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ORIGINAL ARTICLE – HEPATOBILIARY TUMORS

Laparoscopic Resection of Perihilar Cholangiocarcinoma Type IIIb: A Video Demonstration of No-Touch En-Block Technique and Radical Lymphadenectomy

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ABSTRACT

Background. Minimally invasive surgery for perihilar cholangiocarcinoma (pCCA) is in an exploratory phase by now and is only recommended for carefully selected patients.

Patients and Methods. Our team performed total laparoscopic hepatectomy in a 64-year-old woman with perihilar cholangiocarcinoma type IIIb. Laparoscopic left hepatectomy and caudate lobectomy were performed involving a no-touch en-block technique. Meanwhile, extrahepatic bile duct resection, radical lymphadenectomy with skeletonization, and biliary reconstruction were performed.

Results. Laparoscopic left hepatectomy and caudate lobectomy were successfully performed in 320 min with 100 ml of blood loss. The histological grading was T2bN0M0 (stage II). The patient was discharged on the 5th day without postoperative complications. Following the operation, the patient received single-drug capecitabine chemotherapy. There was no recurrence after 16 months of follow-up.

Conclusion. Our experience is that, in selected patients with pCCA type IIIb or type IIIa, laparoscopic resection can reach comparable outcome to open surgery with standardized lymph node dissection by skeletonization, use of no-touch en-block technique, and proper digestive tract reconstruction.

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Surgical treatment of perihilar cholangiocarcinoma (pCCA) is performed according to Bismuth–Corlette classification, among which type III lesions usually require major hepatectomy, extrahepatic bile duct resection, regional lymphadenectomy, and biliary reconstruction.[1–3] In the era of minimally invasive surgery, experts have been investigating the feasibility of laparoscopic resection of pCCA, while initial experience with case series and small cohorts suggested that laparoscopic resection can achieve non-inferior outcomes in selected patients.[4–6] Nevertheless, to date, laparoscopic resection of pCCA is still in its exploratory phase. The main issue is technical limitations and oncological concerns, strictly restricting the application of a minimally invasive approach.[7,8] Herein, we present a video case of total laparoscopic resection in a patient with perihilar cholangiocarcinoma type IIIb. We aim to demonstrate that, in selected patients with pCCA type III lesions, laparoscopic resection can reach an outcome comparable with open surgery with standardized lymphadenectomy by skeletonization, use of no-touch en-block technique, and proper biliary reconstruction.

PATIENTS AND METHODS

Patient Selection and Preoperative Assessments

In this case, a 64-year-old woman was admitted to our hospital following 2 weeks of jaundice. On admission, her total bilirubin (TB) was 78 μmol/L and direct bilirubin was 53 μmol/L, with normal level of CA-199, CEA, and AFP.

Enhanced computed tomography (CT) revealed thickening and enhancement of perihilar biliary tree, ranging from common hepatic duct to left hepatic duct. The largest cross-section of the tumor was 1.5×0.9 cm, invading into adjacent liver parenchyma. Three-dimensional reconstruction did not show vascular invasion. Her liver function was Child–Pugh class A. She was diagnosed with perihilar cholangiocarcinoma type IIIb and scheduled for radical resection.

