Day-case laparoscopic cholecystectomy

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ABSTRACT

الأهداف: من أجل تقييم أمان وإمكانية إجراء استئصال المرارة بالمنظار كعملية يوم واحد .

الطريقة: في هذه الدراسة الإستعادية تم اعتبار كل المرضى المتتابعين الذين قبلوا في مدينة الملك سعود الطبية ، الرياض ، المملكة العربية السعودية في وحدة جراحة اليوم الواحد من أجل استئصال المرارة بالمنظار من تاريخ 1 يوليو 2009م حتى 30 يونيو 2013م. وتمت مراجعة السجل الطبي من حيث العمر ، الجنس ، أعراض الحضور ، الموجودات المخبرية ، الدراسة الشعاعية ، درجة الASA ،التخدير، التحويل إلى جراحة مفتوحة ، المضاعفات ، خبرة الجراحين ، تدبير الألم بعد الجراحة ، الاقياء والغثيان ، القبول للتنويم ، إعادة القبول ، الامراضية والوفيات والمتابعة في العيادة الخارجية حيث جمعت المعلومات وحللت .

النتائج: مجموعة من 487 مريض خضع لعملية استئصال مرارة بالمنظار بجراحة اليوم الواحد (316: ASA 1 171 :ASA 2) أجريت الجراحة من قبل جراحين عالي التدريب (HSTs) (n=417) واستشاريين (n=70) تم التحويل إلى جراحة مفتوحة عند 4 مرضى، 22 مريض (5%) تم تنويمه لأسباب مختلفة بينما 465 مريض (95%)خرجوا قبل الساعة 8 مساء .مريضين (0.4%) أعيد تنويمهما في المستشفى بسبب ألم بطني ، 5 مرضى حدث لديهم خمج مكان المدخل (1%). مجموعة من 443 من المرضى (97%) كانوا راضيين بينما 14 (3%)كانوا غير راضين لم تسجل وفيات أو تجمع داخل البطن في هذه الدراسة .

الخاتمة: أن استئصال المرارة بالمنظار بجراحة اليوم الواحد هي جراحة آمنة وممكنة باختيار المرضى الموائم والتثقيف واعطاء مضادات الاقياء والمسكنات بعد الجراحة .

Objectives: To assess the safety and feasibility of laparoscopic cholecystectomy as a day-case procedure.

Methods: All consecutive patients who were admitted to the day-surgery unit for laparoscopic cholecystectomy at the Department of Surgery, King Saud Medical City, Riyadh, Saudi Arabia from July 2009 to June 2013 were considered for this retrospective study. The medical records were reviewed for age, gender, presenting symptoms, laboratory findings, imaging studies, American Society of Anesthesiology (ASA) grade, anesthesia, conversion to open cholecystectomy, complications, the operating surgeons, pain management, nausea, and vomiting, overnight stay, readmission, morbidity, mortality, and outpatient follow up were collected and analyzed.

Results: A total of 487 patients underwent laparoscopic cholecystectomy as a day case (ASA I=316, ASA II=171). Surgery was performed by high surgical trainees (HSTs) (n=417) and consultants (n=70) with conversion to open cholecystectomy in 4 patients. Twenty-two (5%) patients were admitted for overnight stay for different reasons, while 465 (95%) patients were discharged before 8 pm. Two patients (0.4 %) were re-admitted to the hospital due to abdominal pain. Five patients developed umbilical port site infection (1%). A total of 443 patients were satisfied (97%), while 14 (3%) were unsatisfied. There was no mortality or intra-abdominal septic collection.

Conclusion: Day-case laparoscopic cholecystectomy is safe and feasible with optimal patient selection, education, and planned postoperative antiemetic and analgesia management.

