



Laparoscopic right hepatectomy with selective vascular clamping in an anterior approach manner

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Abstract: A 39-year-old female patient presented with huge hepatocellular carcinoma (HCC) in the right lobe with clinical stage IIIA (cT3N0M0). Preoperative evaluation indicated the feasibility of a right hepatectomy. A laparoscopic right hepatectomy in an anterior approach was then performed. Selective clamping of the right branch of the portal vein was applied, and the estimated blood loss was 200 mL. Postoperative pathology suggested HCC of Edmondson Grade III and stage IIIA (pT3N0M0).

Keywords: Laparoscopic right hepatectomy; selective vascular clamping; hepatocellular carcinoma (HCC)

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Introduction

The annual number of laparoscopic hepatectomy cases is rapidly increasing in the recent decade, along with prosperous development of enhanced recovery after surgery (1). Laparoscopic approach has been widely applied in various hepatectomy, from resection of solitary liver cancer to anatomic resection of multiple segments, even colorectal liver metastasis and living donor hepatectomy (2-4). Indications of laparoscopic hepatectomy have gradually broadened, indicating the possibility of laparoscopic approach in nearly all kinds of hepatectomy cases. Comparing to open hepatectomy, laparoscopic approach showed similar oncologic outcomes and operative safety, which has been verified by a large number of studies (5-6). In this report, we present a surgical case of laparoscopic right hepatectomy with selective vascular clamping in an anterior approach for a 39-year-old female patient with hepatocellular carcinoma (HCC).

Surgical technique

A huge HCC lesion was discovered in the segments VI-VII, with two satellite lesions involving segments VIII.

The middle hepatic vein (MHV) was intact. A contrasted magnetic resonance (MR) scan also indicated intratumoral hemorrhage (*Figure 1*). The multidisciplinary board diagnosed this patient as HCC with clinical stage IIIA (cT3N0M0) according to the 8th edition of AJCC staging system. We planned to perform a laparoscopic right hepatectomy in this patient. Simulated preoperative assessment of postoperative remnant liver function showed that the future liver remnant (FLR) of 521 cm³ and the standard liver volume (SLV) of 1,088 cm³ resulted in a FLR/SLV ratio of 47.89%, indicating the feasibility of right hepatectomy in the patient with the indocyanine green retention rate at 15 min (ICG R15) of 5.7% and the total bilirubin level in a normal range.

After laparoscopic exploration, the Calot's triangle was exposed, and the cystic duct and the cystic artery were identified and dissected with Hem-o-lok (*Figure 2*). The gallbladder was then removed from the cystic plate with cauterization. After the right hepatic artery was dissected with Harmonic scalpel, and ligated with Hem-o-lok, the right branch of the portal vein was clamped with Mersilk suture to block the blood flow to the right lobe (*Figure 3*). The second hepatic hilum was dissected with Harmonic to expose the suprahepatic inferior vena cava (IVC) and

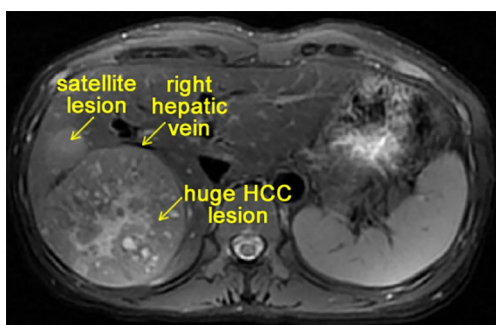


Figure 1 A huge HCC lesion with satellite lesions in a contrasted MR scan. HCC, hepatocellular carcinoma; MR, magnetic resonance.

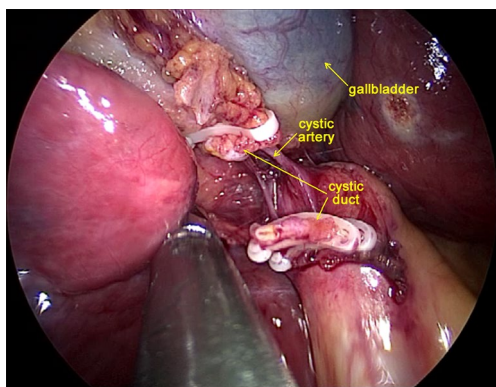


Figure 2 The cystic duct and the cystic artery were identified and dissected with Hem-o-lok.

