CASE REPORT JSLS

Laparoscopic Completion Cholecystectomy and Common Bile Duct Exploration for Retained Gallbladder After Single-Incision Cholecystectomy

Matthew Kroh, MD, Sricharan Chalikonda, MD, Bipan Chand, MD, R. Matthew Walsh, MD

ABSTRACT

Background: Recent enthusiasm in the surgical community for less invasive surgical approaches has resulted in widespread application of single-incision techniques. This has been most commonly applied in laparoscopic cholecystectomy in general surgery. Cosmesis appears to be improved, but other advantages remain to be seen. Feasibility has been demonstrated, but there is little description in the current literature regarding complications.

Patient and Methods: We report the case of a patient who previously underwent single-incision laparoscopic cholecystectomy for symptomatic gallstone disease. After a brief symptom-free interval, she developed acute pancreatitis. At evaluation, imaging results of ultrasonography and magnetic resonance cholangiopancreatography demonstrated a retained gallbladder with cholelithiasis. The patient was subsequently referred to our hospital, where she underwent further evaluation and surgical intervention.

Results: Our patient underwent 4-port laparoscopic remnant cholecystectomy with transcystic common bile duct exploration. Operative exploration demonstrated a large remnant gallbladder and a partially obstructed cystic duct with many stones. Transcystic exploration with balloon extraction resulted in duct clearance. The procedure took 75 minutes, with minimal blood loss. The patient's postoperative course was uneventful. Final pathology results demonstrated a remnant gallbladder with cholelithiasis and cholecystitis.

Conclusion: This report is the first in the literature to describe successful laparoscopic remnant cholecystectomy and transcystic common bile duct exploration after previous single-port cholecystectomy. Although inadvertent partial cholecystectomy is not unique to this technique, single-port laparoscopic procedures may result in different and significant complications.

Key Words: Single-port laparoscopy, Complications, Retained gallbladder.

INTRODUCTION

New technologies and surgical approaches continue to advance the field of minimally invasive surgery. Laparoscopy has revolutionized approaches to general surgical problems with improved outcomes of decreased postoperative pain and patients' quicker return to work. In large part because of these successes, natural orifice and single-site approaches have been adopted. Although enthusiasm for transvisceral approaches has waned, single-site operations have increased significantly. A PubMed search for "single-port laparoscopic surgery" generated 202 peer-reviewed articles in the past year, 163 articles in the year prior, and only 8 publications during the intervening 5 years from 5 to 10 years ago. Although many procedures have been described, it appears that the most common application for single-port surgery within general surgery is transumbilical cholecystectomy. Trials are currently underway and certain benefits have been suggested, but the only clear advantage at this time appears to be cosmesis.[1] Difficulties with single-port access procedures include external clashing secondary to lack of triangulation and possibly alterations in surgical approaches. As such, complications associated with this technique are now being described and include common bile duct injury, subcapsular hematoma, and incisional hernia.[2,3] We describe a case of laparoscopic completion cholecystectomy with transcystic common bile duct exploration for incomplete cholecystectomy after single-port cholecystectomy resulting in retained gallbladder and postoperative gallstone pancreatitis.

PATIENTS AND METHODS

A 51-year-old woman with symptomatic cholelithiasis underwent a single-port cholecystectomy using a single-port device at an outside hospital. The presence of gallstones

Department of General Surgery, Digestive Disease Institute, Cleveland Clinic, Cleveland, Ohio, USA (all authors).

