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Laparoscopic Cholecystectomy and Management of Biliary Tract Stones in a Freestanding Ambulatory Surgery Center

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ABSTRACT

Objective: We conducted a retrospective 4-year study of patients undergoing laparoscopic cholecystectomy at a freestanding ambulatory surgery center. Data on rates of hospital admission, conversion to open surgery, bile duct injury, postoperative bile leakage, and incidence of choledocholithiasis were analyzed. The success rate for dynamic fluoroscopic intraoperative cholangiography was computed, and outpatient laparoscopic common bile duct exploration and anesthetic management were reviewed.

Methods: Patient charts from the ambulatory surgery center, office, and hospital were reviewed over a 4-year period commencing in October 1999. All cases were performed by 1 of 3 surgeons who are experienced with outpatient laparoscopic cholecystectomy and practice routine dynamic fluoroscopic intraoperative cholangiography.

Results: A total of 338 laparoscopic cholecystectomies were performed. Dynamic fluoroscopic intraoperative cholangiography was successfully performed in 89% (n=302). No instances of bile duct injury or conversions to open surgery were reported. A 0.89% (n =3) incidence of postoperative bile leak occurred. Six patients were admitted for inpatient care for a rate of 1.78%. Choledocholithiasis occurred in 2.0% and was managed successfully in the ambulatory setting.

Conclusion: Laparoscopic cholecystectomy can be adapted to the freestanding ambulatory surgery environment with very high standards of care and very low complication rates.

Key Words: Ambulatory surgery, Cholangiogram, Choledocholithiasis, Laparoscopic cholecystectomy, Laparoscopic common bile duct exploration.

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INTRODUCTION

Laparoscopic cholecystectomy (LC) has become the standard therapy for symptomatic cholelithiasis. The outpatient management of elective cases has become common in many institutions. This trend has been driven by the significant cost savings that have been documented when outpatient LC is compared with the cost of inpatient care. Despite this trend, Medicare has not approved LC in freestanding ambulatory surgical centers (ASC). Some private insurance companies following the lead of Medicare do not cover LC in freestanding ASC. Pennsylvania has attempted to curtail LC in freestanding ASC citing safety concerns. There is very little data in the literature regarding LC in freestanding ASC. A Medline search found only 2 small series of 55 and 66 patients reported.[1,2] Our study reviews a 4-year retrospective series of 338 patients operated on for elective LC in a freestanding ASC. Routine dynamic fluoroscopic intraoperative cholangiography (DFIOC) was performed, because this has been documented in several studies to reduce the incidence of bile duct injuries.[3,4] Routine DFIOC also allows the detection of common bile duct (CBD) stones. These may be dealt with by concurrent laparoscopic common bile duct exploration (LCBDE) at the same time as LC. LCBDE has been shown in controlled studies to be as effective as or superior to endoscopic retrograde cholangiopancreatography (ERCP) for the treatment of choledocholithiasis.[5] LCBDE at the same time as LC has been shown to be the most cost-effective approach to treating choledocholithiasis.[6] Our experience with LCBDE in a freestanding ASC is reviewed. The frequency of hospital admission after LC at a freestanding ASC and rates of conversion from LC to open cholecystectomy are calculated. Further, the cost of outpatient LC at a full service community hospital is compared with the cost at the freestanding ambulatory center.

METHODS

Patient Demographics

A 4-year retrospective review of all patients undergoing LC from October 1999 to December 2003 at the Center for Ambulatory Surgery and Endoscopy of Southeastern New

Mexico (CASE of NM) was undertaken. Of the 338 patients in this study, 80% (n=272) were female, 20% (n=66) were male. The average age of female patients was 42, and the average age of male patients was 48. Because patients on Medicare were not included in this group (LC is not included on Medicare's list of covered procedures at an ASC), our patients tended towards a younger age. LC was performed electively and preoperative evaluation was completed at a prior office visit.

