Unusual Case

Robotic-assisted laparoscopic common bile duct exploration with hepaticojejunostomy for primary ductal stones in nonagenarians: A report of two cases

Vivyan W. Y. Tay¹, Zhongkai Wang¹, Brian K. P. Goh¹²

¹Department of Hepatopancreatobiliary and Transplant Surgery, Singapore General Hospital, Singapore, ²Duke-National University of Singapore Medical School, Singapore

Abstract

Experience with complex robotic-assisted laparoscopic (RAL) hepatobiliary and pancreatic (HPB) surgery remains limited to few tertiary institutions worldwide. In this report, we focus on biliary bypass surgery, one of the more complex HPB surgeries. Over the past few decades, the laparoscopic approach has gained preference over the open approach, but the robotic approach is still uncommon. Biliary bypass is also not often performed in nonagenarians due to its inherent-associated morbidity and mortality, and these patients typically have higher surgical risks. We present two cases of nonagenarians who had recurrent episodes of cholangitis secondary to multiple primary common bile duct (CBD) stones and ectatic bile ducts. Both the patients were treated conservatively over many years with repeated endoscopic retrograde cholangiopancreatography and stentings. They eventually presented to us and underwent successful RAL CBD exploration with hepaticojejunostomy.

Keywords: Bile duct exploration, choledocholithiasis, elderly, hepaticojejunostomy primary bile duct stones, robotic biliary surgery

INTRODUCTION

Biliary bypass surgery may be indicated in patients with benign and malignant extrahepatic biliary tract obstruction or congenital anomalies. The most common causes of benign extrahepatic biliary obstruction are choledocholithiasis, biliary strictures and sclerosing cholangitis. In the case of choledocholithiasis, first-line treatment is usually endoscopic retrograde cholangiopancreatography (ERCP) with removal of stones, followed by cholecystectomy to prevent recurrence. However, in elderly patients with ectatic bile duct, recurrent primary ductal stones are common and definitive treatment through the creation of biliary bypass in the form of Roux-en-Y hepaticojejunostomy (HJ) should be considered to avoid recurrent presentations and interventions. Here, we present our recent experience with two elderly patients above the age of 90 with primary bile duct stones, who underwent successful robotic-assisted laparoscopic (RAL) common bile duct exploration (CBDE) and HJ.

Access this article online

Quick Response Code: Website: www.journalofmas.com

DOI: 10.4103/jmas.JMAS_295_19

How to cite this article: Tay VW, Wang Z, Goh BK. Robotic-assisted laparoscopic common bile duct exploration with hepaticojejunostomy for primary ductal stones in nonagenarians: A report of two cases. J Min Access Surg 2020;16:431-4.
CASE REPORTS

Case 1
Patient 1 was a 93-year-old female, Eastern Cooperative Oncology Group (ECOG) 2, with previous cholecystectomy more than 20 years ago and multiple medical issues including ischemic heart disease, hypertension, diabetes and hyperlipidaemia. She was first admitted in 2010 for cholangitis and underwent an ERCP with sphincterotomy and biliary stent insertion. The patient subsequently defaulted follow-up for 9 years and was readmitted in March and July 2019 for recurrent cholangitis. Computed tomography (CT) scan performed during both admissions confirmed dilated biliary tree with multiple intraductal calculi measuring up to 3 cm. ERCP and stent exchange were performed. She was then referred for consideration for surgical treatment.

The patient underwent RAL CBDE and HJ. Port placements are illustrated in Figure 1. The robot (Da Vinci Si Surgical System) was docked from the patient’s head with the patient placed in reverse Trendelenburg position. The common bile duct (CBD) was transected and impacted stones were retrieved [Figure 2]. Choledochoscopy was performed from the second-order ducts to the ampulla of Vater. A retrocolic end-to-side Roux-en-Y HJ was fashioned. The intracorporeal jejunojejunostomy was created using Powered Echelon (Ethicon, USA), and the enterotomy was closed with V-Loc 3/0 (Medtronic, USA). An end-to-side HJ was created in a retrocolic fashion using Prolene 3/0 [Figure 3]. The operation time was 410 min and the estimated blood loss was 50 ml. The patient was transferred to surgical high dependency postoperatively and then to the general ward on post-operative day (POD) 2 and was discharged on POD 8.

Case 2
Patient 2 was a 96-year-old female, ECOG 2, who had a previous open cholecystectomy in 2005 for gangrenous cholecystitis, previous coronary angioplasty and hypertension. She had recurrent admissions in 2015 and 2016 for cholangitis for which ERCP was performed for stone extraction. The patient was then referred for surgery in view of multiple primary ductal stones with ectatic bile duct.

The patient underwent robotic laparoscopic choledochotomy, choledochoscopy and Roux-en-Y HJ. Port placement was similar to that of patient 1. Intraoperatively, dense adhesions secondary to previous cholangitis, endoscopic procedures and cholecystectomy

Figure 1: Diagram showing port placements – 12-mm subumbilical port for camera (C), 1 mm × 8 mm port in the right hypochondrium and 2 mm × 8-mm port in the left hypochondrium for robotic arms (R), 1 mm × 12 mm port in the right iliac fossa for an assistant (A) and a 12-mm port in the epigastrium for choledochoscopy (C2)

Figure 2: Retrieval of common bile duct stones

Figure 3: Creation of robotic hepaticojejunostomy
were noted. Anterior choledochotomy was performed, followed by choledochoscopy and removal of stones. Side-to-side HJ was created using V-Loc 3/0. The subumbilical camera port site was extended to 3 cm, and a hand-sewn extracorporeal anastomosis was used to create the jejunoojejunostomy with Vicryl 3/0. The operation time was 435 min and the estimated blood loss was 100 ml. The patient was transferred to high dependency postoperatively for monitoring and then to the general ward on POD 2. She was discharged on POD 7.