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The first laparoscopic cholecystectomy (LC) was performed by Muhe in 1985.[1] Since then LC skills have progressively improved, and it has become the gold standard treatment for gallstone disease.[2] It is most common to perform LC on an inpatient basis in the surgical ward or in the short stay unit with overnight admission. However, recent reports have demonstrated the safety and feasibility of day-case (DC) LC for selected patients.[3-6] Advantages of DCLC over inpatient LC include early return to the community and work,[3] lower cost,[6] avoiding complications associated with hospital stay.[6] However, this trend should not jeopardize the safety of the procedure because of early patient discharge. There are many concerns in treating surgeons mind embarking on DCLC. The serious complication of bleeding is usually detected at the time of surgery whereas bile duct injury, if not detected intra-operatively, manifests few days later.[3] Other concerns are the management of post-operative pain, nausea, and vomiting. Experience, mostly from advanced centers did not find any difference between DCLC and overnight stay LC.[3] However in an area like ours, where primary care facilities are not well integrated with hospitals, patients would have to return to the hospital if these postoperative problems could not be managed adequately at home. This study was undertaken to assess the experience with DCLC at this center with regard to feasibility, safety, postoperative management of pain, vomiting, and other complications, hospital re-admission rate, and patient satisfaction.

Methods. All consecutive patients who were admitted to the day-surgery unit for laparoscopic cholecystectomy at the Department of Surgery, King Saud Medical City, Riyadh, Saudi Arabia from July 2009 to June 2013 were considered for this retrospective study. Ethical approval was obtained from the hospital research committee before the beginning of this study. Patients whose surgeries were canceled on the day of surgery due to a new illness, or deranged chronic illness were excluded from the study. The process of assessing and managing followed the day surgery protocols in the hospital. Patients were assessed in the outpatient clinic by a board certified general surgeon and anesthetist in the same week, and were scheduled for surgery if patients agreed to the day procedure and met the inclusion criteria. The inclusion criteria were: 1) adult patients ≥16 years; 2) American Society of Anesthesiology (ASA) grade I & II; 3) symptomatic uncomplicated gallstone disease; 4) normal liver function tests; 5) patient's residence in Riyadh; 6) adult company overnight at home until next morning after surgery; and 7) body mass index <35. The exclusion criteria were: 1) ASA grade >II; 2) history of acute cholecystitis; 3) clinical or radiological evidence of acute cholecystitis; 4) thickening of the gallbladder wall, or mass in ultrasound; 5) suspicion of stone in the common bile duct; 6) previous major or complicated upper abdominal surgery; 7) patients who require extra monitoring and observation during the early postoperative period such as insulin-dependent diabetes or epilepsy; 8) patient's residence outside Riyadh; 9) pregnant patients; and patients who were deemed unfit for anesthesia and surgery due to new illness, such as upper respiratory tract infection, or uncontrolled hypertension. All patients had symptomatic cholelithiasis that was confirmed by ultrasonography, and signed a written informed consent for anesthesia and surgery. The procedures were described to each patient, including the potential complications, possibility of conversion to open surgery, and hospital admission. Patients were briefed on the administrative procedures involved in a day surgical procedure. They were also informed of the expected postoperative pain, nausea, and vomiting that could occur at home after surgery. All patients were instructed to fast beginning at 12 AM, and arrive, accompanied by an adult person at the day surgery unit at 6:30 AM on the day of surgery. The patients were admitted for surgery between one to 3 weeks from the clinic visit. They were placed as the first and second case on the morning operating list. On the morning of surgery, patients were reassessed by the anesthetist, and the surgeon scheduled to perform the operation; the surgeon was assisted by a house staff. Cleansing the umbilicus with 10% povidone-iodine solution is a routine patient care. All patients also received a single intravenous dose (750 mg) of cefuroxime at the induction of anesthesia, and wore antiembolic graduated stockings. Total intravenous general anesthesia was provided with propofol infusion, rocuronium, fentanyl, and sevoflurane with oxygen. An intravenous infusion of 1-2 L of crystalloid solution was given to all patients during the operation. All patients underwent laparoscopic cholecystectomy through a standard 4-port technique with intra-abdominal carbon dioxide pressure set at 12-14 mm Hg. All patients were operated on by a consultant, or a higher surgical trainee (HST) in the general surgery training program; the trainee was supervised by a consultant. Right upper quadrant saline wash with, or without a subhepatic drain was performed in patients with difficult dissection,