ASA Status

ASA Class I patients comprised 15% (n=50), ASA Class II 79% (n=266), and the remaining 6% (n=21) were considered ASA Class III. No patients were above ASA Class III. Anesthesia was provided by certified registered nurse anesthetists.

Procedure

All patients were operated on by 1 of 3 experienced attending surgeons performing LC at the ASC during this time frame. All surgeons practiced routine DFIOC and used a standard 4-port laparoscopic technique. A 10-mm port was placed at the umbilicus, a second 10-mm port in the epigastrium, and two 5-mm ports on the right side (one in the subcostal position in the anterior axillary line and the second at the level of the umbilicus). DFIOC was accomplished using the Arrow-Karlan laparoscopic cholangiography balloon catheter (Arrow International, Inc. Reading, PA) and the American Catheter guide. The technique has been described in detail.[7] Laparoscopic cautery scissors were used for dissection. When choledocholithiasis was discovered, LCBDE was carried out using both transcystic duct and choledochotomy approaches. The Multiple Instrument Guide (MIG) (Lapsurgical Systems, LLC, Roswell, NM) was used in conjunction with the 2.8-mm flexible Olympus choledochoscope (Olympus Corporation, Melville, NY). The use of the MIG for LCBDE has been previously described in detail.[8]

Anesthetic Technique

Surgery was performed with the patients under general endotracheal anesthesia (GETA) with controlled ventilation and muscle relaxation. Standard monitoring was used for all patients: noninvasive blood pressure, EKG, Sa02, and temperature. An orogastric tube was placed only if the stomach was noted by the surgeon to be distended. Anesthesia was induced with propofol in all patients and maintained with oxygen in air and desflurane or sevoflurane. Residual neuromuscular block was reversed at the end of the procedure.

Rofecoxib (Vioxx) 50mg was given to patients preoperatively. Intraoperatively, all patients received opiates, sufentanil (64%), and fentanyl (33%) and nonopiate adjuncts like ketorolac. Intraoperatively, the incision site was infiltrated with bupivacaine 0.5% or ropivacaine 0.5%. Patients were given supplemental narcotic (fentanyl) in the PACU as needed. Hydrocodone or oxycodone was prescribed for pain after discharge except in patients allergic to the drugs or their known side effects.

Postoperative nausea and vomiting (PONV) prophylaxis was given to 75% of our patients intraoperatively. Metoclopramide, droperidol, ondansetron, or dolasetron, or a combination of these was administered as prophylaxis for PONV. Occasional patients were sent home with promethazine suppositories.

As with all ASC, we require a responsible adult to escort the patient home after the procedure and to be present the night of the surgery in the event that any complications should develop.

RESULTS

Pathology

The excised gallbladder was sent to the pathology laboratory and examined. The resulting diagnoses were taken from the pathology report. Percentage of patients exhibiting chronic cholecystitis with cholelithiasis was 70% (n=234), patients exhibiting chronic cholecystitis was 17% (n=56), and patients diagnosed with cholesterolosis was 6% (n = 20). Acute cholecystitis with cholelithiasis was found in 4% (n=15) of patients. The remaining 3% (n=10) were judged to have normal gallbladders.

Dynamic Fluoroscopic Intraoperative Cholangiography

DFIOC was successfully completed in 89% (n=302) of these patients. Failure to achieve an adequate DFIOC was often the result of extremely small cystic duct diameter, being less than the diameter of the cholangiography catheter. In these cases, careful dissection and attention to anatomic detail (critical view) was relied upon exclusively. This DFIOC technique has not been plagued by false-positive results leading to unnecessary bile duct exploration.

Bile Duct Injury

The incidence of bile duct injury was 0% (n=0) in this study, a value we attribute to surgeon experience, careful dissection, and routine DFIOC.

