

Comments on “Liver resection using total vascular exclusion of the liver preserving the caval flow, *in situ* hypothermic portal perfusion and temporary porta-caval shunt: a new technique for central tumors”

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Comment on: Azoulay D, Maggi U, Lim C, *et al.* Liver resection using total vascular exclusion of the liver preserving the caval flow, *in situ* hypothermic portal perfusion and temporary porta-caval shunt: a new technique for central tumors. *Hepatobiliary Surg Nutr* 2014;3:149-53.

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We read with great interest the article by Azoulay *et al.* (1), published in *Hepatobiliary surgery and nutrition*, about total vascular exclusion (TVE) of the liver with preservation of the caval flow using *in situ* hypothermic portal perfusion and temporary porto-caval shunt (PCS) in centrally located tumors. We would like to praise the authors for their technical skills in performing such extreme liver resections and we would like to deeply discuss some technical aspects.

The principal indication of TVE is liver tumors involving the cavo-hepatic confluence.

Technically, the procedure was described for left hepatectomies. It started with the division of the liver attachments followed by vascular control of the left branches of the hepatic artery and the portal vein. A direct porto-caval anastomosis was sutured prior to the control of the outflow. Then, hypothermic perfusion of the liver was performed through a catheter inserted into the right portal vein above the clamp used for Pringle maneuver. The discharge of the perfusion was made through an opening of the right hepatic vein below the clamp. Thus, the transection was carried out with a completely excluded liver and a liver temperature down to 17 °C and 24 °C in the two reported cases.

The use of a temporary porto-caval shunt (PCS) with

in situ portal hypothermic perfusion of the liver, as described by the authors, prevents from hemodynamic and renal consequences due to caval clamping and from splanchnic congestion caused by portal clamping.

In this technique, the authors performed a direct anastomosis between the portal vein and the vena cava. This shunt might fixate the hepatic pedicle to the vena cava and thus could limit the possibilities of mobilizing the liver during parenchymal transection. For this reason, we carried out a latero-lateral PCS using a prosthetic (Dacron) graft (*Figure 1*) after consecutive lateral clamping of the vena cava and the portal vein. This anastomosis is feasible regardless to the length of the proximal stump of the portal vein and maintains a complete mobility of the liver during parenchymal transection.

During the hypothermic perfusion of the liver, the liquid was drained through a venotomy in the right hepatic vein that was sutured at the end of the procedure. Taking into account the value of the outflow in particular during major hepatic resections, we find it more cautious to use the resected hepatic vein to avoid future stenosis caused by the suture. Therefore, we would rather clamp the outflow of the remnant liver; we stapled the contralateral hepatic vein and discharged the perfusate through an opening of its proximal stump.

We used this modified technique in two patients.

