bile spillage/drainage)
12*	69	M	2	Oozing from gall bladder bed/drainage
13*	28	F	2	Oozing from gall bladder bed/drainage
36**	47	F	2	Oozing from gall bladder bed/drainage
40*	56	M	2	Open cholecystectomy (difficult access)

*The decision to admit these patients was made intra-operatively.
**The decision to admit these patients was made in second stage recovery.

Other Complications

There were few other significant complications. A further four patients had surgical drains inserted because of intra-operative oozing from the gall bladder bed, but the drain was removed uneventfully in the recovery room prior to discharge. No patient developed an acute surgical complication after discharge. The seven patients who were admitted on the day of operation subsequently had unremarkable hospital stays.

Recovery Room Information

For the 33 patients managed as day cases, the mean time to sit out of bed was 143 minutes (SD 53.4; range 50-315), and the mean time to be ready for discharge was 272 minutes (SD 58.8; range 125-365).

Pain scores were available for 31 of the 33 day-case patients at four different times in recovery and the distribution of these scores are shown in Figure 1. There was no significant correlation between the initial recovery pain scores for these patients and their intra-operative fentanyl dose ($r = -0.233$; $P = 0.207$).

Fourteen of the 33 day-case patients (42%) were considered to require intravenous fentanyl in the first stage of recovery (mean dose 0.87 $\mu g.kg^{-1}$; SD 0.47; range 0.24-1.67) and there was reasonable correlation between the recovery fentanyl dose and the initial recovery pain score ($r = 0.732$; $P < 0.001$). The remaining 19 day-case patients received only oral analgesia in the recovery room, and only three of this group were judged to require oxycodone.

The extent of recovery room PONV affecting patients discharged on the day of surgery is illustrated in Figure 2. Of these 33 patients, 24 received anti-emetics in recovery. All patients who required intravenous anti-emetics received metoclopramide, eight received droperidol and metoclopramide and one received ephedrine in addition to droperidol and metoclopramide.

Post-discharge information

(a) Pain and nausea and vomiting

The range of post-discharge analgesia used by the 33 day surgery patients and the extent of post-

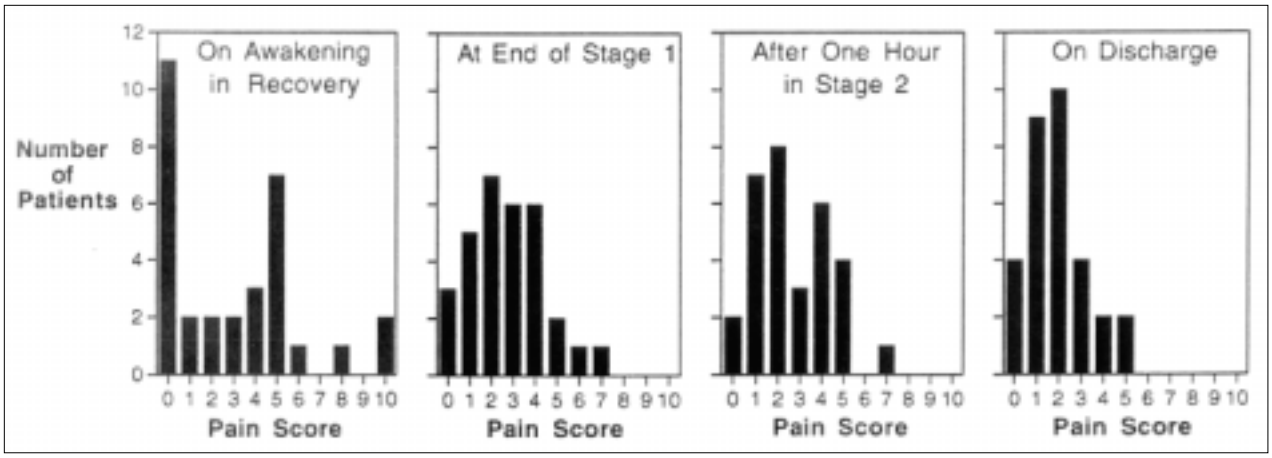

FIGURE 1: Distribution of pain scores at different times in the post-operative recovery room for the 31 day surgery patients for whom complete data was available.

