CASE REPORT

Single-Incision Cholecystectomy for Left-Sided Gallbladder

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ABSTRACT

True left-sided gallbladder (sinistroposition) is a rare anatomic anomaly in which the gallbladder is found to the left of the falciform ligament, under the left lobe of the liver. Though uncommon, it is important for the surgeon to recognize this finding because the ductal anatomy is unique and the mechanics of the operation provide a technical challenge. Multiple case reports have documented safe management of sinistroposition encountered during conventional laparoscopic cholecystectomy. We present a case of sinistroposition encountered during a single-incision laparoscopic cholecystectomy. We believe that the single-site laparoscopic technique is not only a safe option but may actually provide certain benefits in approaching this difficult anatomy in the properly selected patient and the experienced single-site surgeon's hands.

Key Words: Single-incision laparoscopy, Single-site laparoscopy, Suture retraction technique, Sinistroposition, Left-sided gallbladder.

INTRODUCTION

First described in 1886 by Hochstetter, left-sided gallbladder remains a rare anomaly.[1] In a multicenter series of laparoscopic cholecystectomies completed in Hungary, its prevalence was found to be 0.3%.[2] True left-sided gallbladder (sinistroposition) occurs when the gallbladder is found to the left of the falciform ligament, beneath the left lobe of the liver. It is located between segments III and IV or on segment III of the liver. The ductal anatomy of sinistroposition is of key importance to the surgeon. The course of the cystic duct in sinistroposition has been classically described as joining the hepatic duct on the right side in a right-to-left manner, thus creating a hairpin turn anterior to the hepatic duct.[2] Less common, the cystic duct has been noted to join the common hepatic duct or left hepatic duct from the left side. Given this variable ductal anatomy, proper identification is essential for the safe completion of cholecystectomy when this anomaly is encountered.

Sinistroposition often is encountered unexpectedly in the operating room because common preoperative imaging, such as ultrasonography (US), fails to recognize this variant anatomy.[1,3] Initially, the safe completion of laparoscopic cholecystectomy in patients with sinistroposition was questioned and reasonably so, given its variable ductal anatomy. However, numerous case reports have documented safe laparoscopic removal of the rare left-sided gallbladder.[1,4] As expected, these reports stress the proper identification and management of sinistroposition's ductal anatomy.[1,4,5] If the anatomy is ever in doubt, intraoperative cholangiography is recommended.[1]

Single-incision laparoscopy is currently among the techniques at the forefront of minimally invasive surgery. Many techniques have been described, from a single skin incision with multiple ports placed through the fascia within the area under the single skin opening to use of a commercially available "single port" with multiple working channels. Regardless of technique, reports have shown single-incision laparoscopy to be safe and effective in cholecystectomy.[6,7] Some of the proposed benefits of single-incision surgery include improved cosmesis, less postoperative pain, and the ability to convert to traditional 4-port laparoscopy.[8] At our institution, for our single-incision laparoscopic cholecystectomies, we use the suture retraction, or marionette, tech-

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nique. In this technique a single incision is made at the umbilicus with insertion of two ports: one for the camera and one for working. By passing sutures through the gallbladder fundus, body, and infundibulum, we are able to manipulate the gallbladder in an extracorporeal manner, eliminating the need for another port site.

CASE REPORT

A 34-year-old woman presented to our outpatient clinic with biliary dyskinesia. She had no medical or surgical history. Her symptoms included epigastric pain and postprandial nausea. Her diagnosis was confirmed by a right upper quadrant US, Cholecystokinin-Hepatobilary scan, and esophagogastroduodenoscopy. The results of her right upper quadrant US were negative, showing no stones. Her Cholecystokinin-Hepatobilary scan showed a decreased gallbladder ejection fraction of 19% and reproduction of symptoms at the time of Cholecystokinin injection. The options and expected outcomes were discussed with the patient. She consented to undergo laparoscopic cholecystectomy and was electively taken to the operating room. Of note, none of the preoperative imaging obtained provided any indication as to a diagnosis of sinistroposition.

In the operating room, the patient was approached in our standard manner. This entails entering the abdomen by use of techniques that allow us both a single site and the traditional, multiple-port laparoscopic approach. Once the laparoscope is placed in the abdomen and the abdomen is surveyed, the decision to proceed with single-site or traditional 4-port laparoscopic cholecystectomy is made. A semicircular supraumbilical incision was made. The umbilicus was encircled at the base and detached from the fascia below. The abdomen was entered through the umbilical fascial defect with a 5-mm optical trocar. The abdomen was insufflated to 15 mm Hg at which time a laparoscope was placed through the trocar and the abdomen was inspected. The gallbladder was normal in color, that is, the so-called robin's egg blue. However, the gallbladder was not in its expected anatomic location. It was encountered to the left of the falciform ligament, attached to segment III of the liver. Because the traditional port placement in the right upper quadrant would be less than optimal, the decision was made to proceed with a single-incision technique. This was based on the idea that the flexibility obtained by the suture retraction technique would be beneficial in this situation.