**DISCUSSION**

In today’s practice, the first-line treatment for CBD stones is ERCP, followed by interval cholecystectomy as the definitive management of gallstones. However, despite apparent complete clearance of stones during ERCP, recurrent CBD stones are found to develop in 3%–15% of patients. Other than the gallbladder in situ, other risk factors for stone recurrence can be related to conditions predisposing to biliary stasis, including bile duct dilation >15 mm and anatomy that may impede bile flow such as sharp angulation of CBD, periampullary diverticula, biliary strictures or papillary stenosis. In patients with recurrent CBD stones after cholecystectomy whereby predisposing factors are difficult to correct, biliary-enteric bypass should be considered.

While there are few studies on biliary bypass surgery specifically for the management of recurrent primary ductal stones after cholecystectomy, the surgery, in general, is reported to have mortality rates up to 6.5%. Furthermore, it is associated with high morbidity risks such as cholangitis, bile leak and anastomotic leakage. Hence, the role of surgery is limited to patients with recurrent CBD stones that are refractory to non-surgical management. Naturally, these risks are expected to be higher in elderly patients who are often frailer and have more comorbidities.

The type of surgical approach plays a significant role in determining a patient’s overall clinical outcome. Numerous studies show that minimally invasive surgery (MIS) has many potential advantages as compared to open surgery. With MIS, smaller incisions cause less pain to patients, allowing quicker recovery. This translates to lower rates of post-operative complications such as pneumonia, urinary tract infections and deep vein thrombosis which are frequently related to prolonged hospitalisation and immobility. This is especially so in patients undergoing biliary surgery whereby the most common open incision is the muscle-cutting Kocher’s incision that often results in significant upper abdominal pain, impairing deep respiration, hence putting patients at increased risk of developing respiratory complications.

After the advent of laparoscopic surgery in the late 1980s, robotic surgery was shortly introduced. Despite advancements of laparoscopic technology, inherent limitations of conventional laparoscopy remain. They include restriction in movement and dexterity due to rigidity of instruments, tremor amplification from surgeon and assistant holding the camera and lack of depth perception. RAL surgery was first introduced to overcome these limitations. It provides three-dimensional view, improved dexterity and elimination of tremors. This is especially important in biliary surgery as it enables surgeons to perform precise biliointestinal anastomosis with lesser difficulty and with shortened learning curve, unlike conventional laparoscopy.

In the above-mentioned two case reports, the HJ anastomosis was performed robotically, allowing precise suturing. In our opinion, MIS is especially beneficial in elderly patients as the surgical incision is minimised, which decreases post-operative pain, enabling them to become more mobile quicker and hence a faster recovery.

Despite the above advantages, the RAL approach inevitably leads to longer operative time than the open approach as it demands dexterity and hand-eye coordination. Longer operative time will require judicious management by the anaesthetists. This could be disadvantageous in patients with multiple comorbidities for which a shorter duration of surgery is necessary to minimise the risk of general anaesthesia. Hence, careful consideration is needed to be taken to balance such risk versus the post-operative benefits. Despite its main drawback of having a relatively longer operative time compared to an open approach, the RAL approach is likely to be more beneficial to patients in terms of overall surgical outcome post-operatively.

**CONCLUSION**

The RAL approach for HJ and CBDE is feasible and can be performed safely in selected elderly patients with moderate...
functional status. In our opinion, MIS may be superior to the open approach in reducing post-operative morbidity in this vulnerable group of patients. However, careful patient selection and surgical planning is necessary, and further evaluation with clinical trials in larger patient cohorts is needed to confirm the advantages of RAL surgery versus conventional approaches.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**
Goh BK had received travel support and proctor fees from Transmedic Pte Ltd., the local distributor for the Da Vinci Si robotic system.

**Conflicts of interest**
There are no conflicts of interest.

**REFERENCES**

1. Hussain Talpur KA, Mahmood Malik A, Iqbal Memon A, Naeem Qureshi J, Khan Sangrasi A, Laghari AA. Biliary bypass surgery – Analysis of indications outcome of different procedures. Pak J Med Sci 2013;29:799-802.

2. ASGE Standards of Practice Committee, Maple JT, Ikenberry SQ, Anderson MA, Appalaneni V, Decker GA, et al. The role of endoscopy in the management of choledocholithiasis. Gastrointest Endosc 2011;74:731-44.

3. Yoo ES, Yoo BM, Kim JH, Hwang JC, Yang MJ, Lee KM, et al. Evaluation of risk factors for recurrent primary common bile duct stone in patients with cholecystectomy. Scand J Gastroenterol 2018;53:466-70.

4. Kadaba RS, Bowers KA, Khorsandi S, Hutchins RR, Abraham AT, Sarker SJ, et al. Complications of biliary-enteric anastomoses. Ann R Coll Surg Engl 2017;99:210-5.

5. Zafar SN, Khan MR, Raza R, Khan MN, Kasi M, Rafiq A, et al. Early complications after biliary enteric anastomosis for benign diseases: A retrospective analysis. BMC Surg 2011;11:19.

6. Goh BK, Lee SY, Chan CY, Wong JS, Cheow PC, Chung AY, et al. Early experience with robot-assisted laparoscopic hepatobiliary and pancreatic surgery in Singapore: Single-institution experience with 20 consecutive patients. Singapore Med J 2018;59:133-8.

7. Goh BK, Lee SY, Teo JY, Kam JH, Jeyaraj PR, Cheow PC, et al. Changing trends and outcomes associated with the adoption of minimally invasive hepatectomy: A contemporary single-institution experience with 400 consecutive resections. Surg Endosc 2018;32:4658-65.