Address correspondence to: Matthew Kroh, MD, Department of General Surgery, Digestive Disease Institute, Cleveland Clinic, Cleveland, OH, USA. Telephone: (216) 445-9966, Fax: (216) 444-2153, E-mail: krohm@ccf.org

DOI:10.4293/108680812X13517013317356

was confirmed by preoperative ultrasonography, and the patient did not have a prior history of pancreatitis or jaundice. The operative report from the outside hospital was reviewed. The operation was performed with a commercially available single-port trocar with 3 trocars for instruments and camera access. The report described dissection within Calot's triangle and securing both the cystic duct and cystic artery with clips. There was no specific description of removal of the adventitial tissue from Calot's triangle to obtain a critical view of safety. There was also no description of difficulties or unusual circumstances during the operation. Cholangiography was not performed during this operation, and the patient was subsequently discharged from the facility on postoperative day 0. On postoperative day 14, she presented to the same hospital emergency department with back and flank pain. She was found to have elevated amylase and lipase levels, so right upper quadrant ultrasonography was performed, which demonstrated an echogenic foci of stones in what appeared to be a cystic structure, or a dilated cystic duct. Ultrasonography also demonstrated a common bile duct dilated to 1.2 cm, but no distal stone was visualized. The patient was admitted and treated for acute pancreatitis with intravenous fluid resuscitation, analgesics, and slow reinstitution of diet. She was discharged after 3 days and was then referred to our facility as an outpatient for a retained remnant or duplicate gallbladder. As part of her workup, magnetic resonance cholangiopancreatography (MRCP) was performed **(Figure 1)**, which demonstrated a large gallbladder remnant with gallstones and normal caliber extrahepatic biliary tree. The patient was advised to undergo completion cholecystectomy with intraoperative cholangiogram.

Figure 1. MRCP. Arrow points to the remnant gallbladder with filling defects and normal extrahepatic biliary tree.

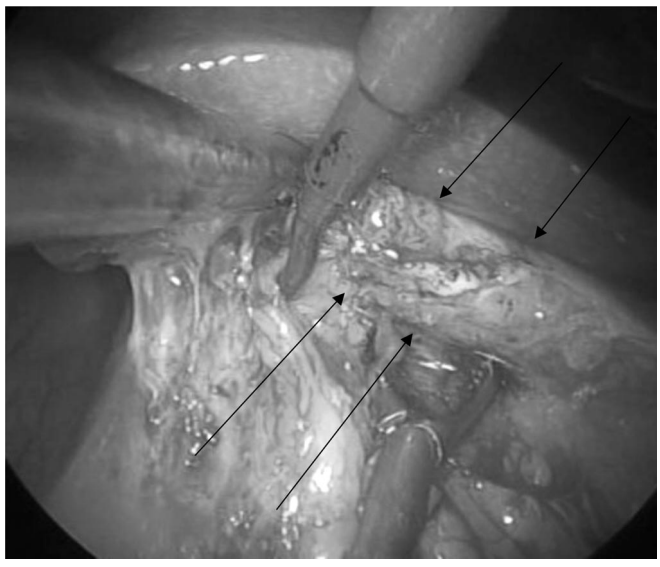

Figure 2. Laparoscopic view of remnant gallbladder during adhesiolysis. Black arrows denote the border of the gallbladder.

At operation, the patient was placed supine on a radiolucent bed. Entrance into the peritoneal cavity was obtained with a 5-mm optical trocar in the right subcostal region, given her previous intraumbilical incision. After abdominal insufflation, 2 additional 5-mm trocars were placed, one in the epigastrium and one in the right lower quadrant. After a brief sharp adhesiolysis, a 10-mm trocar was placed at the umbilicus. Inferior margin of the liver was carefully elevated, and a large dilated gallbladder remnant was identified **(Figure 2)**. The gallbladder remnant was retracted lateral and cephalad toward the right shoulder. The peritoneum overlying the cystic duct and gallbladder junction was opened, and the cystic artery and cystic duct were dissected out circumferentially. The hepatocystic plate was also partially mobilized, and a critical view of safety with normal hepatic parenchyma behind this structure was obtained **(Figure 3)**. One distal and two proximal clips were placed across the artery, a single clip was placed on the duct, and a small cystic ductotomy was made. The cystic duct was gently compressed, and several stones were removed retrograde through the cystic ductotomy. Cholangiography was performed and showed a normal-caliber common bile duct and common hepatic