Postoperative Bile Leakage

The incidence of postoperative bile leakage was 0.9% (n=3). One of these leaks was felt to have originated from the Duct of Luschka and was treated with catheter drainage. The second leak occurred in a patient who went skiing 2 weeks postoperatively and fell. Adherent omentum pulled eschar off the gallbladder fossa, and this resulted in a bile leak. This presented with intense right subcostal pain. Diagnostic laparoscopy revealed the problem. This was treated with a JP drain, and recovery was uneventful. The third leak occurred in a patient undergoing LCBDE and is discussed further below.

Incidence of Choledocholithiasis

Choledocholithiasis was detected in 2% (n=7) of patients and was successfully managed using LCBDE techniques. One transcystic duct LCBDE and 6 choledochotomy LCBDEs were used. The MIG was used in 5 of these cases to facilitate stone extraction. Within this choledochotomy group, a T-tube was placed in 3 patients, and primary closure was achieved in the other 3. Successful stone clearance was achieved in 100% (n=7) of these patients, and the patients were allowed to return home that same day. One patient that had the choledochotomy closed primarily required hospital admission and laparoscopic placement of a T-tube, as the choledochotomy closure leaked, and the JP drain did not prevent bile peritonitis.

Operative Time

Median operative time for LC with routine DFIOC was 46 minutes (mean, 51), with a range from 25 to 230 minutes. The small number (n=10) of cases with operative time greater than 100 minutes were often dual procedures, in which another patient problem (hernia and others) was corrected at the same time as the LC was performed. In cases with choledocholithiasis, median operative time for LC with DFIOC and LCBDE was 134 minutes (mean, 120 minutes), with a range from 63 to 208 minutes.

Anesthesia

No primary admissions or readmissions were necessary because of anesthesia-related complications, difficulty in controlling pain or PONV. The mean length of stay in the PACU was 80.1 minutes; the median time was 70 minutes.

Hospital Admission

Percentage of patients requiring admission to the hospital was 1.78% (n=6). The first experienced pleuritic chest pain. Admission was necessary to rule out pulmonary embolism. The second developed pancreatitis 12 days postoperatively. This was one of the patients in whom DFIOC was not achieved. The third was a diabetic patient who developed a subhepatic abscess postoperatively and was treated by placement of a percutaneous drain. The fourth and fifth patients developed postop bile accumulations. The fourth from a Duct of Luschka leak and the fifth from trauma secondary to a fall while skiing. These leaks were treated by placement of a drainage catheter in the subhepatic space. The sixth was among the patients who underwent LCBDE. This patient developed a bile leak after the choledochotomy was closed primarily. The closure was not watertight and had not been checked by cystic duct injection. We have since adapted our techniques to include the use of cholangiography and cystic duct injection while observing the choledochotomy closure to ensure a watertight seal. This patient required hospital admission and laparoscopic insertion of a T-tube to remedy this problem. The Jackson-Pratt peritoneal drain in the subhepatic space did not prevent bile peritonitis from developing in this patient.

Safety

There was a 0% rate of conversion to open surgery, necessity for blood transfusion, or death in this study.

DISCUSSION

LC in a freestanding ASC has been demonstrated to be safe and cost-effective. LC is a proven technique that has been used for over 15 years. Conversion of LC to open cholecystectomy in this select group of elective patients should be a rare event in the hands of qualified surgeons.

Pain control is a major factor affecting the ability of a patient to go home on the same day. Rofecoxib (Vioxx) was chosen to be given preoperatively because of a long half-life (17 hours) permitting once a day dosing and its effectiveness as an analgesic for postoperative pain. As a selective COX 2 inhibitor, it has no effect on platelet function and does not increase the risk of bleeding. It decreases postoperative narcotic analgesic requirement and thereby decreases nausea while improving activity

level.[9] The withdrawal of this drug by the FDA (because of cardiac complications that occur after 13 months of chronic usage) is felt to be a significant loss of a valuable nonnarcotic analgesic that was very useful in relieving acute postoperative pain.