intraoperative bleeding, or bile spillage due to gallbladder perforation. At the end of surgery, all patients were given one dose of ondansetron to prevent postoperative nausea and vomiting, and all port sites were injected with combined adrenaline and bupivacaine. Postoperatively, the patients were transferred to the day surgery unit for close observation by a senior nursing staff for 4-8 hours. Postoperative pain, nausea, and vomiting were managed with nonsteroidal anti-inflammatory drug (NSAIDs), paracetamol infusion, and metoclopramide as required. Every patient was assessed for discharge by the operating surgeon. The discharge criteria included normal vital signs, no nausea, or vomiting, tolerance to oral feeds, normal voiding, and full mobility. The pain was assessed by visual analogue scale. A cutoff pain score of ≥7 was defined as excessive, and mandated overnight stay. All patients were given paracetamol and ibuprofen to take regularly for 48-72 hours. Upon discharge from the hospital, a telephone number to contact the day surgery unit for any advice was provided to all patients. Patients were directed to come to the emergency department (ED) for persistent complaints. All patients were seen at the outpatient clinic at one week and 6 weeks after the surgery, and were discharged if found well and asymptomatic. The patients were contacted by telephone at the beginning of this study, and requested to answer the following questions: 1) was the pain control adequate with analgesics provided?; 2) did they visit any other health care facility for any complain?; and 3) what was their satisfaction rating on a scale of 1-10 for the procedure? Their response were documented at the time of interview on a form designed for this study, along with the patient data from medical records review. The data included age, gender, presenting symptoms, laboratory findings, imaging studies, American Society of Anesthesiology (ASA) grade, anesthesia, conversion rate to open cholecystectomy, complications, experience of the operating surgeons, postoperative pain management, nausea, and vomiting, admission to the general ward, readmission after discharge, outpatient follow up, morbidity, and mortality. Single entry method was used for all data collection by authors and analyzed. Medline search was used to retrieve the relevant literature in English.

The Statistical Package for Social Sciences version 19 (IBM Corp., Armonk, NY, USA) was used for data analysis. The chi-squared test and Fisher's exact test were used for comparisons of nominal variables. Student's t-test was used for independent groups' comparisons between the 2 methods with respect to numerical variables. $P<0.05$ was considered statistically significant.

Results. A total of 523 patients were admitted to the day surgery unit over a 48-months period. Thirty-six patients were excluded from the study as they had high blood pressure (n=4), high blood sugar (n=12), and upper respiratory tract infection (n=20). The remaining 487 patients were assessed and judged to be suitable for DCLC. The female to male ratio was 7:1 (426 females and 61 males), and the median age was 42 years (range 17-65 years) (**Table 1**). A total of 316 patients were ASA grade I, while 171 patients were grade II. No patient with an ASA grade >II was included in this study. A total of 417 patients were operated by HSTs while 70 patients underwent operation performed by consultants (**Table 2**). Surgery was converted from laparoscopic to open cholecystectomy in 4 patients (0.82%). Conversion to open surgery was due to adhesion and difficult anatomical dissection in 3 patients and complete transection of common hepatic duct in one patient. An end-to-side hepaticojejunostomy for the common hepatic duct transection was successfully performed by hepatobiliary surgeons during the index surgery. Sub-hepatic space were drained in 8 patients (1.64%), because of difficulty in anatomical dissection with significant intraoperative bleeding (n=3), and bile spillage due to gallbladder perforation (n=5). Gallbladder perforation although documented in 17 patients (3.49

Table 1 - Characteristics and distribution of 487 patients that underwent day-case laparoscopic cholecystectomy.

