Robotic Left Hepatectomy: a Case Report (First Reported Case of Robotic Hepatectomy in India)

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Abstract Robotic surgical platform is being increasingly used by liver surgeons for performing minimal invasive liver surgery, with results comparable to open surgery and added benefits of laparoscopic approach. The authors describe a case of robotic left hepatectomy done for recurrent pyogenic cholangitis. This is the first reported case of robotic hepatectomy done in India.

Keywords Robotic · Liver · Resection · Recurrent pyogenic cholangitis

Case Report

A 46-year-old male presented with history of recurrent fever with chills and abdominal pain since 2012. Endoscopic retrograde cholangiopancreatography (ERCP) done in September 2013 showed dilated left hepatic duct; papillotomy with balloon sweeping was done. Repeat ERCP and balloon sweeping was done for cholangitis in October 2014. ERCP for recurrent symptoms in March 2015 found dilated common bile duct, left hepatic duct, and left intrahepatic bile duct stricture; reaching a diagnosis of recurrent pyogenic cholangitis. Computed tomography (Fig. 1) showed cholangiolar abscesses in left lobe and intrahepatic bile duct dilation with pneumobilia. Magnetic resonance cholangiopancreatography showed mild dilation of common bile duct/left hepatic duct and left lateral segmental duct stricture with multiple pseudotumor in left

lateral segment (Fig. 2). Liver function test showed mild elevation of alkaline phosphatase (179 IU/L) and gamma-glutamyl transferase (101 IU/L); carbohydrate antigen 19–9 was elevated at 160 U/ml. Total robotic left lobe liver resection was performed after treatment for cholangitis. Intraoperative and postoperative course was uneventful; no blood transfusion was required, and patient was discharged after 5 days. Pathology showed dilated, inflamed bile ducts and intrahepatic abscesses, with no evidence of malignancy.

Surgical Technique

The patient was placed in supine position; general anesthesia was administered, and pneumoperitoneum was created using Hassan technique via an infraumbilical incision. Twelve-millimeter port was placed at the infraumbilical position for the robotic camera. Two 8-mm robotic ports were placed at the left upper quadrant and right upper quadrant, and a 12-mm trocar port was placed lateral to the umbilicus for the assistant.

The da Vinci-Si Surgical System (Intuitive Surgical Inc., Sunnyvale, CA, USA) robot was brought into position over the right shoulder of the patient and docked after placement of the ports. The operator moved to the robot console to control the robotic arms. The assisting surgeon remained at the patient's side to change robotic instruments and performed clipping, stapling, and mobilization through the assistant 12-mm trocar. Hilar dissection was performed, and left hepatic artery and portal vein were isolated and divided after ligation. Parenchymal transaction was then performed under low CVP using a harmonic scalpel (Ethicon Endo-surgery, Cincinnati, USA) and bipolar grasper with clipping of vessels and pedicles (Fig. 3). Left hepatic vein was divided using a vascular reticulating endoscopic stapler (Ethicon Endo-surgery, Cincinnati, USA). Left hepatic duct was clipped, divided, and suture

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Fig. 1 Computed tomography image showing cholangiolar abscesses in the left lobe and intrahepatic bile duct dilation with pneumobilia

ligated with 5–0 pds suture followed by hilar plate along caudate lobe. Cut surface was checked for hemostasis and bile leak and fibrillar applied near the hilar plate followed by placement of drain in the subhepatic space. The specimen was extracted via a 7-cm upper midline incision.

Discussion

Use of robotic surgical system for liver surgery was reported by Vibert E et al. [1] in 2003 where they used it for pedicle dissection and initial hepatotomy; since then, many case series have been published reporting on the safety, limited conversion rates, reasonable blood loss, and minimal postoperative morbidity, even for major hepatectomy [2–5]. This is the first reported case of robotic left hepatectomy in India.

Fig. 2 Magnetic resonance image showing mild dilation of common bile duct/left hepatic duct and left lateral segmental duct stricture with multiple pseudotumor in left lateral segment

Fig. 3 Intraoperative image showing liver parenchymal transection with harmonic scalpel and bipolar grasper

Robotic-assisted laparoscopic surgery overcomes the limitation of conventional laparoscopic instruments in performing liver surgery including depth perception, rigid instruments, and difficulty of suturing. The da Vinci-Si Surgical System provides surgeons with intuitive translation of the hand movements to the instrument tip, eliminating the mirror-image effect. In addition, a remotely controlled camera provides improved visualization with high-quality three-dimensional images and a stable camera platform with scaling, tremor filtering, and coaxial alignment of the eyes and EndoWrist, with a 360° range of motion, allowing more precise operating techniques (Intuitive Surgical Inc., Sunnyvale, CA, USA).

The potential drawbacks of this surgical approach are the separation of the console surgeon from the patient along with the concern of delay in open conversion due to robotic setup in cases of hemorrhage. In addition, a qualified assistant is required and robotic liver surgery requires significant experience with the robotic surgical system, laparoscopic surgery, and open hepatic surgery.

Conclusion

The authors report the first robotic left hepatectomy in India, adding on to the growing evidence on the feasibility and safety of robotic liver resections.

Conflict of Interest The authors declare that they have no competing interests.

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