PONV can be a significant problem after the LC procedure. Relieving PONV is a major determinant of patient satisfaction. The overall incidence of PONV is 44%/22% in LC patients treated with placebo antiemetics. The incidence in those treated with metoclopramide is 32%/8% and with ondansetron is 45%/4%.[10] Our numbers for PONV (4%/1%) are lower than those in most studies reviewed. Several reasons for this could be hypothesized: our data are limited to the predischarge period, our multimodality approach to PONV may be very effective, or PACU nurses may not have documented PONV data rigorously in this retrospective study. Another reason may be that propofol was used as an induction agent. Propofol is desirable as an induction agent because of its antiemetic properties and because of its association with more rapid awakening and discharge.[11]

Opioids enhance the tendency to PONV and cause spasm of the Sphincter of Oddi. The latter may create a false impression of gallstones impacted in the CBD during cholangiography. When short-acting narcotics are used in modest doses at induction, the effects may regress by the time cholangiography is performed.[12] It is worthwhile to use nonopioid analgesics like ketorolac before cholangiography to limit the use of opioids. A multimodal approach to pain works well, ie, local infiltration of the wound and IV opiates and nonopiates.

In the attempt to make LC as safe as possible, we believe that routine DFIOC is a vital step in all LC procedures. A cohort analysis of Medicare patients undergoing cholecystectomy from 1992 through 1999 showed that not using an IOC during cholecystectomy was associated with a 50-fold to 70-fold increase in CBD injury.[3] A previous study of ours has shown routine DFIOC adds an average of 4.3 minutes to the LC procedure, an increase in time well worth the information gained.[7]

Hospital admission after outpatient LC in our freestanding ASC is uncommon (1.78%). The complications seen in this study would likely not be different had these patients been treated in a hospital-associated surgical facility. We do not feel that these patients' care was adversely affected by treatment in a freestanding ASC. In our study group, we did not deal with cases of gallstone pancreatitis. Gallstone pancreatitis has been shown to be a predictor of hospitalization, and these patients should be treated in an inpatient facility.[13] Though we did not include Medicare patients in this study, previous studies have demonstrated that age is not a significant contraindication to successful outpatient LC, and that the procedure can be performed successfully and safely in an unselected population of patients.[13,14]

Bile duct leaks occurred after elective LC in this study at a rate of 0.9%. The leak rate of 1/338 (0.29%) from Ducts of Luschka draining directly from the liver into the gallbladder through the gallbladder bed is comparable to rates mentioned in the literature.[15,16] These can occasionally be seen during the course of dissection and if identified should be clipped. The leak secondary to a fall while skiing in the early postoperative period perhaps should speak to the need to instruct patients to avoid contact sports for a more prolonged period of time.

Choledocholithiasis is rare in patients who would be selected for treatment at a freestanding ASC. However, choledocholithiasis is likely to be detected in about 2% of these patients, based on this study. These may be dealt with by a trained laparoscopic surgeon in an outpatient environment. Outpatient LCBDE is a feasible, effective treatment, as demonstrated by our 100% stone clearance rate. LCBDE at the time of LC precludes the need for pre- or postoperative ERCP and its approximate 10% risk of pancreatitis, which will be severe in about 1% of cases in which it develops.[17–19]

The cost savings for the patient at a freestanding ASC is significant. The cost of outpatient LC at our freestanding ASC is between $4,000 and $6,000. The cost for the same procedure (outpatient LC) at our local hospital is between $16,000 and $17,000.

CONCLUSION

We can identify no medical or safety issue that would explain why Medicare should not allow outpatient LC to be performed at a freestanding ASC. By failing to allow the choice of surgical venue, Medicare patients are forced to pay considerably higher costs for a level of care that has not been demonstrated to be safer than that of a freestanding ASC. Age not being a significant predictor of complications, choice of surgical venue should be between surgeon and patient. We feel that any healthy patient not deemed to be at high risk for complications should be given the option to be treated in a freestanding ASC for safe, effective care at a reasonable cost.

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