The first case of ischemia-free organ transplantation in humans

van Leeuwen, Otto B.; Ubbink, Rinse; de Meijer, Vincent E.; Porte, Robert J.

Published in:
American Journal of Transplantation

DOI:
10.1111/ajt.14869

DOI: 10.1111/ajt.14869

The first case of ischemia-free organ transplantation in humans: A proof of concept

With great interest we have read the article by Xiaoshun He and colleagues regarding their first patient who underwent successful ischemia-free organ transplantation (IFOT).[1] This group transplanted a liver donated after brain death to a 51-year-old patient with decompensated cirrhosis and hepatocellular carcinoma without any ischemic episode or interruption of the blood circulation. The graft was procured, ex-situ preserved, and implanted under continuous normothermic machine perfusion using the Liver Assist device (Organ Assist, Groningen, The Netherlands). The donor liver had 85%-95% macrovesicular steatosis; however, there was no postreperfusion syndrome observed after revascularization of the graft and the recipient had an uneventful recovery. Liver function tests and histological examination revealed only minimal signs of hepatocellular, biliary, and endothelial cell injury during ex-situ preservation and posttransplantation.

The team led by Dr. He is to be commended for this great achievement, which we consider a milestone in the history of organ transplantation. Even though the field of ex-situ machine perfusion in organ transplantation is rapidly emerging, all currently used protocols still include periods of cold or warm ischemia before and after the period of machine perfusion.[2] With their innovative surgical technique, He and colleagues have demonstrated that organ transplantation can be performed without any meaningful ischemia-reperfusion (IR) injury, and they have taken machine perfusion to a different level.

The worldwide shortage of donor organs has led to the increased use of extended-criteria donor organs. However, as a result of the IR injury encountered during the transplantation process, complications after transplantation of these organs are frequent. For this reason, many extended-criteria donor organs are still declined for transplantation. If almost all available organs could be used, in many countries the waiting list mortality would be reduced considerably. Several centers, including ours, use machine perfusion as a tool to increase the number of suitable donor livers.

The innovative surgical technique described by He et al offers a unique solution for the problems with extended-criteria donor livers: no more ischemia during procurement, preservation, or graft implantation. We believe that within the next decade, IFOT could become the preferred preservation method for extended criteria donor organs, especially those with an increased susceptibility for IR injury, such as livers with a high degree of steatosis. However, He et al used IFOT in an organ donor in their own hospital. In centers in Europe and United States, most donor organs come from other hospitals. The machine perfusion device used by He et al is not suitable for transportation. This is a limitation for wider adoption of this technique by other centers. In addition, we believe that the current method of IFOT is surgically challenging and its simplification may stimulate its introduction in other centers. For example, the use of an iliac vein graft to the portal vein requires an additional anastomosis and may theoretically increase the risk of posttransplant portal vein thrombosis. We propose a modification in obtaining access to the portal venous circulation by retrograde cannulation of a surgically reopened umbilical vein.[3]

DISCLOSURE

The authors of this manuscript have no conflicts of interest to disclose as described by the *American Journal of Transplantation*.

Keywords

clinical research/practice, donors and donation: extended criteria, editorial/personal viewpoint, liver transplantation/hepatology, organ perfusion and preservation, organ procurement and allocation

Otto B. van Leeuwen[1]
Rinse Ubbink[2]
Vincent E. de Meijer[1]
Robert J. Porte[1]

[1]*Department of Surgery, Section of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands*
[2]*Groningen Transplant Center, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands*

Correspondence
Robert J. Porte
Email: r.j.porte@umcg.nl

REFERENCES

1. He X, Guo Z, Zhao Q, et al. The first case of ischemia-free organ transplantation in humans: a proof of concept. *Am J Transplant*. 2018;18(3):737-744.
2. Karangwa S, Dutkowski P, Fontes P, et al. Machine perfusion of donor livers for transplantation: a proposal for standardized nomenclature and reporting guidelines. *Am J Transplant*. 2016;16(10):2932-2942.
3. Soyama A, Eguchi S, Takatsuki M, et al. Tumor thrombectomy via a surgically reopened umbilical vein combined with right hemihepatectomy in a patient with hepatocellular carcinoma. *Dig Surg*. 2011;28:222-225.