HOW I DO IT

Ante-situm resection: a novel approach to avoid extracorporeal circulation using a transient portacaval shunt

Eduardo de Santibañes, Agustín Cristiano, Martín de Santibañes, Alejandro Yanzon, Fanny Rodriguez Santos, Victoria Ardiles & Juan Pekolj

Liver Transplant Unit & General Surgical Service, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina

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Correspondence
Eduardo de Santibañes, Liver Transplant Unit & General Surgical Service, Hospital Italiano de Buenos Aires, Juan D. Perón 4190, C1181ACH Buenos Aires, Argentina. Tel: +54 11 4981 4501. Fax: +54 11 4981 4041. E-mail: eduardo.desantibanes@hospitalitaliano.org.ar

A video abstract of this article can be viewed at http://youtu.be/iXD7859w-bU

Introduction

Hepatic tumours located at the hepatocaval confluence or compromising the inferior vena cava (IVC) are not often resectable using conventional techniques. To overcome this problem, different surgical procedures have been described. Ex-vivo resection techniques provide excellent accessibility to tumours placed around the IVC that otherwise would be unresectable. These ex-vivo techniques include in-situ, ante-situm and ex-situ resections.

The in-situ technique performs hypothermic perfusion of the liver, with cross-clamping but without sectioning of the vena cava and the hepatic pedicle. The ante-situm approach also includes hypothermic perfusion, with cross-clamping of the major vessels and division of the suprahepatic IVC for complete exposure of the liver, preserving the hepatic artery and biliary tree. And finally, the ex-situ technique requires cross-clamping and division of the major vessels for complete removal of the liver, allowing a bench procedure before re-implantation of the organ.

The two main problems regarding ex-vivo procedures are the low hepatic tolerance to warm ischaemia and the splanchnic congestion secondary to vascular exclusion. Hypothermic hepatic perfusion and veno-venous bypasses, frequently used in classic ex-vivo resections, are two well-known strategies to avoid these complications.

This report describes a novel technique of ante-situm resection using an in-vivo veno-venous bypass between the portal vein and the IVC with a cadaveric venous graft in a patient with IVC replacement.

Case

A 27-year-old female presented with an isolated hepatic metastasis 9 years after first being diagnosed with metastatic rectal cancer. The patient had previously undergone an extended right hepatectomy. The 4-cm lesion compromised the hepatocaval confluence and the only remaining hepatic vein (Fig. 1). The patient received four courses of FOLFOX and bevacizumab with a partial response. As a result of the hepatocaval confluence and left hepatic vein involvement, an ante-situm resection with replacement of the hepatic vein and the retrohepatic IVC was planned.

Surgical approach

The liver was mobilized. The infra- and suprahepatic IVC, the portal vein and hepatic artery were isolated. To avoid vascular

Figure 1 Magnetic resonance image (MRI) showing a 4-cm lesion with compromise of the hepatocaval confluence and the left hepatic vein. FHV: left hepatic vein; IVC: inferior vena cava
congestion or extracorporeal venous bypass, a side-to-side shunt between the portal vein and the infrahepatic IVC, using a bank-
preserved cadaveric vein graft, was performed. With the portal flow drained into the IVC, the portal vein proximal to the shunt was clamped and cannulated in preparation for the hypothermic solution perfusion (Viaspan, University of Wisconsin cold storage solution, Bristol-Myers Squibb Company, New York, NY, USA). The biliary tree and hepatic artery were clamped. Total vascular exclusion was performed by cross-clamping the supra- and the infrahepatic IVC (Fig. 2a). The retrohepatic IVC was excised leaving it attached to the liver and tumour.

Caval venous continuity was reconstituted using a polytetrafluoroethylene (PTFE) 20-mm-ringed prosthesis (Gore-Tex® Vascular Graft, W. L. Gore & Associates, Inc., Newark, DE, USA) during which time the splanchnic vascular flow was diverted to the distal IVC via the venous shunt (Fig. 2b). Total vascular exclusion (warm ischaemic time) was less than 30 min.

With the liver in an ante-situm position, cooled with ice and perfused with the hypothermic preservation solution, the hepatic transaction (CUSA Excel, Tyco Healthcare) was performed using an ultrasonic dissector. The retrohepatic IVC and the confluence with the hepatic vein were included in the resection. For reconstruction of the hepatocaval confluence, an iliac cadaveric bank-
preserved vein was used to extend the left hepatic vein. An end-to-side anastomosis between the remaining left hepatic vein and the PTFE prosthesis was performed (Fig. 2c).

The portal cannula was subsequently removed, and the portacaval shunt divided using staplers (Fig. 2c). An intra-
operative Doppler ultrasound showed normal venous flow within the neo-vena cava and portal vein.

The histopathological report confirmed the CRLM with involvement of the hepatocaval confluence with the R0 margins. Post-operative complications were a right pleural effusion and a low-output bile leak, both managed conservatively (Clavien–Dindo grade I).

**Conclusion**

With this novel technique, combining IVC replacement and the in-vivo portacaval shunt during an ante-situm liver resection, it was possible to avoid the shortcomings of extracorporeal veno-
venous bypass.

**Conflicts of interest**

None declared.

**References**


