



Research Communication

Robotic right hemihepatectomy for perihilar cholangiocarcinoma (with video)

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Perihilar cholangiocarcinoma is one of the most complex challenges for hepatobiliary surgeons owing to both anatomical and oncological reasons. Surgical resection remains the only potentially curative treatment and requires complex procedures such as major hepatectomy with extrahepatic bile duct resection and lymphadenectomy [1].

The introduction of minimally invasive methods has revolutionized liver surgery, offering benefits such as reduced postoperative pain, shorter hospital stays, and faster recoveries compared with open surgery [2–4]. Among these techniques, robotic-assisted surgery has become more popular owing to its distinct advantages, including superior 3-dimensional visualization, enhanced instrument articulation, and improved surgeon ergonomics [2,3]. These features are especially valuable for complex operations such as liver resection for perihilar cholangiocarcinoma, in which lymphadenectomy, vascular control, and biliary reconstruction are essential [2,3].

We present a Video (available online at <http://doi.org/10.1016/j.gassur.2025.102302>) of a robotic right hepatectomy with lymphadenectomy and Roux-en-Y hepaticojejunostomy for perihilar cholangiocarcinoma. A 69-year-old woman presented with jaundice. Magnetic resonance imaging showed dilatation of the intrahepatic bile ducts, stenosis of the right portal vein, and compensatory hypertrophy of the left liver. The findings were consistent with perihilar cholangiocarcinoma classified as Bismuth IIIa. After endoscopic retrograde cholangiopancreatography drainage failed, percutaneous biliary drainage was performed and the jaundice resolved. She was then transferred to

our care. The multidisciplinary team opted for upfront surgical treatment. A right hemihepatectomy with lymphadenectomy and Roux-en-Y hepaticojejunostomy was proposed. A robotic approach was indicated and consent was obtained. The decision to perform a right hepatectomy instead of a right trisectionectomy was based on specific aspects of this case. The bifurcation of the right and left hepatic arteries occurred early in the hepatic hilum. The left hepatic artery and the segment 4 artery (a branch of the left hepatic artery) were not involved by the tumor. There was also no involvement of the segment 4 bile duct. In addition, segment 4 was extremely hypertrophied. Therefore, removal of segment 4 was not justified for oncological or anatomical reasons. Liver volumetry showed that the future liver remnant volume was 59%, indicating adequacy. Because the bilirubin level was normal, the patient had no liver disease, and no neoadjuvant therapy was used, liver function was considered adequate based on volumetry alone.

The procedure included hilar lymphadenectomy and skeletonization of the portal triad (Fig. 1). The common bile duct was divided, and the distal bile duct was sent for frozen section, which was negative. Biliary stents were removed and sent for culture. Proximal and distal bile ducts were closed to prevent bile spillage. The right hepatic artery was ligated and divided between hemoclips. The right portal vein was ligated, resulting in ischemic delineation of the right liver, which was confirmed with fluorescence imaging after indocyanine green injection (Fig. 1). The right liver was then mobilized, and the percutaneous biliary drain was removed. Small retrohepatic hepatic veins were controlled with hemoclips. The liver was then transected under intermittent Pringle maneuver using robotic shears and bipolar forceps with saline irrigation. Larger vessels, including the distal part of the middle hepatic vein and

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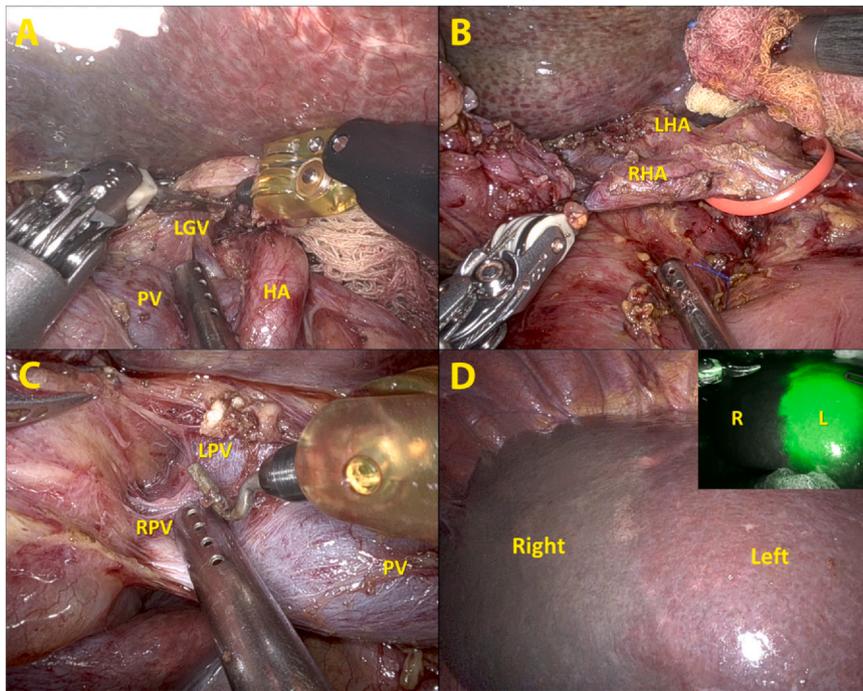