A second 5-mm trocar was placed through the same skin incision, just to the left and superior to the original trocar. A suture was then placed through the left anterior abdominal wall, into the fundus of the gallbladder, and back through the abdominal wall, essentially suspending the gallbladder from the abdominal wall. A second suture was placed through the anterior abdominal wall (epigastric region), into the body of the gallbladder in a figure-of-8 fashion, and back out the left lateral abdominal wall, thus allowing for manipulation. A third suture was placed in the same fashion as described earlier, this time passing through the infundibulum of the gallbladder and again exiting through the left anterior abdominal wall. This allowed us to manipulate the gallbladder in such a way as to expose the triangle of Calot (**Figure 1**). The peritoneum was stripped, exposing the cystic duct and artery. Both were dissected circumferentially, and the liver edge was exposed, allowing us to obtain a true "critical view" of the patient's anatomy (**Figure 2**). As shown in **Figure 2**, we found that the ductal anatomy in our patient with sinistroposition held true because the cystic duct entered the hepatic duct from the right side. The cystic duct and artery were then clipped and transected (**Figures 3** and **4**). An ultrasand dissection device scalpel was used to dissect the gallbladder off of the fossa (**Figure 5**). The sutures through the fundus and body of the gallbladder were removed. The suture through the infundibulum was securely grasped, allowing us to remove the gallbladder through the umbilical fascial defect.

DISCUSSION

First pioneered in the late 1980s, laparoscopic cholecystectomy has since revolutionized the surgeon's approach

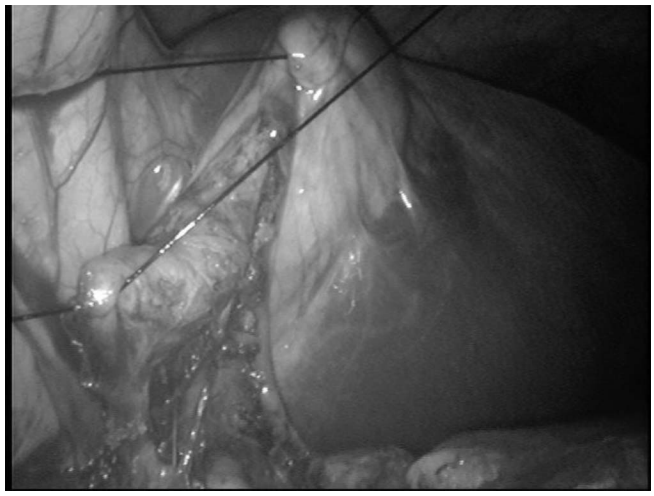

Figure 1. Suture retraction exposure of left-sided gallbladder. One should note that the falciform ligament lies to the right of the gallbladder and the gallbladder bed is within segment III of the liver.

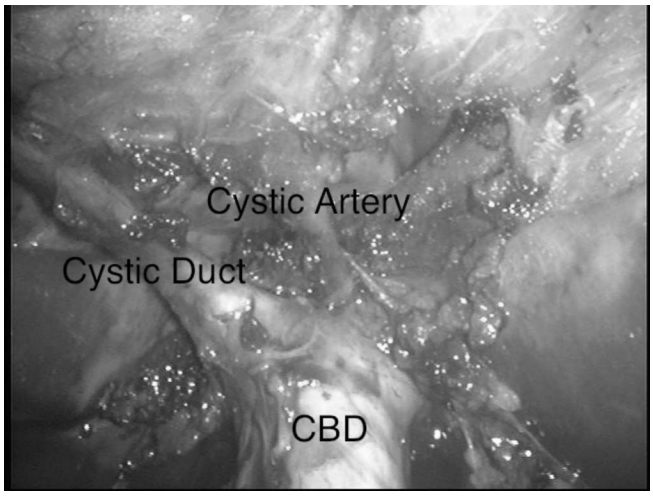

Figure 2. Dissected critical view. One should note that the cystic duct enters the common bile duct (CBD)/common hepatic duct from the right side.

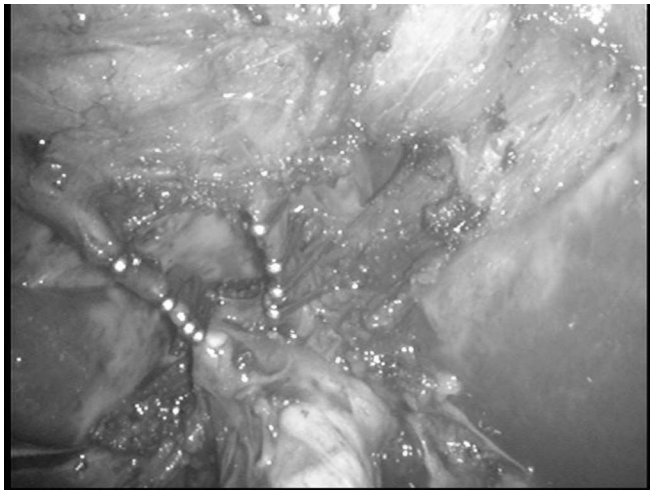

Figure 3. Cystic duct and cystic artery clipped with 5-mm clip applier.