RESULTS

Surgical Techniques and Prognosis

The detailed demonstration of the surgical procedure is provided in a supplementary video. In short, the patient was placed in left semi-decubitus position, followed by total intravenous general anesthesia. Carbon dioxide was insufflated to establish pneumoperitoneum, and the intraabdominal pressure was maintained at 13 mmHg. Two 12 mm and two 5 Smm trocars were applied. After freeing the duodenum, paraaortic (group 16) and retropancreatic (group 13) lymph nodes were dissected for biopsy. Extrahepatic bile duct was exposed for tumor exploration. Distal common bile duct was transected for biopsy, revealing a tumor-free margin. Lymphadenectomy was performed by removing lymphatic tissues around the hepatic artery with skeletonization. After exposing the potal vascular structure, right gastric artery (RGA), left hepatic artery (LHA), and middle hepatic artery (MHA) were transected. Next, after freeing the left liver and caudate lobe, the inferior vena cava (IVC) was exposed. Left portal vein was occluded and the gallbladder was resected. Laparoscopic indocyanine green (ICG) fluorescence imaging (Lap-IGFI) was performed to determine the surgical division line and guide the resection of liver parenchyma. Segment-based anatomic liver resection was performed. The superficial parenchyma was dissected by harmonic scalpel (Ethicon Endo-Surgery, USA). For vessels ≥ 5 mm in diameter, Hem-o-Lok clips (Weck Surgical Instruments, USA), or titanium clips were used to achieve vascular control. The hepatic veins and portal pedicles were transected by a laparoscopic linear stapler. Following transection of hepatic veins V4b-1 and V4b-2, the caudate lobe was also dissected. Biopsy of the right hepatic duct confirmed a tumor-free margin. Left hepatectomy was accomplished after transection of left hepatic vein. The resected specimen was placed into a protective bag and extracted through an enlarged port in the upper abdomen. Hepaticojejunostomy was performed using a Roux-en-Y jejunal limb to achieve biliary reconstruction. Of note, the small intestine was brought up over the mesocolon into the upper abdominal cavity, then cholangioenterostomy and entero–entero anastomosis were successively performed, and finally the jejunum was transected. This is to make the laparoscopic procedure more concise and effective. Abdominal drainage was placed on the cut surface. The whole operation time was 320 mins with 100 ml of intraoperative blood loss. The were no requirements for transfusion during and after surgery.

Postoperative histology confirmed the diagnosis of perihilar cholangiocarcinoma type IIIb. The histological grading was T2bN0M0 (stage II). The postoperative course was uneventful. CT on postoperative day 5 showed satisfying postoperative recovery, and the patient was discharged from hospital. Following the operation, the patient received single-drug capecitabine chemotherapy. There was no recurrence after 16 months of follow-up.

DISCUSSION

Total laparoscopic resection of pCCA is still in its exploratory state. Admittedly, there have long been active attempts to initiate the minimally invasive era for perihilar cholangiocarcinoma. Initially, to avoid unnecessary laparotomy, the efficacy of staging laparoscopy in patients with suspected perihilar malignancy was evaluated.[9,10] In 2010, using a robotic surgical system, Giulianotti et al. reported a case of total laparoscopic resection of pCCA involving extended hepatectomy and lymph node dissection.[11] Although intraoperative transfusion and intensive care unit was involved, the patient survived without recurrence at 8-month follow-up. From then, case series emerged, mainly concentrating on laparoscopic resection for Bismuth type I and II pCCA, which was limited to bile duct resection.[12] For Bismuth type III and IV pCCA, few cases are available, especially with the requirement for extended hepatectomy and radical lymphadenectomy.[13]

This article is a video case demonstrating the process of total laparoscopic resection of pCCA type IIIb. The whole operation was performed with no-touch en-block technique, while radical lymphadenectomy with vessel skeletonization was also applied. These are all very important factors for long-term recurrence-free survival. In a multicenter cohort involving over 1000 pCCA patients, formal lymphadenectomy was found to be essential to achieve better long-term outcomes.[14] In another cohort study, Cai et al. revealed the beneficial effects of no-touch en-block technique in treatment of left-sided pCCA.[15] Our team successfully validated these techniques under laparoscopic conditions, with the hope that in the future the validation of these techniques will push forward the normalization of laparoscopic pCCA resection.

In short, our experience is that in selected patients with pCCA type III lesions, laparoscopic resection can reach comparable outcomes with open surgery with standardized lymphadenectomy by skeletonization, use of no-touch en-block technique, and proper biliary reconstruction.

SUPPLEMENTARY INFORMATION The online version contains supplementary material available at https://doi.org/10.1245/s10434-023-13552-x.

DISCLOSURE All authors have no conflicts of interest or financial to disclose.

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