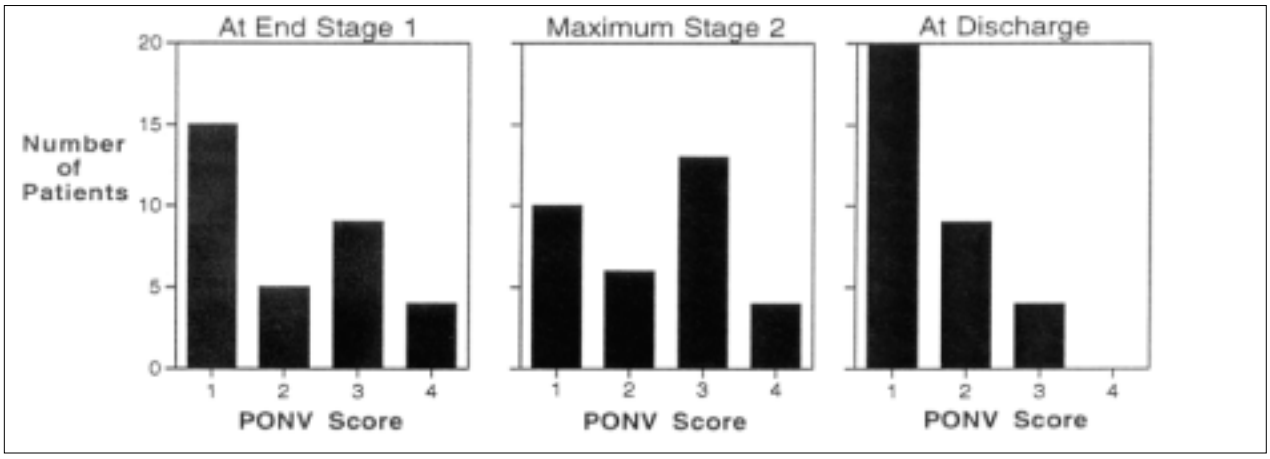

FIGURE 2: Distribution of nausea and vomiting scores at different times in the postoperative recovery room for the 33 day surgery patients.

discharge nausea and vomiting are illustrated in Figures 3 and 4 respectively.

(b) Return to normal function

Twenty-one, 79 and 94% of patients mobilized from bed by postoperative days 1, 2 and 4, respectively. Fifteen, 85 and 94% of patients returned to normal activities by postoperative days 7, 15 and 20, respectively.

(c) Home and community support requirements

Fourteen of the 33 day-case patients (42%) required either another individual to take time off work for assistance and/or for family or friends to provide help with child care. In both instances the time assistance required averaged around two days. All but one patient received a preoperative home visit from the RDNS.

Post-discharge home attendances by the RDNS averaged 3.3 visits (SD 1.9; range 0-9). Seven (21%) patients contacted their family doctor during the first two postoperative weeks either for advice on wound care or for further prescription of analgesia. The patient admitted to hospital on the second post-operative day with nausea and vomiting was the only patient who presented to a hospital accident and emergency department during the same two-week interval.

(d) Patient perception of same day management

At follow-up on the first postoperative day, 26 patients (79%) rated their management as "very satisfactory", five (15%) as "satisfactory", one (3%) as "not satisfactory" and one other (3%) said she would not undergo the same procedure again as a day patient. At the two-week follow-up, twenty-five

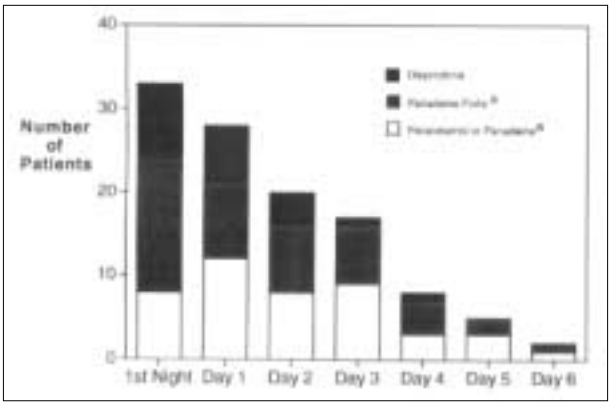

FIGURE 3: The distributions for the most potent analgesic used by each of the 33 day surgery patients at different time intervals during the first six postoperative days.

patients (76%) were happy to have spent the first postoperative night at home, usually because they preferred the comfort, convenience and privacy of home. Seven patients (21%) volunteered that they would have preferred to remain in hospital for the first postoperative night, either because of general anxiety provoked by discharge home or because they believed their PONV or pain may have been better managed in hospital. One patient was indifferent about same day management.

DISCUSSION

Our experience with this series of patients confirms that laparoscopic cholecystectomy can be performed safely and satisfactorily as a day surgery procedure. Successful outcome is facilitated by careful patient selection, a co-ordinated team approach by all members of the peri-operative service, and appropriate pre-arranged home care.

The unanticipated admission rate on the day of the procedure was 17.5% in this series of patients, which is similar to that reported elsewhere for day case laparoscopic cholecystectomy[8], but considerably higher than the rates normally recommended for day surgery[15]. It is therefore necessary to have the facilities and willingness to admit a larger proportion of patients after laparoscopic cholecystectomy than after more traditional day procedures.