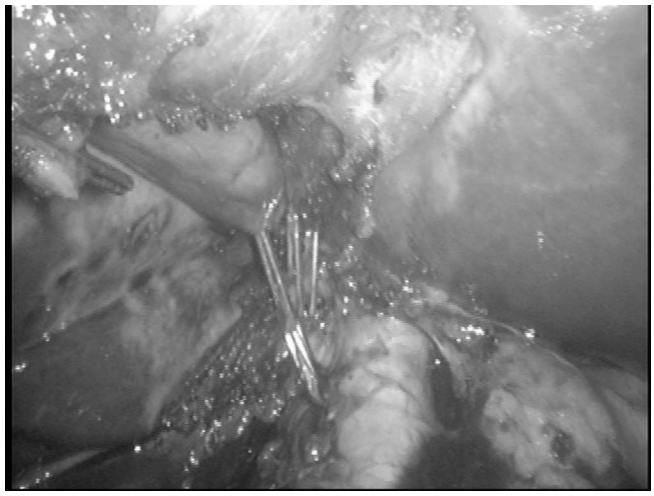

Figure 4. Cystic artery and cystic duct transected.

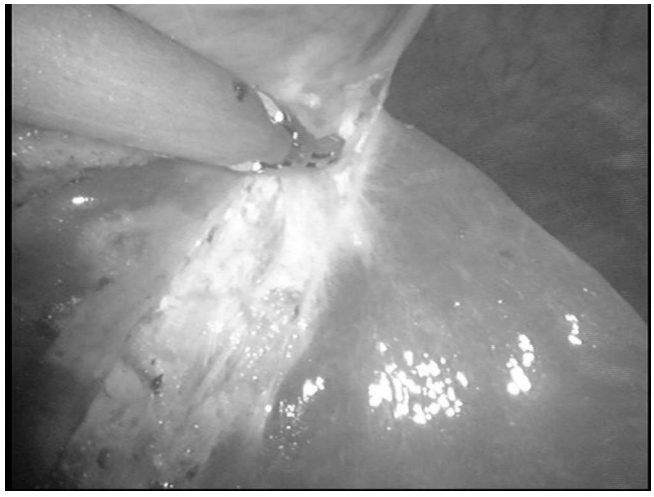

Figure 5. Gallbladder being removed from gallbladder bed with ultrasonic dissection device.

to gallbladder disease. With the advancement of laparoscopic skills and the continued high volume of gallbladder disease, laparoscopic cholecystectomy is one of the most common surgical operations in the United States. Given this fact, it is not surprising that despite its rarity, left-sided gallbladder (sinistroposition) is encountered at times during laparoscopic cholecystectomy.

Ductal anatomy and ergonomics both pose challenges when sinistroposition is encountered laparoscopically. As previously mentioned, multiple case reports have documented the safe removal of the gallbladder by means of conventional laparoscopic cholecystectomy when sinistroposition is encountered. These reports stress the proper identification of unanticipated ductal anatomy as the key to safe completion of the operation. In addition to the unexpected ductal anatomy, port placement and ergonomics also provide a challenge when sinistroposition is encountered. This is often more challenging for the right-handed surgeon, as has been documented in the literature regarding cholecystectomy in situs inversus totalis.[9] Dissection can be carried out in one of two ways. In the first manner, the surgeon attempts to mirror the steps used in a standard laparoscopic cholecystectomy. Thus the right hand would provide retraction and manipulation of the gallbladder, whereas the left would be used for dissection and clipping. Alternatively, some surgeons have advo-

cated a crossover technique in which the dominant hand (assuming right) is used for dissection and clipping whereas the nondominant hand (left) provides retraction.[9]

Although a single-incision technique does not entirely solve the difficulty of the right-handed surgeon operating on a left-sided gallbladder, it does simplify port placement and ergonomics. We believe that the use of single-incision laparoscopic surgery (SILS) is a safe alternative among the options for laparoscopic cholecystectomy in patients with sinistroposition. Although there are numerous methods for performing SILS, the overall concept bodes well for the unexpected anatomy encountered with sinistroposition. With a single port site, no further ports need be placed and the troublesome ergonomics faced by the right-handed surgeon when presented with a left-sided gallbladder is significantly reduced. We do admit that a learning curve exists for SILS. However, once one is facile with this technique, the same skill set is needed for both right- and left-sided gallbladders alike. The multichannel-port single-site technique is based on the surgeon's ability to work in tight quarters and have significant "crossover" of instruments. Likewise, the suture retraction (marionette) technique is easily adapted to the left-sided gallbladder. In our case and with the chosen single-site technique specifically, we believe that the ability to remove and replace the sutures to optimize exposure without creating additional incisions was of true benefit. In addition, the single working port allows the surgeon to operate with his or her dominant hand. We believe that this eliminates the difficulties of relying heavily on the nondominant hand when sinistroposition is encountered and allows for safe removal of the gallbladder.

CONCLUSION

We believe that single-incision laparoscopic cholecystectomy represents a valid and safe option for cholecystectomy when sinistroposition is encountered, granted that the operating surgeon is facile with the single-incision technique and aware of the aforementioned anatomic ductal variations.

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