Variables	n	(%)
Gender		
Male	61	(12.5)
Female	426	(87.5)
Age		
Years	42	
Average, range	17-65	
ASA grade I	316	(65.0)
ASA grade II	171	(35.0)
Conversion to open surgery	4	(0.82)
Biliary injury	2	(0.4
Gallbladder perforation	17	(3.5)
Sub-hepatic drain	8	(1.6)
Intra-abdominal abscess	0	(0.0)
Admitted patients	22	(5.0)
Readmitted patients	2	(0.4)
Port site wound infection	5	(1.0)
Mortality	0	(0.0)
Satisfied patients	443	(97.0)
Unsatisfied patients	14	(3.0)

ASA - American Society of Anesthesiology

Table 2 - Distribution of patients undergoing day-case laparoscopic cholecystectomy according to the experience of the surgeon.

Variables	Operation performed by consultant	Operation performed by HST	*P*-value
Number of patients	70	417	
Operating time, minutes	35-45 (40 ± 5)	40-65 (55 ± 9.1)	<0.0001*
Gallbladder perforation, n (%)	4 (5.7)	13 (3.1)	0.218†
Biliary injuries, n (%)	1 (1.4)‡	1 (0.2)§	0.465†
Conversion to open surgery	1 (1.4)	3 (4.6)	0.465†
Admission	3 (4.3)	19 (4.6)	0.608†
Readmission	1 (1.4)	1 (0.2)	0.267†

*student's t-test for independent group ,†Fisher's exact test, ‡complete common hepatic duct, §cystic duct leak transection. HST - high surgical trainee

Table 3 - Reasons for patient hospital admission and readmission after day-case laparoscopic cholecystectomy.

Reasons	No. of patients
For admission	
Abdominal drain	8
Conversion to open surgery	4
Persistent pain	4
Nausea and/or vomiting	2
Patient desire	2
Social	2
For readmission	
Non-specific abdominal pain	1
Bile leak with intra-abdominal collection	1

%), a sub-hepatic drain was placed in only 5 patients. No intra-abdominal collection was reported in any of these patients. Twenty-two (5%) patients were not discharged on the day of surgery, they were admitted to the general surgical ward for different reasons (**Table 3**). The remaining 465 (95%) patients were assessed by the operating surgeon and discharged from the day surgery unit before 8 PM. A total of 5 patients (1%) visited the ED within 48 hours after surgery, complaining of abdominal pain with, and without nausea and vomiting. Three patients were examined, treated, and reassured in the ED, and discharged on the same day. Two patients (0.4%) were admitted to the hospital, one who was found to have normal biochemical and imaging results, and was discharged in an asymptomatic condition within 24 hours. The other patient was found to have biloma in the right subhepatic region caused by cystic duct bile leakage. He underwent ultrasound guided percutaneous drainage, endoscopic retrograde cholangiopancreatography (ERCP) with papillotomy and biliary stenting, and was discharged after 5 days in stable condition. Five patients were diagnosed with umbilical port site infection (1%) during the outpatient follow up. All were treated with oral antibiotics, and 3 of them also underwent wound drainage. Swab cultures were performed on the drained fluid, and all of those cultures were negative. Of the 487 patients, 457 (94%) could be contacted by telephone and were asked regarding their response on post-operative pain management, visit to other health facility for any complaints, and their satisfaction rating of the cholecystectomy as a DC surgery. A total of 443 (97%) patients were satisfied (median: 9; range: 8-10), while 14 (3%) were unsatisfied (median: 2; range: 1-5) primarily because of inadequate analgesia, persistent nausea, and vomiting. Five patients visited the ED between 20 to 48 hours after surgery, while most of the remaining patients managed with analgesics provided at the time of discharge from the hospital. No patient had visited any other medical facility for relief of postoperative complaints. There was no intra-abdominal septic collections or mortality in this study.

Discussion. The first LC performed as a day-case without overnight admission was reported in 1990.[7] Since then, many studies have documented the safety of DCLC.[3-6] Most of these studies come from the part of world where primary health care facilities are well integrated with hospital service. There is no reported experience of DCLC from this part of Saudi Arabia. This study was conducted to fill this gap, and assess the feasibility, safety, and patient acceptance of DCLC in this area. This study found that DCLC is feasible and safe in a selected group of patients with a very high patient acceptance rate. No patient had refused DCLC once offered, 95% could be discharged from the day surgery unit after LC, only 0.4% needed readmission to the hospital, and 97% were satisfied with the procedure.