Recovery room protocols for the management of postoperative pain and PONV were found to be useful. There was a wide range in postoperative analgesic requirements both in the recovery room and at home. Severe pain, not uncommon in the early postoperative phase, almost invariably settled by the time of discharge, often after combined intravenous and oral analgesia. Post-discharge pain was generally well managed with the oral analgesia supplied at discharge. All patients used some form of oral analgesia on the first postoperative night, but eight (24%) required nothing stronger than Panadeine®. By the third postoperative day less than one-quarter of the patients required analgesia stronger than Panadeine® and only one did so after the fifth postoperative day. PONV was a significant problem for many patients in this series; close to three quarters of all day surgery cases required anti-emetics in recovery and one-third of those received more than one type of anti-emetic drug. Nausea remained a problem for 30% and 15% of patients on the first and second postoperative day respectively, but settled in all patients thereafter.

Patient return to normal function was not prolonged, with the majority of patients mobilizing at home by the second postoperative day and most returning to normal activities of daily living within two weeks. The average of 3.3 postoperative RDNS visits for each patient does not seem to be excessive,

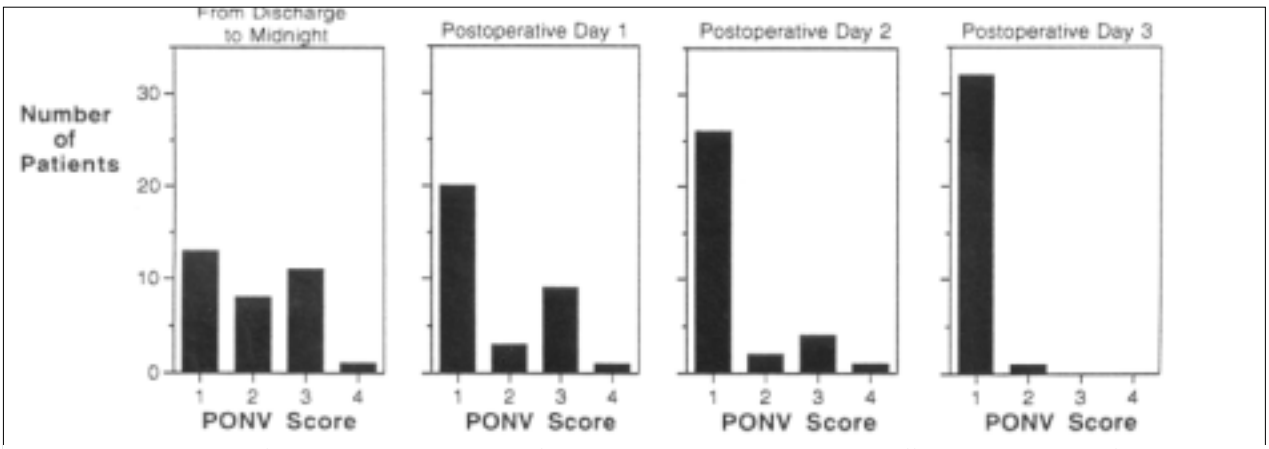

FIGURE 4: Distributions of the maximum PONV scores for the 33 day surgery patients during different time intervals after discharge.

although it is possible that the number of these visits could be reduced without any significnt detrimental effect. There were no major support requirements imposed on either family doctors or hospital accident and emergency services.

The financial cost to the community for these support services has not been calculated, but this type of information should prove useful towards incorporating real cost estimations into the planning of management protocols for laparoscopic cholecystectomy as a day surgery procedure. In assessing the relative value of day surgery for this operation, consideration should also be given to the opportunity cost incurred when finite day surgery theatre and recovery time is monopolized by patients undergoing a relatively lengthy procedure that requires a potentially long recovery time, thus excluding the performance of greater numbers of shorter, more typical day surgery procedures. These factors should be included in any calculations of cost savings produced by performing laparoscopic cholecystectomy as a day surgery procedure, rather than having patients remain in hospital overnight after the operation. These costing issues need careful consideration to determine the allocation of existing finite resources for day surgery and the need for increased resources in the future.

In conclusion, laparoscopic cholecystectomy can be successfully performed as a day surgery procedure with an encouraging level of patient satisfaction. However, both the unanticipated hospital admission rate on the day of surgery and the length of recovery room stay can be expected to be significantly greater than for more traditional day surgery procedures and facilities need to be available to accommodate these requirements. Protocols for the management of postoperative and post-discharge pain and nausea and vomiting facilitate patient care, although PONV remained a significant problem for many patients in this series. In addressing this problem, alternative anaesthetic techniques such as total intravenous anaesthesia are under consideration. Refinements in patient selection may also contribute to a lowering of the unanticipated admission rate as well as enhancing patient satisfaction, but may exclude a number of patients who could be successfully managed as day patients. The real cost implications of performing laparoscopic cholecystectomy as a day surgery procedure are not readily quantified; inevitably there is some transfer of costs from the hospital to the broader community. Similarly the negative impact on total day surgery patient throughput may carry significant financial implications.

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