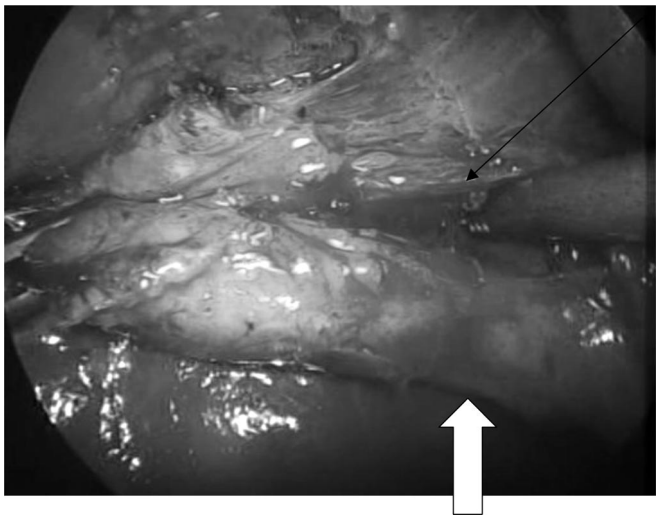

Figure 3. Critical view of safety. The cystic duct (white arrow) and the cystic artery (black arrow) seen to be the only 2 structures entering into the remnant gallbladder with normal liver demonstrated behind them.

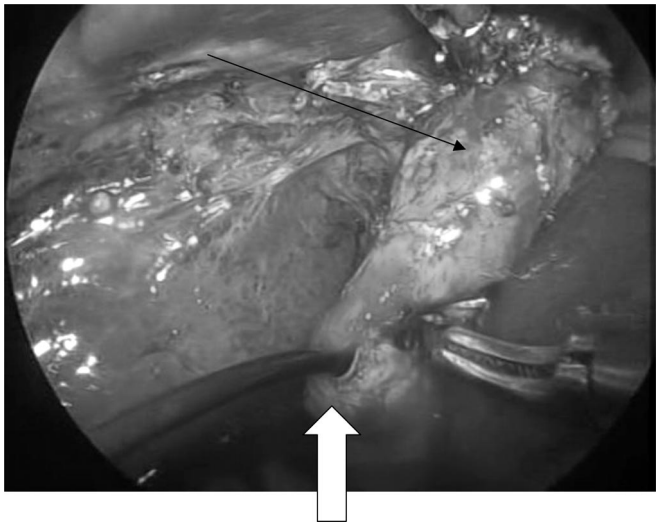

Figure 4. Laparoscopic transcystic common bile duct exploration with a balloon extraction catheter in the cystic duct. The white arrow depicts the cannula in the cystic duct; the black arrow shows the remnant gallbladder.

duct without filling defects, as well as free contrast flow into the duodenum. There were, however, several filling defects within the cystic duct at its insertion into the common bile duct. A transcystic common bile duct exploration was then performed using a commercially available kit. After dilation of the cystic duct, the access cannula was placed into the duct and a guidewire was inserted through this into the duodenum **(Figure 4)**. Under fluoroscopic guidance, a balloon extraction catheter was used to successfully remove several small stones retrograde through the dilated ductotomy incision. After several sweeps through the common bile duct, completion cholangiography was performed that showed complete clearance of the stones. The cystic duct was controlled with a suture tie, and both the cystic duct and artery were transected. The remnant gallbladder was dissected off the gallbladder fossa and removed in the standard manner. Examination of the gallbladder was performed immediately after its removal **(Figure 5a and 5b)**.