Success of DCLC depends on proper patient selection. Routine LC performed on a day-case basis without specific patient selection has resulted in higher admission rate.[8] We believe that proper selection of patients for DCLC is essential for the success of the procedure. In the present series, DCLC patients were selected according to the hospital laid inclusion

and exclusion criteria, hence, the admission (5%) and readmission (0.4%) rates were low. The safety of DCLC has been demonstrated in older and high risk patients (ASA grade III) in some reports,[9] while other studies have concluded that a previous diagnosis of acute cholecystitis, acute biliary pancreatitis, and ASA >II were highly predictive of a hospital admission.[10] In the present study, no patients with higher ASA grade (>II) were included. Moreover, patients with clinical or radiological evidence of acute cholecystitis, biliary pancreatitis, evidence of CBD stone, or history of upper abdominal surgery were also excluded for this procedure.

In addition to patient selection, educating the patients regarding the expected postoperative pain, nausea, and vomiting that might occur has an important impact on the success rate of DCLC.[11] All patients in this study were informed regarding these symptoms to ensure that they could cope at home after surgery. However, some factors that lead to the failure of DCLC and increased admission rate cannot be recognized and avoided by preoperative assessment. These factors includes difficult anatomical dissection, persistent pain, nausea, and vomiting. Most of the admissions in this study were related to these factors. Selecting the most effective and appropriate anesthetics, analgesia, and perioperative anti-emetics can reduce the severity of postoperative pain, nausea, and vomiting, hence, it will reduce the rate of admission and help ensure the success of DCLC.[4] In the present study, nitrous oxide was not included in the anesthesia, and ondansetron was administered as an anti-emetic prophylaxis. All port sites were injected with combined adrenaline and bupivacaine to reduce postoperative pain. Multimodal analgesics were used postoperatively for pain control. These measures all seems to be important in reducing the rate of postoperative admission. Most of our patients were satisfied with the postoperative pain management.

Performing LC as a day surgery instead of as an inpatient surgery offers many advantages. It reduces cost for the health care provider and patients because of the short stay in the day surgery unit without occupying inpatient beds. It shortens the surgical waiting times.[12-14] Furthermore, it increases the number of beds available for other major elective and emergency admissions. It also improves the utilization of major operating rooms by allowing more free operating spaces.[4] The DCLC by allowing the patient to go home the same day lessens the impact on the family situation. Additional advantage of DCLC is the improvement of the training quality. It provides the opportunity for the postgraduate surgical trainees to perform a variety of surgical procedures under supervision, and be exposed to different policies in the management of surgical cases.[15] In the present study, 86% of DCLC was performed by HST. Although the performance of DCLC by HSTs was associated with longer operating times ($p<0.0001$), it did not result in increased complication, conversion to open surgery, admission for overnight stay, readmission, or delay in the operation schedule.

With all the advantages of DCLC, it should not jeopardize the safety of LC. In this study, there was one complete CBD injury (0.2%), which was successfully repaired during the index operation by the hepatobiliary surgeon. Another patient had a cystic duct bile leak, which was successfully treated by imaging and endoscopic intervention. Five patients were diagnosed and treated for umbilical port site infection. However, the complication of DCLC seen in this series is comparable to the inpatient laparoscopic cholecystectomy.[16,17] Even for the 2 patients who were readmitted, inpatient LC would not have affected their management; one patient who had normal biochemical and imaging results, and was discharged within 24 hours, and the second patient was diagnosed to have biloma on the 4th postoperative day.

In this study, the success rate (95%) and re-admission rate (0.4%) is comparable to the results of previous studies that performed DCLC with a success rate of 86-95%, and readmission rate of 1.5-8%.[4,18] However, the retrospective nature of this study limits the power of its recommendations. A well-controlled trial from this area will be needed to reinforce the findings of this study.

In conclusion, the study has shown that the day-case laparoscopic cholecystectomy is a safe procedure and feasible in our health facilities setup. Optimal patient selection, education, and planned postoperative antiemetic and analgesia management are essential components for the success.

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