

# Outpatient laparoscopic cholecystectomy: Experience of a university group practice in a developing country

Anthony Relucio Perez, Krista Angeli Delos Santos

## ABSTRACT

**Aims:** In developed countries, efforts to improve outcome and minimize costs prompted the performance of laparoscopic cholecystectomy as an outpatient procedure. In the Philippines and in most developing countries, most laparoscopic cholecystectomies are still performed on admitted patients who are discharged one or more days after the surgery. No local experience has been published in the Philippines demonstrating the safety and feasibility of outpatient laparoscopic cholecystectomy. **Materials and Methods:** This study is a retrospective study investigating the outcome of outpatient performed laparoscopic cholecystectomy in the University of the Philippines, Philippine General Hospital Faculty Medical Arts Building (UP-PGH FMAB), an ambulatory surgical facility within UP-PGH. The patients were admitted to the ambulatory facility on the day of surgery, underwent laparoscopic cholecystectomy under general anesthesia and discharged on the same day. **Results:** From June 2012 to June 2016, 122 patients underwent laparoscopic cholecystectomy at the UP-PGH Faculty medical arts building. There were 80

women (85%) and 42 men (15%) with a mean age of 46 years. The mean operating time was 58 minutes. The unplanned admission rate was 2.4% (two patients), one for conversion to open and two for unrelieved postoperative nausea and vomiting. **Conclusions:** Outpatient laparoscopic cholecystectomy is safe and technically feasible even in developing countries. It has potential for much economical and social benefit when employed judiciously. Prospective, randomized trials must be conducted in the local setting to refine technique, standardize patient selection and address system deficiencies to allow safe performance of outpatient laparoscopy in the Philippines.

**Keywords:** Day surgery, Developing country, Laparoscopic cholecystectomy, Outpatient laparoscopy

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## INTRODUCTION

The advent of laparoscopy and endoscopic surgery has brought tremendous advances in the field of

medicine, evolving from a simple diagnostic tool to an indispensable modality in the diagnosis, treatment and follow-up of several diseases. Since its introduction in 1985, laparoscopic cholecystectomy has become the standard of care for the treatment of gallstones [1]. The UP-PGH Department of Surgery has distinguished itself by pioneering laparoscopic cholecystectomy in the Philippines and it has been more than 20 years since the 1st laparoscopic surgery was performed in PGH [2]. The succeeding years marked tremendous improvement in training and instrumentation, and consequently, the frequency of laparoscopic cholecystectomy has increased. This may be attributable both to the increased incidence of gallstone disease worldwide and to the increasing number of surgeons performing laparoscopic surgery in the country [3]. Despite laparoscopic surgery being accepted as the standard of care, majority of cholecystectomies in the country are still being performed via the open method [4]. In the Philippines, the cost of laparoscopic cholecystectomy is perceived, even by surgeons, to be higher compared to open surgery [5]. The benefits of decreased pain and early recovery are thus not maximized.

Based on the absence of published or reported experience locally, practically all institutions performing elective laparoscopic cholecystectomy in the Philippines have been doing it on an inpatient basis [4]. Patients stay in the hospital for 1 to 3 days after surgery. In many advanced centers abroad, the conscious effort to bring down cost has resulted in many procedures being done on an ambulatory surgery basis, foremost of which is laparoscopic cholecystectomy. Several studies reported by western centers support the safety and effectiveness of laparoscopic cholecystectomy performed on an outpatient basis in prospective randomized trials [6–8]. In developing countries including the Philippines, concerns regarding adequacy of ambulatory surgery centers, postoperative monitoring facilities and patient compliance with home instructions preclude the adoption of this practice [5, 9, 10]. This study was conducted to determine whether the laparoscopic cholecystectomy performed in an outpatient basis in the local setting is comparable to those operated on an inpatient basis based on experience reported in literature with regard to morbidity rate, mortality rate, complications, and patient-centered outcomes including pain and time to return to normal activity.