RESULTS

The procedure took 75 minutes, with minimal blood loss. No drain was left. The patient was discharged home on postoperative day 0. Follow-up in the office at 2 weeks

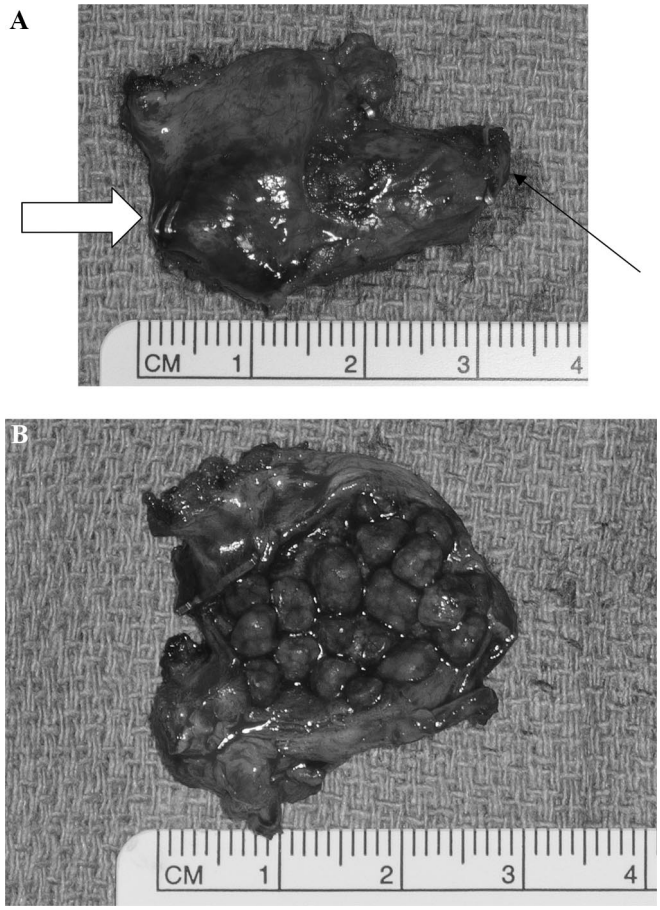

Figure 5. A, Gross specimen. The white solid arrow marks clips from the previous operation; the black thin arrow marks the clip on the cystic duct. B, The gross specimen, opened, demonstrating retained stones.

and by phone at 2 months showed the patient to be symptom free. Final pathologic results were consistent with chronic cholecystitis and cholelithiasis. The presence of the previously placed clips on the gallbladder fundus confirmed the diagnosis of retained gallbladder versus a duplicate or accessory gallbladder.

DISCUSSION

Minimally invasive surgery and its applications continue to progress. New techniques have been introduced to deliver equal surgical results in a less invasive manner. Single-port laparoscopy is an extension of this phenomenon. Advantages have been suggested and these may include less pain, but until more stringent trials are completed, cosmesis and potential complications from additional trocar sites appear to be the main differences. Drawbacks of this technique, unique from standard multitrocar laparoscopy, have also been identified. This is inherent to the single portal of access and may be related to technical considerations including external clashing of instruments, poor visualization of critical structures, and surgeon fatigue. Complications from single-port cholecystectomy have been described, although whether these are the result of the surgical approach or isolated events is unclear, and large-scale comparative trials against standard laparoscopic approaches have not been performed. In addition, the learning curve for these techniques has not been described. Currently, opportunities for training in single-site surgery are limited but include formal and informal fellowship training, continuing medical education courses sponsored by surgical societies, and industry-sponsored events including laboratory work and proctoring.

Planned partial cholecystectomy is a described technique when dissection is inhibited by severe inflammation, and it may prevent biliary injury in the setting of cholecystitis. Incomplete cholecystectomy may also arise inadvertently with incomplete dissection of Calot's triangle, resulting in transection of the gallbladder fundus instead of the cystic duct. Although inadvertent partial cholecystectomy was initially thought to have increased with the widespread adoption of laparoscopy, increased rates have not been seen in the surgical literature.[4] Retained gallbladder after cholecystectomy can manifest with symptoms similar to primary gallstone-related disease. Biliary symptoms after cholecystectomy are evaluated with ultrasonography, and typically in these cases this will demonstrate a cystic lesion containing stones.[5] MRCP can further delineate biliary anatomy, and it is considered a definitive test for diagnosis. Completion cholecystectomy, by means of laparotomy or laparoscopy, is the definitive treatment.[4,6]

