A Translational Approach to Standardization of Machine Perfusion Adoption in *Ex Vivo* Liver Resection

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ABSTRACT

Background. Hepatic resection represents the best treatment for primary and metastatic liver tumors but is not always feasible. In early 1980, Piclmayr described a complex liver resection technique, termed “*ex vivo* liver resection,” for the treatment of locally advanced tumors not conventionally resectable. The authors approached this technique with translational research in a preclinical setting and then similarly reproduced it in human patients.

Methods. In the swine median xyphopubic laparotomy, the liver was mobilized to expose the vena cava. A temporary porto-caval shunt was previously prepared on the back table using a segment of thoracic aorta, and a vascular anastomosis between the supra-hepatic vena cava and a caval graft was quickly performed. The liver was placed in a machine perfusion system and continuously perfused for 2 h for its final implantation orthotopically in the same animal. The anastomoses were performed as usual. Based on this experience, the intervention was reproduced in the

human model of a 39-year-old woman affected by large intrahepatic cholangiocarcinoma considered unresectable.

Results. All animals survived the procedure. The peak aspartate aminotransferase level (460 ± 87 U/L) was recorded 60 min after reperfusion. Lactate levels flared up for 120 min (3.6 ± 0.2 mmol/L). In the clinical case, the postoperative period was uneventful, and the patient was discharged on day 22.

Conclusions. The described procedure is feasible only for surgeons with a transplantation background. The study showed that this translational approach enhances the surgeon's ability to perform the intervention systematically in a shorter time and with a good outcome.

DISCLOSURE There are no conflicts of interest.

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Electronic supplementary material The online version of this article (<https://doi.org/10.1245/s10434-019-08163-4>) contains supplementary material, which is available to authorized users.

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First Received: 22 October 2019;
Published Online: 3 January 2020

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