Cholecystectomy in the Philippines is one of the most commonly performed in patient elective general surgical procedure. In a year, more than 8,000 patients undergo elective cholecystectomies in hospitals with accredited surgical training programs. In 2013 alone, UP-PGH which is the largest tertiary government medical center in the country and which undertakes the most number of cholecystectomies, had 893 uncomplicated elective cholecystectomies performed [11]. Of the total 55% were done laparoscopically and the rest were done open. Laparoscopic cholecystectomy has been the

standard of care for the past decade and is the preferred approach in most advanced centers, with 90–95% of the cholecystectomies performed laparoscopically. Developing countries such as ours are still lagging behind in terms of the proportion of patient done open and laparoscopic. This is due to the delayed adoption of the technique attributable to training concerns, and issues of cost. In recent years, advances in training techniques and integration into the General Surgery program have begun to address training issues. In the UP-PGH, the frequency of laparoscopic surgery is constantly increasing, evident in the leap from less than one-third of the total cholecystectomies more than five years ago to the current 55%. Many centers are recognizing the advantages of laparoscopic surgery, shortening the recovery period which redounds to the benefit of both the hospital and the patients. Despite increasing access to hospitals equipped with laparoscopic equipment, costs to the patients remain to be an issue. Although rapid return to work and decreased analgesic requirements may negate the costs due to equipment and instrumentation, strategies to further reduce expenses shouldered by patients will further increase the acceptance of laparoscopic cholecystectomy as the standard of care in the country. In the health care industry, decreasing hospital stay is the cornerstone of lowering costs. This has encouraged the adoption of ambulatory surgery even for major procedures. In the local setting, demonstrating outcomes comparable to that being attained in well-equipped and well-staffed centers abroad will broaden acceptance of this approach. This retrospective study will hopefully provide local surgeons with a basis on which prospective and randomized trials will be based. Well-designed local trials will eventually establish the role outpatient laparoscopic cholecystectomy will play in the overall management of a very common surgical disease entity, symptomatic gallstone disease.

## **MATERIALS AND METHODS**

This is a retrospective review of all the records of patients who underwent laparoscopic cholecystectomy performed by surgeons in a University based group practice at of the University of the Philippines-Philippine General Hospital (UP-PGH) FMAB. Data for the outpatient laparoscopic outpatient cholecystectomy group were extracted from a prospective database maintained by the surgeon investigators. All patients who underwent elective laparoscopic cholecystectomy from June 2012 to June 2016 at the UP-PGH FMAB performed by a select group of surgeons were included in the study. Patients who were seen at the FMAB with symptomatic gallstones documented by imaging studies (ultrasound or CT scan) were advised to undergo elective laparoscopic cholecystectomy. Criteria for selecting patients were used by the group based on guidelines recommended by foreign institutions. Although a patient selection criteria

was not rigidly implemented due to the absence of existing clinical pathways and guidelines at the UP-PGH, criteria for the ideal patient were set by empirical methods: elective operations only; age less than 65; no significant underlying medical problems; no previous major upper abdominal operations; “no/low” risk for common bile duct stones. [7]. Patients requiring a concomitant procedure (e.g. ERCP, endoscopy, cholangiography) were advised admission.

All the patients were referred to an anesthesiologist for preoperative evaluation and the informed consent process. Patients were referred for further evaluation by an internist if deemed necessary by the surgeon or anesthesiologist. The UP-PGH FMAB starts operations at 700H and closes at 1900H. Thus, all patients were scheduled in the morning to enable them to be discharged prior to closing the FMAB. Arrangements for possible admission if necessary were made prior to surgery. All patients underwent endotracheal intubation and maintained on general anesthesia using sevoflurane. Prophylactic antibiotics were given only for patients deemed at high risk for developing wound infection. All the patients underwent the standard 4-port technique of laparoscopic cholecystectomy performed by at least one or two of the participating surgeons. A single full high definition laparoscopic tower was used for all the cases, along with reusable standard hand instruments. Pneumoperitoneum was maintained at a pressure range of 10–15 mmHg pressure with CO<sub>2</sub> insufflation. Dissection was carried out using the critical view of safety technique, with ligation of the duct and artery performed using titanium clips. After completion of the procedure, local anesthesia using bupivacaine was injected into the trocar wound sites. Drains were not routinely placed.

Patients were discharged 6 to 8 hours after surgery if vitals signs were acceptable, patients were able to understand instructions and can ambulate; relieved of nausea, vomiting and pain; able to tolerate liquids and void urine; no bleeding from surgical sites; with the patient feeling comfortable and ready to go home willingly.