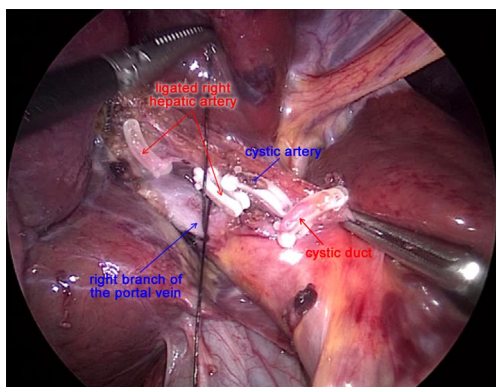


Figure 3 Selective vascular clamping with ligation of the right hepatic artery and the right branch of the portal vein.

the right hepatic vein (RHV) after the hepatic falciform ligament division. The caval ligament was then dissected, where the exposed short hepatic veins (SHVs) were

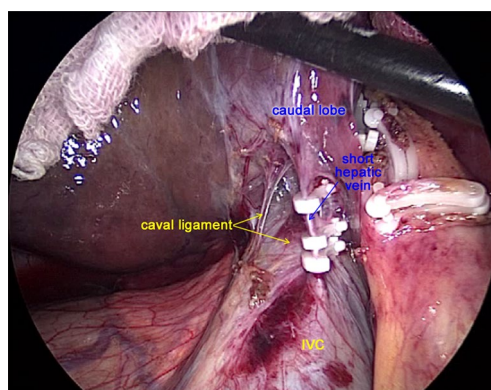


Figure 4 Dissection of the caval ligament with the exposed short hepatic veins carefully ligated.



Figure 5 A branch of MHV was dissected and ligated with Hem-o-lok during parenchymal transection. MHV, middle hepatic vein.

carefully ligated (*Figure 4*). After liver hanging using a 2-0 straight-needle monofilament nylon suture, parenchymal transection was performed with Harmonic according to the Rex-Cantile's line marked with Harmonic. The branches of MHV was dissected and ligated with Harmonic (for the small MHV branches) or Hem-o-lok (*Figure 5*). After parenchymal transection between the segment IV and segments V/VIII, the caudal lobe was then dissected along the paracaval lobe to expose the right hepatic pedicle with careful dissection of the SHVs, reserving the Spiegel lobe (*Figure 6*). The right branch of the portal vein and the right Glisson's pedicle were then ligated with an Endo GIA stapler. The Arantius ligament along with the RHV was also staple ligated subsequently (*Figure 7*). The right lobe was completely mobilized by dissection of the right coronary ligament and right triangular ligament with Harmonic.

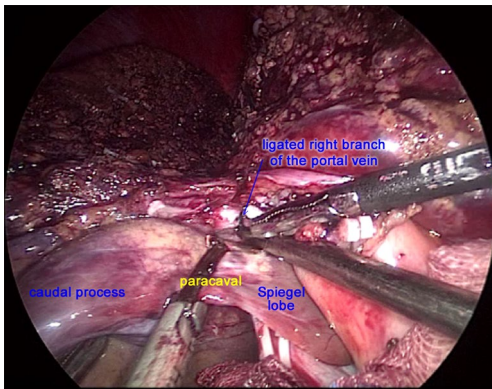


Figure 6 Dissection of the caudal lobe along the paracaval parenchyma.

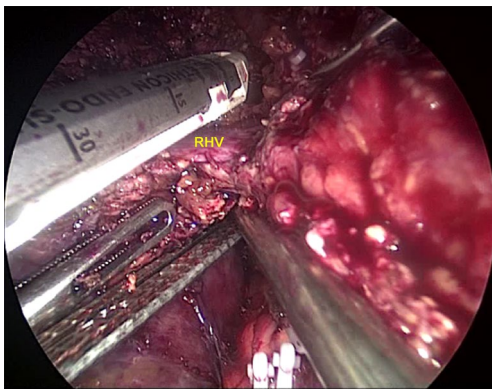


Figure 7 Dissection and ligation of the RHV with an Endo GIA stapler. RHV, right hepatic vein.

The procedure went well (*Figure 8*). The estimated blood loss was 200 mL. Postoperative pathology suggested HCC of Edmondson Grade III and stage IIIA (pT3N0M0).

Discussion

We suggested anterior approach in laparoscopic right hepatectomy, which provide better exposure with a magnifying effect, especially at the surgical field around the IVC. The better exposure using the anterior approach could decrease the risk of injury during dissection of the first hepatic hilum before clamping. Laparoscopic hepatectomy has another advantage of reducing intraoperative hemorrhage, mainly from the hepatic vein, with the help of positive pneumoperitoneum pressure and properly controlled central venous pressure (7).

We used the technique of selective vascular clamping



Figure 8 Laparoscopic right hepatectomy with selective vascular clamping in an anterior approach manner (9).

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to reduce the blood loss during parenchymal transection. An alternative clamping method is Pringle maneuver. The selective vascular clamping, with the theoretical advantage in anatomy, could achieve higher clamping efficacy and better postoperative outcomes (8), while increasing the surgical difficulties especially for large tumors or tumors near the root of the hepatic veins.

In addition, precise and gentle vascular dissection is also vital to the operation. The SHVs joining the IVC are short and fragile, which could sometimes contribute to a major hemorrhage when improperly dissected. Cautious dissection per vein or direct stapling of the SHVs should be applied intraoperatively to reduce the risk of massive hemorrhage and the rate of conversion.

In conclusion, the laparoscopic right hepatectomy with selective vascular clamping is feasible in an anterior approach, which is superior in providing clear exposure, reducing blood loss, and improving operative efficacy.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/tcr.2018.08.02>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Declaration of Helsinki (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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