

Ultrasound-Guided Liver Resection of a Tumor Involving the Hepatocaval Confluence

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Rezumat

Rezecția hepatică echoghidată a unei tumori localizate la confluența hepato-cavală

Prezentăm cazul unei paciente în vârstă de 72 de ani, cu multiple comorbidități cardio-vasculare, internată în centrul nostru pentru o tumoră hepatică, imposibil de biopsiat pe cale percutanată. Examenul CT decelează o formațiune tumorală cu aspect radiologic de colangiocarcinom, localizată în segmentul I superior (partea superioară a porțiunii para-cavale și întregul lob caudat), cu extensie spre segmentele VII, VIII, IV superior și II, ce invadează vena hepatică dreaptă și medie, aderentă de vena hepatică stângă și vena cavă inferioară în porțiunea retrohepatică. Demnă de menționat este existența a 2 vene hepatice drepte inferioare accesorii, care ne-au permis să efectuăm o rezecție echoghidată non-anatomică transversală superioară, a segmentelor I, VII, VIII, IV superior și II, ce a implicat și vena hepatică dreaptă și pe cea medie, cu prezervarea venei hepatice stângi, prin detașarea tumorii de la acest nivel, dar și de pe vena cavă inferioară retrohepatică. Cu toate că, literatură încă dezbate asupra rezecției vasculare R1 pentru colangiocarcinom, am decis să promovăm această abordare asupra venelor hepatice, dar o considerăm proscrisă asupra pediculilor portalii, astfel drenajul venos al hemifecatului stâng restant a fost asigurat de vena hepatică stângă, iar pentru hemifecatului drept restant de venele accesorii. Chiar dacă, rezecția R1 vascular pentru venele hepatice în tumorile localizate la confluența hepato-cavală ce implică toate venele hepatice este

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dificilă din punct de vedere tehnic, o considerăm fezabilă cu precădere atunci când ecografia intraoperatorie este utilizată.

Cuvinte cheie: rezecție hepatică, ghidaj ecografic intraoperator, tumoră la confluența hepatocavă, rezecție hepatică transversală superioară, colangiocarcinom intrahepatic

Abstract

We present the case of a 72-year-old patient with multiple cardiovascular comorbidities, hospitalized in our center for a liver tumor, impossible to biopsy percutaneously. CT examination detected a tumor formation with radiological features of cholangiocarcinoma, located in the upper part of segment I, extending to segments VII, VIII, IV superior and II, invading the right and middle hepatic vein, adherent to the left hepatic vein and to the retrohepatic inferior vena cava. Worth mentioning is the existence of 2 accessory lower right hepatic veins, which allowed us to perform a superior transverse non-anatomical ultrasound resection of the upper I, VII, VIII, IV and II segments, which also involved the right and middle hepatic veins, preserving the left hepatic vein, by detaching the tumor from it, but also from the retrohepatic inferior vena cava. Although the literature still debates the R1 vascular resection for cholangiocarcinoma, we decided to adopt this approach on the hepatic veins. Of note, we consider this policy not applicable for the portal pedicles. By adopting this strategy, the venous drainage of the remaining left hemiliver was ensured by the hepatic vein, and of the right one by the accessory veins. Although resecting tumors located at the hepato-caval confluence involving all hepatic veins is technically difficult, we consider it feasible especially when intraoperative ultrasound is used.

Key words: liver resection, ultrasound guidance, tumor involving the hepatocaval confluence, upper transversal hepatectomy, intrahepatic cholangiocarcinoma

Introduction

Resection of tumors located at hepatocaval confluence are technically challenging, particularly in insuring the venous drainage of the remnant liver. The present video shows a clinical case that benefitted from such type of resection.

Case Report

A 72-year-old female patient (BMI 30), with congestive heart failure, atrial fibrillation, hypertension, ischemic heart disease was diagnosed at CT and MRI with a liver tumor with radiological features of cholangiocarcinoma, involving the hepatocaval confluence and in contact with the retrohepatic inferior vena cava (IVC), located in segment 1 (superior

part of the paracaval portion and the entire caudate lobe) extending to segments 7, 8, 4 superior and 2. AFP, CEA, CA19-9 within normal range. Percutaneous biopsy was not considered due to the very difficult approach.

The tumor was invading the right and middle hepatic veins and in contact with the left hepatic vein, but two large accessory inferior right hepatic veins were present. These allowed an upper transversal liver resection (1) consisting in a non-anatomic resection of segments 1, 7, 8, 4 superior and 2, resecting the right and middle hepatic vein and preserving the left hepatic vein by detaching the tumor at this level and from the retrohepatic IVC (R1 vascular). Even though accepting R1 vascular in case of cholangiocarcinoma may be criticized (2), our policy is to

accept R1 vascular in case of hepatic veins, but not in case of portal pedicles (except in case of otherwise unresectable tumor in contact with the main portal bifurcation). We consider that true R1 vascular is only in case of hepatic veins, as in case of portal pedicles the tumor is in fact in contact with the glissonian sheath of the portal pedicle (and not with vascular structures), and therefore it carries, in our opinion, a higher risk of tumor infiltration. We did not choose the aggressive surgical alternative of venous resection and reconstruction of the IVC and LHV, as it involved a significantly higher risk of morbidity and mortality in a patient with severe comorbidities and advanced age. Moreover, we did not have a pathological diagnosis at surgery. By accepting R1 vascular for the IVC and left hepatic vein, the venous drainage of the remnant liver was insured by the latter (for the left remnant hemiliver) and the accessory veins (for the right remnant hemiliver). The resection was carried out using a J-shaped incision, with prior complete mobilization of the retrohepatic inferior vena cava and complete detachment of the tumor from the vena cava, that allowed its control by placing tourniquets. During dissection, particular care was paid for preserving the two right inferior accessory veins. Tourniquets were also placed on the right hepatic vein and on the common trunk of the middle and left hepatic veins. Intraoperative ultrasound (IOUS) did not show any other liver lesions. The resection area was marked under IOUS guidance. The liver transection was also carried out under IOUS-guidance (2), using Harmonic® scalpel in the superficial portion (first 2-3 cm) and crush clamping technique in the deeper part of the liver.

Results

On demand intermittent Pringle time was 30 minutes (two periods of 15 minutes with 5 minute interval). There were no intraoperative incidents. Operative time was 440 minutes. Blood loss was 1350 ml with no blood transfusion. The postoperative course was uneventful, and the patient was discharged in POD 8. At pathology, a G1-G2 pT2 cholangiocarcinoma was diagnosed.

Conclusion

Resection of tumors at hepatocaval confluence involving all hepatic veins, even though technically demanding is safe, especially when intraoperative ultrasound is used for guidance. Further studies are needed to clarify the difference in terms of oncological outcome for R1 resection in case of hepatic veins versus portal pedicles.

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References

1. Torzilli G, Procopio F, Donadon M, Del Fabbro D, Cimino M, Garcia-Etienne CA, et al. Upper transversal hepatectomy. *Ann Surg Oncol*. 2012; 19(11):3566.
2. Torzilli G, Viganò L, Fontana A, Procopio F, Terrone A, Cimino MM, et al. Oncological outcome of R1 vascular margin for mass-forming cholangiocarcinoma. A single center observational cohort analysis. *HPB (Oxford)*. 2020;22(4):570-577.
3. Torzilli G, Montorsi M, Del Fabbro D, Palmisano A, Donadon M, Makuuchi M. Ultrasonographically guided surgical approach to liver tumours involving the hepatic veins close to the caval confluence. *Br J Surg*. 2006; 93(10):1238-46.