Patients undergoing outpatient laparoscopic cholecystectomy were to be admitted if:

- 1) there was a conversion to open
- 2) anesthetic discharge criteria were not satisfied
- 3) with unexpected medical problem attributed to the surgery.

Baseline patient characteristics including sex and age (in years), diagnosis, employment status (employed or not), coexisting conditions, ASA grade, and body mass index were recorded (Table 1).

Primary outcomes investigated were perioperative morbidity rate and mortality rate. Possible complications recorded intraoperatively included bile duct injuries, iatrogenic visceral injuries, trocar related complications and intraoperative bleeding. Immediate postoperative complications recorded include urinary retention, bleeding, and hematoma. Perioperative anesthetic

complications were likewise recorded. Data for patients those underwent outpatient laparoscopic cholecystectomy and admitted including those readmitted after discharge were recorded, noting for the reasons for the admission or readmission (Table 2).

Patient-centered outcomes included in the study are pain and time to return to normal activity. Pain scores using visual analogue scales as documented on discharge and follow-up were recorded on the surgeon’s notes on the electronic patient’s records. Return to normal activity, defined as the number of days after the operation when patient is able to resume work or usual activity without significant discomfort or pain, was noted. Normal activity is defined as the level of physical activity or work the patient is able to perform prior to the operation. Morbidity and mortality rates were reviewed up to the end of a 30-day follow-up period (Table 3).

## RESULTS

From June 2012 to June 2016, 122 patients were scheduled to undergo laparoscopic cholecystectomy at the UP-PGH Faculty medical arts building. There were 80 women (85%) and 42 men (15%) with a mean age of 46 years (range 21–72 years) and a mean body mass index (BMI) of 24.7 (range 24–31). Only ASA I and II patients were included. Distribution into ASA risk groups was as follows: 107 patients (88%) were ASA 1, and 15 (12%) were ASA 2. The mean operating time was 58 minutes (32–221 minutes). 121 of the procedures were completed laparoscopically with one conversion to open due to a stone impacted in the cystic duct/common duct junction. No intraoperative cholangiographies were performed. There were no common bile duct explorations. Indications for laparoscopic cholecystectomy (n = 122) included chronic cholecystitis with symptomatic gallbladder stones (n = 94), acute cholecystitis (n = 4), and minimally symptomatic cholelithiasis (n = 24). Postoperative pain assessment was performed with the visual analogue scale (VAS) prior to discharge. The median pain score on VAS on discharge was 2 (0–3) Postoperatively, four patients suffered from nausea which was controlled by ondansetron and metoclopramide. All but two patients were discharged on the same day of surgery, on the average of 5 hours after surgery (5 to 8 hours) The unplanned admission rate was 2.4% (three patients). One patient was admitted after conversion to open cholecystectomy and two for unrelieved postoperative nausea and vomiting. All were discharged a day after admission. Two (2%) of the patients were subsequently readmitted after discharge. One requested PGH admission and another requested admission at a nearby hospital, both for poorly controlled abdominal pain one day after discharge. Workups revealed no complications, and pain control was achieved initially with IV analgesics. The patients were discharged one day after readmission. Upon follow-up seven days after surgery, 98% of the patients had resumed

normal physical activity although none had returned to activities of employment. Two patients were assessed to have surgical site infections at the umbilical port. Both patients did not receive prophylactic antibiotics and had no comorbidities. Wound care and oral antibiotics on an outpatient basis led to resolution for both patients. A visit to the hospital clinic was scheduled for all patients during the 4th postoperative week for a final evaluation. Three patients did not follow-up after one month, but claimed to be asymptomatic on telephone updates. All patients were able to return to usual activities after one month.