As with all new technologies, single-port access procedures have inherent limitations. Request for patient consent for single-port techniques should include full disclosure of the risks, benefits, and alternatives to the procedure. Although there are not absolute contraindications to this technique, patient selection should be left to the surgeon's discretion. With the adoption of multitrocar laparoscopic cholecystectomy, there was a significant increase in common bile duct injuries. Although this rate improved with increased surgeon experience, the overall rate is still higher than with the open technique. Standardized techniques for safe laparoscopic cholecystectomy have been developed and have resulted in decreased rates of major biliary complications. Techniques of routine cholangiography to identify aberrant biliary anatomy and demonstration of the critical view of safety have improved the overall conduct of cholecystectomy. If single-port applications are to become widespread for cholecystectomy, the operation must not deviate from these protocols. Cholangiography can and should be used routinely to demonstrate biliary anatomical variants, strictures or stones, or to identify structures for safe gallbladder removal. Dissection in Calot's triangle must be complete to achieve a critical view of safety both to prevent major biliary injury and to perform a complete operation. This visualization may be compromised by a single port of access originating from the umbilicus by not allowing cephalad and lateral retraction of the gallbladder. The result may be biliary injury or, as in this case, incomplete cholecystectomy secondary to failure to remove all adventitial tissue in Calot's triangle.

Using different techniques including improved commercial access devices and instruments, as well as robotics, may improve retraction and/or dissection and may represent an improvement in conduct and safety over current manual single-port techniques.[7] Surgeons should also have a low threshold to add additional trocars to recreate relationships seen in standard laparoscopy or convert to open procedures as dictated on an individual patient basis. Recreation of a safe cholecystectomy technique, either laparoscopic or open, must be paramount for single-port procedures, especially in light of the relative improvement over standard laparoscopy. In this particular case, incomplete cholecystectomy resulted in acute gallstone pancreatitis requiring hospitalization and then an additional surgical procedure for definitive care.

CONCLUSION

This detailed report is the first in the literature to describe successful laparoscopic remnant cholecystectomy and transcystic common bile duct exploration after previous single-port cholecystectomy. Although inadvertent partial cholecystectomy is not unique to single-port techniques, careful attention to performing the appropriate procedure, regardless of technique, must be achieved in the face of applying new technologies.

References:

1. Philips MS, Marks JM, Roberts K, et al. Intermediate results of a prospective randomized controlled trial of traditional four-port laparoscopic cholecystectomy versus single-incision laparoscopic cholecystectomy. *Surg Endosc*. 2012;26(5):1296–1303.

2. Krajinovic K, Ickrath P, Germer CT, Reibetanz J. Trocar-site hernia after single-port cholecystectomy: not an exceptional complication? *J Laparoendosc Adv Surg Tech A*. 2011;21(10): 919–921.

3. Hansen AJ, Augenstein J, Ong ES. Large subcapsular liver hematoma following single-incision laparoscopic cholecystectomy. *JSLS*. 2011;15(1):114–116.

4. Pernice LM, Andreoli F. Laparoscopic treatment of stone recurrence in a gallbladder remnant: report of an additional case and literature review. *J Gastrointest Surg*. 2009;13(11):2084–2091.

5. Demetriades H, Pramateftakis MG, Kanellos I, Angelopoulos S, Mantzoros I, Betsis D. Retained gallbladder remnant after laparoscopic cholecystectomy. *J Laparoendosc Adv Surg Tech A*. 2008;18(2):276–279.

6. Walsh RM, Ponksy JL, Dumot J. Retained gallbladder/cystic duct remnant calculi as a cause of postcholecystectomy pain. *Surg Endosc*. 2002;16(6):981–984.

7. Kroh M, El-hayek K, Rosenblatt S, et al. First human surgery with a novel single-port robotic system: cholecystectomy using the da Vinci single-site platform. *Surg Endosc*. 2011;25(11): 3566–3573.