Figure 1. Robotic radical right hepatectomy for perihilar cholangiocarcinoma. A, Intraoperative view. Hilar lymphadenectomy. The LGV, HA, and PV are highlighted. B, Intraoperative view. The LHA and RHA are highlighted. C, Intraoperative view shows the PV and its bifurcation into the RPV and LPV. D, Intraoperative view shows ischemic delineation of the right liver. The inset shows negative fluorescence staining of the R after intravenous injection of indocyanine green. HA, hepatic artery; L, left liver; LGV, left gastric vein; LHA, left hepatic artery; LPV, left portal vein; PV, portal vein; R, right liver; RHA, right hepatic artery; RPV, right portal vein.

hepatic vein from segment 8, were controlled with hemoclips (Fig. 2). The Spiegel lobe was preserved because the tumor was far from the Spiegel lobe bile duct, which was draining into the left bile duct above the bifurcation. In addition, the left liver was massively hypertrophied, making its resection difficult and hazardous. The left bile duct was

divided within the liver substance, and the proximal bile duct was sent for frozen section biopsy, which was negative. Finally, the right hepatic vein was divided with a stapler. The surgical specimen was removed, and the Roux-en-Y was prepared. The jejunal loop was brought to the upper abdomen in an antecolic fashion, and hepaticojejunostomy was

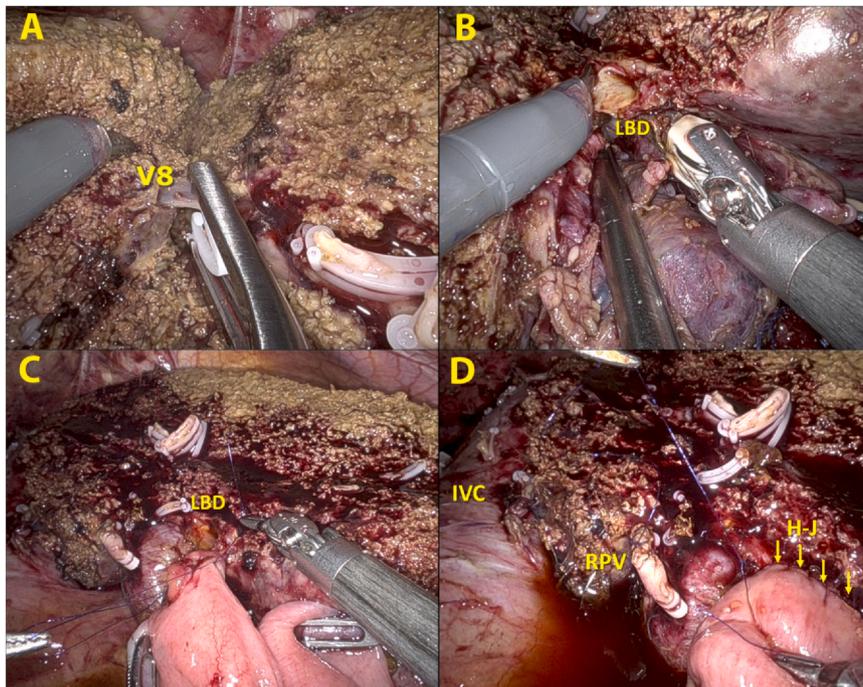


Figure 2. Robotic radical right hepatectomy for perihilar cholangiocarcinoma. A, Intraoperative view during liver parenchyma transection using bipolar forceps and scissors under saline irrigation. The V8 is identified and divided between hemoclips. B, Intraoperative view during liver parenchyma transection showing division of the LBD within the liver tissue. C, Intraoperative view showing the beginning of the Roux-en-Y hepaticojejunostomy. D, Intraoperative view. Final view after right hepatectomy, lymphadenectomy, and Roux-en-Y hepaticojejunostomy (H-J). The stump of the RPV and the IVC are highlighted. IVC, inferior vena cava; LBD, left bile duct; RPV, right portal vein; V8, vein from segment 8.

performed with a 5–0 PDS running suture (Fig. 2). The jejunal loop was fixed to the retroperitoneum, the left liver was fixed to the abdominal wall, and the abdominal cavity was drained.

The total operating time was 350 min with an estimated blood loss of 210 mL. An intermittent Pringle maneuver was performed, and the total Pringle time was 42 min. No transfusion was required during or after the operation. Recovery was uneventful and the patient was discharged on postoperative day 12. No bile leakage was observed. Pathology revealed a perihilar cholangiocarcinoma measuring 2.2 cm with free surgical margins (T2bN1). The patient received adjuvant therapy with capecitabine. The patient is well with no evidence of disease 11 months after the procedure.

Robotic right hepatectomy with lymphadenectomy and Roux-en-Y hepaticojejunostomy is safe and feasible. This complex procedure should be performed by surgeons experienced in both open and robotic hepatobiliary surgery.

Ethics approval

All procedures performed in this case complied with the ethical standards of the institutional and/or national research committees and the Declaration of Helsinki (as revised in 2013). A written informed consent was obtained from the patient for publication of this article and accompanying images.

Disclosure

Dr Machado, Dr Mattos, Dr Lobo Filho and Dr Makdissi have no conflicts of interest or financial relationships to disclose. This manuscript received no financial support. All procedures performed

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Declaration of competing interest

The authors declare no competing interests.

Supplementary material

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.gassur.2025.102302](https://doi.org/10.1016/j.gassur.2025.102302).

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