## DISCUSSION

Outpatient laparoscopic cholecystectomy is being increasingly advocated in the US and many centers with

Table 1: Patient characteristics

Characteristic	Number
No. of patients	122
Age (Mean in years)	46
Gender	80 F/ 42 M
<b>Employment status</b>	
Employed	100
Unemployed	22
<b>Coexisting Conditions</b>	
Asthma	1
COPD	2
Diabetes mellitus	60
<b>Hypertension</b>	48
Prostatism	24
Previous myocardial infarction	0
<b>Cardiovascular disease</b>	
Cerebrovascular disease	0
Liver disease	0
Renal disease	10
Connective tissue disease	8
Malignancy	2 (SLE) 2 breast, 4 colon, 2 prostate
<b>ASA Class</b>	
I	107
II	15

Table 2: Intraoperative findings and events

Intraoperative variables	
Acute Inflammation (Y/N)	118/ 4
Length of operation (mean in minutes)	48
Conversion to open	1
Additional procedures (ERCP, Common Duct exploration)	0
Intraoperative complications (trocar injury, bleeding, bile duct injury etc)	0

Table 3: Admission and readmission, morbidity, and mortality rates

Outcome variables	Value
Admission	3 (2.4%) ( 1 conversion to open surgery, 2 severe post-operative nausea and vomiting)
Readmission rate	2% (2 for uncontrolled abdominal pain)
Morbidity rate	2% (2 superficial Surgical site infection) 3% (4 Postoperative nausea and vomiting) Total 4.9%
Mortality rate	0

advanced ambulatory surgery centers. It is being explored as a possible alternative to inpatient procedure and a rising trend in laparoscopic cholecystectomy performed on an outpatient basis is being seen recently [12]. Despite the evidence supporting the practice in advanced centers in the West, laparoscopic cholecystectomy on an outpatient basis has not been previously performed in our institution prior to the establishment of a state of the art ambulatory center, the Faculty Medical Arts Building operating room. No local data is currently available to support the practice in the local setting. For us to embark on adopting outpatient laparoscopic cholecystectomy in the country, success rates must be encouraging and selection protocols must be established early on.

It has been reported that a strategy of careful selection using a standard criteria, preferably within the context of a clinical pathway, leads to excellent outcomes. Some have reported a success rate of 95% with a low complication rate by adhering to these strategies. These criteria include the patient’s clear understanding of the procedure, proximity of the residence to the hospital or to a health care facility, younger age group, and absence of comorbidities [13, 14]. Some studies have shown that lack of stringent selection criteria lowers the success rate to 70%. Factors identified to be contributory to failure were age older than 50 years, American Society of Anesthesiology (ASA) classification of III or more, and late timing of surgery [15]. There are institutions, however, who reported acceptable success rates despite following more relaxed selection protocols [16].

Aside from mortality and morbidity, failure of day surgery is reflected in the number of unplanned admissions and readmissions after discharge. High rates of admission (39%) and readmission (8%) have been reported in literature [17, 18]. Others have documented comparatively lower rates (14.3% and 1.9%) and a high patient satisfaction rate (92.1%) [19]. On the average, outpatient laparoscopic cholecystectomy is associated with an expected admission rate of 10% and a readmission rate of 5% after discharge [20–22].

Along with other factors, postoperative nausea and vomiting (PONV) has been suggested as a cause of unplanned admissions and common bile duct stones as a cause of readmissions [21–23]. Postoperative nausea and vomiting, a major concern in day case surgery, has been studied in different randomized controlled trials [24–27]. There has been no consensus on the premedications and anesthetic drug regimens for outpatient laparoscopic surgery. Poor postoperative pain control has been demonstrated to delay discharge of patients and leads to unplanned admissions in the ambulatory setting [28]. Different analgesic regimens ranging from single to multimodality treatments have been utilized [28–30]. Along with other measures, intraperitoneal infusion of local anesthetics or pethidine into the gallbladder bed were reported apparently with acceptable results [22, 23]. Strategies such as pre and post op infiltration of local anesthetic into the port sites have been used to reduce the postoperative pain [24, 10–12]. Adequate pain control is the cornerstone of successful ambulatory surgery because it leads to early mobilization and quick return to normal activities.

