



Hypothermic Ex-Situ Perfusion: The feasibility study on pancreas

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Introduction

Increasing use of donors after cardiac death (DCD) lead to a new interest in the organ perfusion as a preservation and evaluation platform. The clinical standard for pancreas preservation for transplantation is static cold storage (SCS). Hypothermic oxygenated ex-situ perfusion (HOPE) has shown advantages over SCS in other abdominal organs preservation. Some animal and human experimental models have already explored the feasibility of these technique in pancreas preservation. In this report we present an application of HOPE, adapted from a certified kidney HOPE configuration, for the evaluation of a pancreas graft procured form a controlled DCD for transplantation.

Methods

After 20 minutes of no-touch period, the graft was procured and placed in SCS for 8h. After SCS, the graft was prepared for perfusion adapting the kidney operational mode and disposable kit (PerKidney) of the PerLife system: Kidney organ container for organ placement, Arterial line for iliac artery perfusion, urine collection bag for duodenal liquid collection. The vein drained freely in the liquid reservoir. Perfusion parameters (pressure (P), flow (F), temperature (T), vascular resistance (VR)) were recorded at the beginning and hourly, until the end of the procedure. Target P, T were established according to recently published recommendations (Consensus Conference Guidelines, TRANSPLANTATION LEARNING JOURNEY, 2022) and set, respectively to 30 mmHg and 5°C. Perfusate and duodenal liquids sampling was performed every 30 minutes for biochemical characterization.

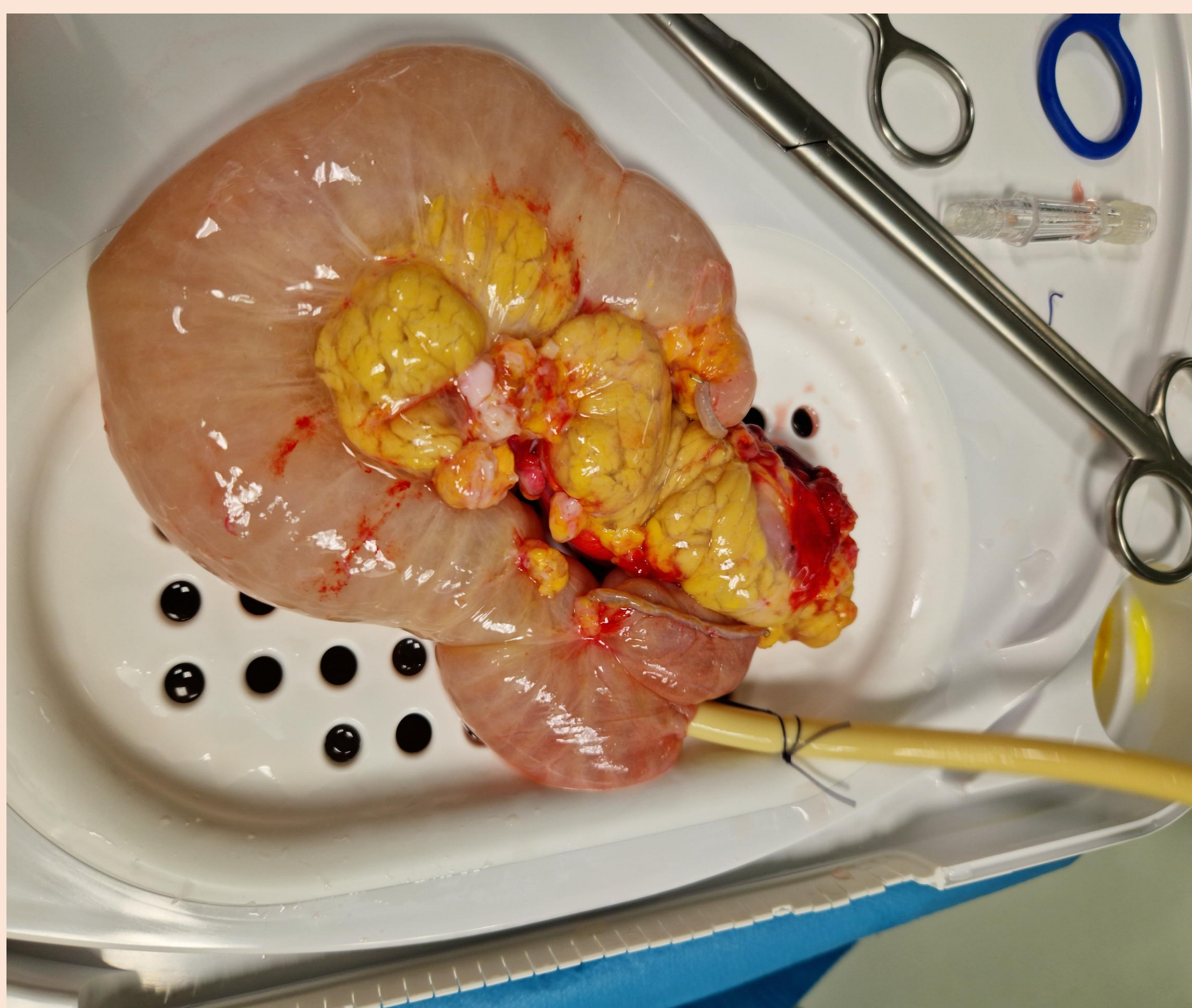


Figure 1: Pancreas Ex-Situ Hypothermic perfusion

Results

The graft was perfused for 187 minutes recording the following parameters: $T = 5.1 \pm 1.2$ °C; $F = 100 \pm 4$ ml/min; $VR = 0.172 \pm 0.006$ mmHg/ml/min. During HOPE, F progressively increased, resulting in a VR decrease. 1 L of pancreatic and duodenal secretion liquid was collected, requiring additions of perfusate liquid after 1h of procedure. A slight increase of lactates was recorded (1,6 to 2,0 mmol/L). at 1h 47 minutes, to reduce the duodenal tension, 18% Mannitol and 20% Albumin were added to the perfusate, positively influencing organ resistance decrease.

Conclusions

The procedure resulted to be safe and feasible with no device-related complications recorded. Further studies are required to develop a fully dedicated pancreas operational mode for ex-situ treatment for transplantation.