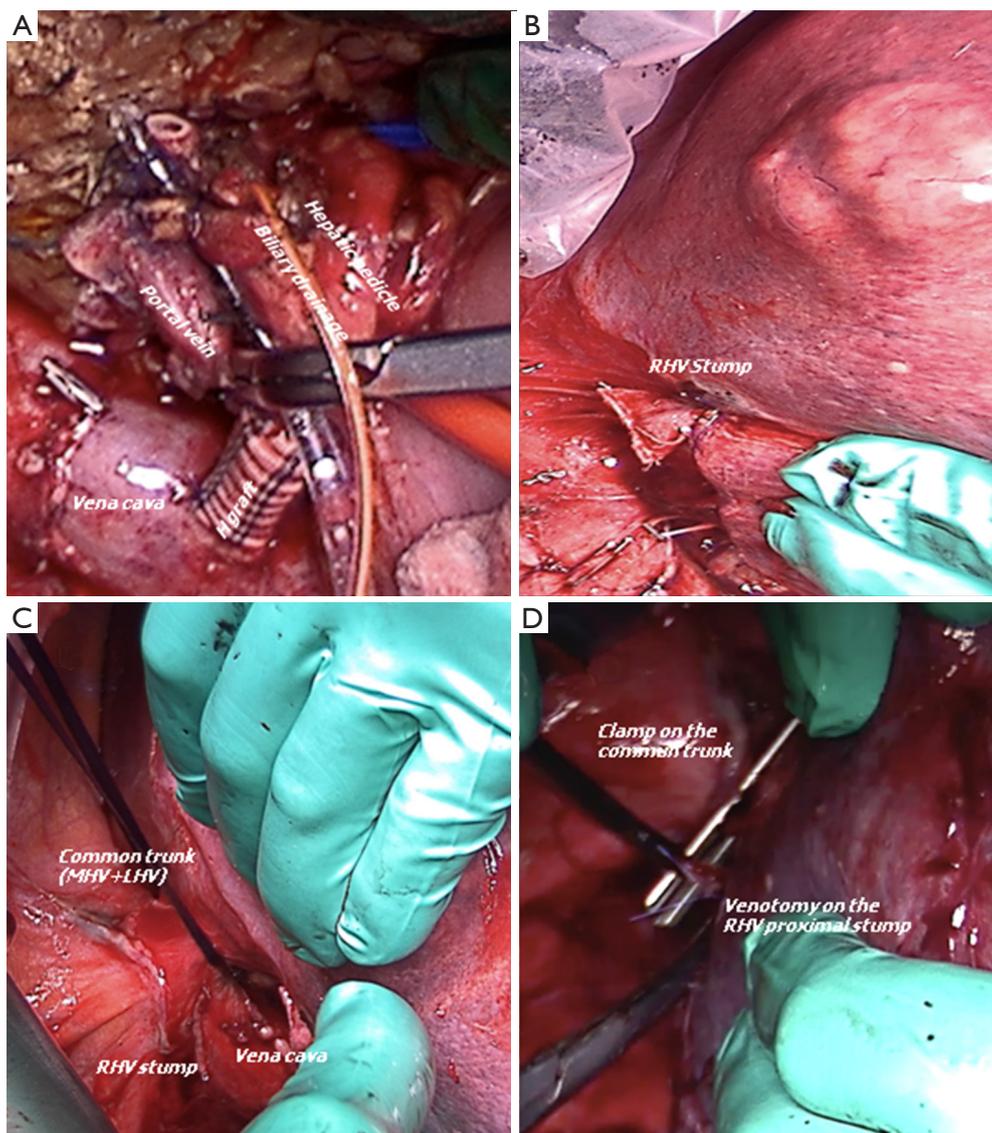


Figure 1 Intraoperative views of technical modifications for total vascular exclusion of the liver with preservation of the caval flow using *in situ* hypothermic portal perfusion and temporary porto-caval shunt (PCS). (A) Confection of the porto-caval shunt using the Dacron graft; (B) the right hepatic vein stump; (C) the common trunk is dissected with the placement of a silastic loop; (D) venotomy on the proximal stump of the right hepatic vein to discharge the perfusion.

We performed for the first a right hepatectomy for an intrahepatic cholangiocarcinoma and for the second a right trisectionectomy for a hepatocellular carcinoma in a cirrhotic liver after sequential TACE and portal embolization. The same steps of the original technique were followed apart from the PCS using a graft and discharging through the right hepatic vein. We used custodiol for hypothermic perfusion with ice over the liver. The hepatic temperature during the procedure dropped

to 21°C in the two patients. The segment VIII vein was controlled at the end of the parenchymal transection to preserve the possibility of discharging the perfusate. Vascular declamping was carried out progressively starting with the outflow, followed by the PCS to end with the hepatic pedicle.

In conclusion, TVE of the liver with preservation of the caval flow using *in situ* hypothermic portal perfusion and temporary PCS is a valuable technique that allows

resection of tumors involving the hepato-caval confluence and prevents from the classical inconvenient of classical TVE or TVE with cavo-portal jugular bypass. The confection of a prosthetic graft PCS and the discharging through the resected hepatic vein could optimize the original technique: It facilitates the parenchymal transection and prevents from eventual complications of suturing the remnant hepatic vein.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Azoulay D, Maggi U, Lim C, et al. Liver resection using total vascular exclusion of the liver preserving the caval flow, *in situ* hypothermic portal perfusion and temporary porta-caval shunt: a new technique for central tumors. *Hepatobiliary Surg Nutr* 2014;3:149-53.