The overall results of our preliminary experience is encouraging. In this particular study, perioperative morbidity and, mortality, unplanned admissions and readmissions are actually lower than those reported in other advanced centers who have been performing the procedure for a longer period of time. Postoperative pain and nausea in this study were not significant problems as had been reported by others. The low rate of conversion (1/122) reflects both surgeon experience and proper patient selection. Without the use of prophylactic antiemetics, the admission rate for postoperative nausea was low (2%), consistent with some recommendations not to use them routinely [12]. The unplanned readmission rate due to pain or other complications was low (2%). Only 2 of the patients was subsequently readmitted [18]. Our clinical outcomes were similar to published series where there is a high proportion of same-day discharges (up to 97%), low admission (<6%) and readmission rate (up to 5%), low levels of morbidity (<3%), no mortality, and high patient satisfaction with the procedure [16–19].

The excellent results are partly attributable to careful patient selection. Although there was no clinical pathway being implemented at the FMAB in this series, the select group of surgeons were basing their selection process on published protocols. It must also be emphasized that the surgical team and the anesthesiologists involved in these procedures are practitioners who have extensive experience in laparoscopic cholecystectomies, having been performing the procedure for more than 20 years. The results being presented here cannot be extrapolated to procedures which will be performed by less experienced surgeons. There were no preoperative predictors of admission identified due to the small sample size.

These preliminary results have shown safety, efficacy and cost effectiveness of outpatient laparoscopic cholecystectomy. With the trend towards laparoscopic

surgery brought about by improved training and better instrumentation, surgeons in the local setting are focusing on improving outcomes and decreasing costs. Demonstrating its safety and feasibility in a developing country will hopefully encourage not only local surgeons but also those from other developing countries in adopting this approach. The economic implications of outpatient laparoscopic cholecystectomy are considerable with a potential reduction in the cost of the operation by 11–25% per patient reported in some series [19, 23]. In addition the ambulatory approach enables inpatient beds to be available for other elective and emergency cases. These outcomes will impact heavily on hospital systems similar to what we have in the UP-PGH.

Analysis of our early experience will be a basis for conducting further prospective randomized trials to establish the safety and effectiveness of outpatient laparoscopic cholecystectomy in the local setting. Furthermore, it may help identify factors which will impact on outcome, allowing surgeons to select patients based on this factors, hopefully leading to decreased overall risks for patients. Clinical pathways incorporating outpatient laparoscopic cholecystectomy will eventually standardize the practice and allow outcomes monitoring. Validating the results being reported in foreign literature in the local setting will increase acceptance of outpatient laparoscopic cholecystectomy by local surgeons. In order for the benefits of outpatient cholecystectomy to be fully realized, policies to be adopted must also apply to institutions in which trainees and less experienced surgeons are performing the procedure. Future investigations must thus take into consideration not only patient selection but surgeon factors as well. It is desirable that trainees be exposed to all aspects of outpatient surgery, including patient selection and practice administration. This prepares them to provide surgical care that is increasingly shifted to outpatient care. It may also be advisable to limit the participation in ambulatory surgery to advanced trainees, as it allows them to practice many procedures that are commonly required in the surgical curriculum [31–35].

## CONCLUSION

Laparoscopic cholecystectomy can be performed safely in an outpatient setting even in developing countries like the Philippines. Careful patient selection and adherence to basic principles of minimally invasive surgery will allow outcomes comparable to advanced MIS centers in the west. This series has demonstrated the feasibility and safety of outpatient cholecystectomy by expert surgeons in the local setting. Achieving similar outcomes in tertiary government centers has the potential to dramatically reduce costs and allow underserved segments of society to benefit from minimally invasive surgery. This baseline study will allow us to conduct prospective trials to improve outcomes by refining technique, adopting

clinical pathways, emphasizing patient education and streamlining selection criteria. Such good results can be achieved by using selection criteria that consider not only the surgical pathology but also the individual and by using appropriate techniques and planned postoperative analgesia. The study is a retrospective study and thus will be subject to limitations and biases inherent to the design. Likewise, the sample size may not be enough to attain powerful recommendations. The experience was limited to a small group of surgeons with a skill set that may not be reflective of general practice. This may hinder generalization and extrapolation to actual practice. This study may however provide the basis for which better designed prospective randomized trials in the Philippine setting may be conducted in the future.

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### Author Contributions

Anthony Relucio Perez – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Krista Angeli Delos Santos – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

### Guarantor

The corresponding author is the guarantor of submission.

### Conflict of Interest

Authors declare no conflict of interest.

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