

Feasibility study assessing normothermic perfusion of the rabbit uterus; implications for uterus transplantation

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Introduction

In organ transplantation, normothermic perfusion (NMP) has been used to facilitate transplantation of livers, kidneys, hearts, and lungs. Storing organs at physiological conditions offers advantages over cold storage: most notably the minimisation of cold ischaemic injury. It also allows organ monitoring and permits the addition of intravenous therapy ex-vivo, which can help determine organ functionality or optimise the organ pre-transplantation.

Aim

To assess the feasibility of perfusing a rabbit uterus to determine whether NMP could be used in the context of uterine transplantation (UTx).

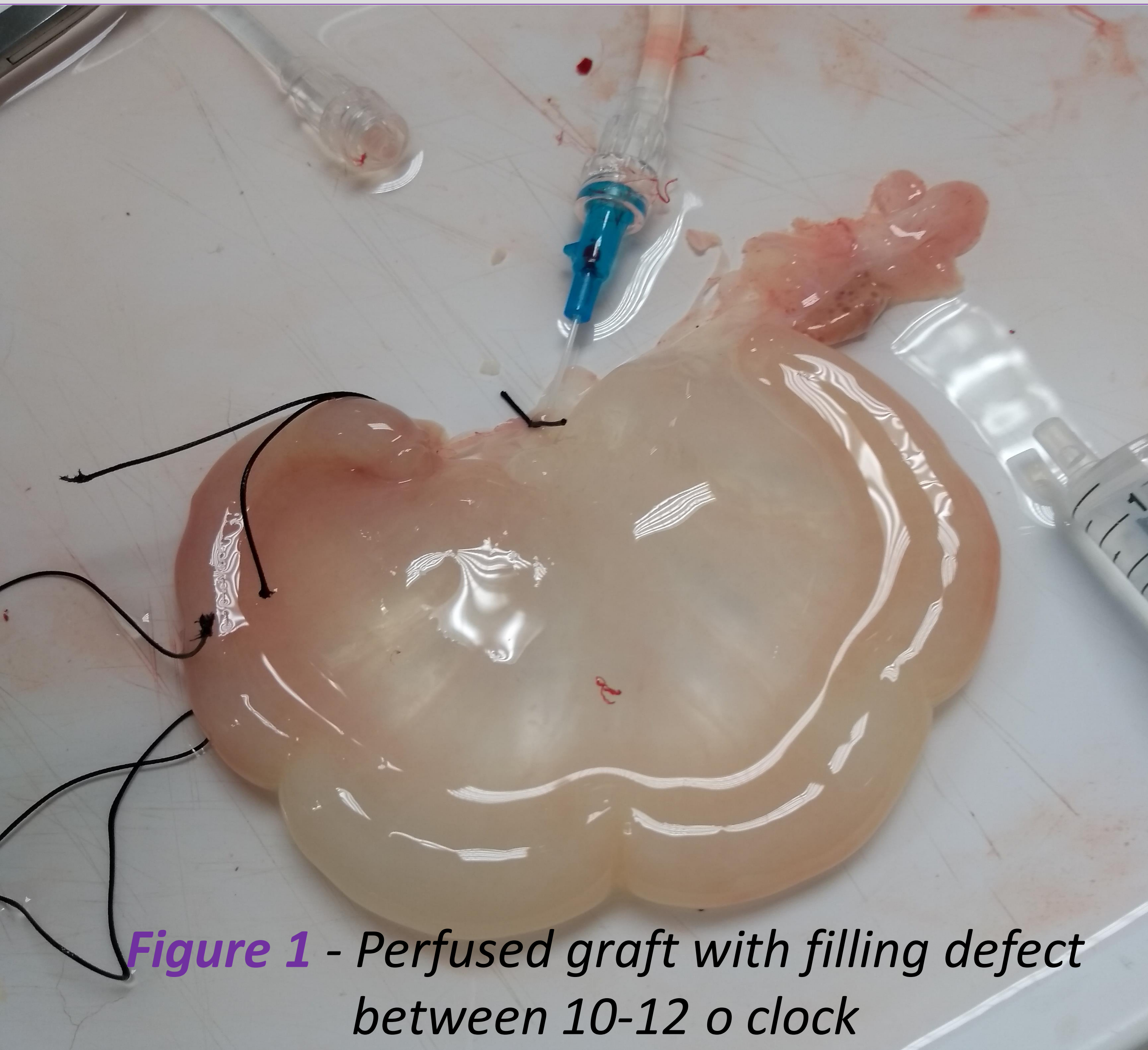


Figure 1 - Perfused graft with filling defect between 10-12 o clock

Results

Two feasibility studies were undertaken. A fluid circuit was created using silicone tubing. The two uterine arteries were cannulated with 22G cannula. Phosphate buffer solution (PBS) was pumped through each uterine graft using a roller pump. An in-line pressure sensor allowed the pressure to be monitored and controlled. A temperature sensor was used to monitor the temperature, which was warmed by a reservoir using a water bath set to 38 degrees celsius. Custom control and a switching circuit served as an interface for the sensor inputs and motor control output. During the first case, the ovarian arteries and veins were ligated, and the uterine veins left open, but the perfusion was suboptimal (Figure 1). To improve venous outflow the ties on the ovarian vessels were released and perfusion improved. For the second case (Figure 2), the ovarian artery was ligated but the ovarian veins left patent. Introduction of dye (Figure 3) demonstrated optimal perfusion the uterus.

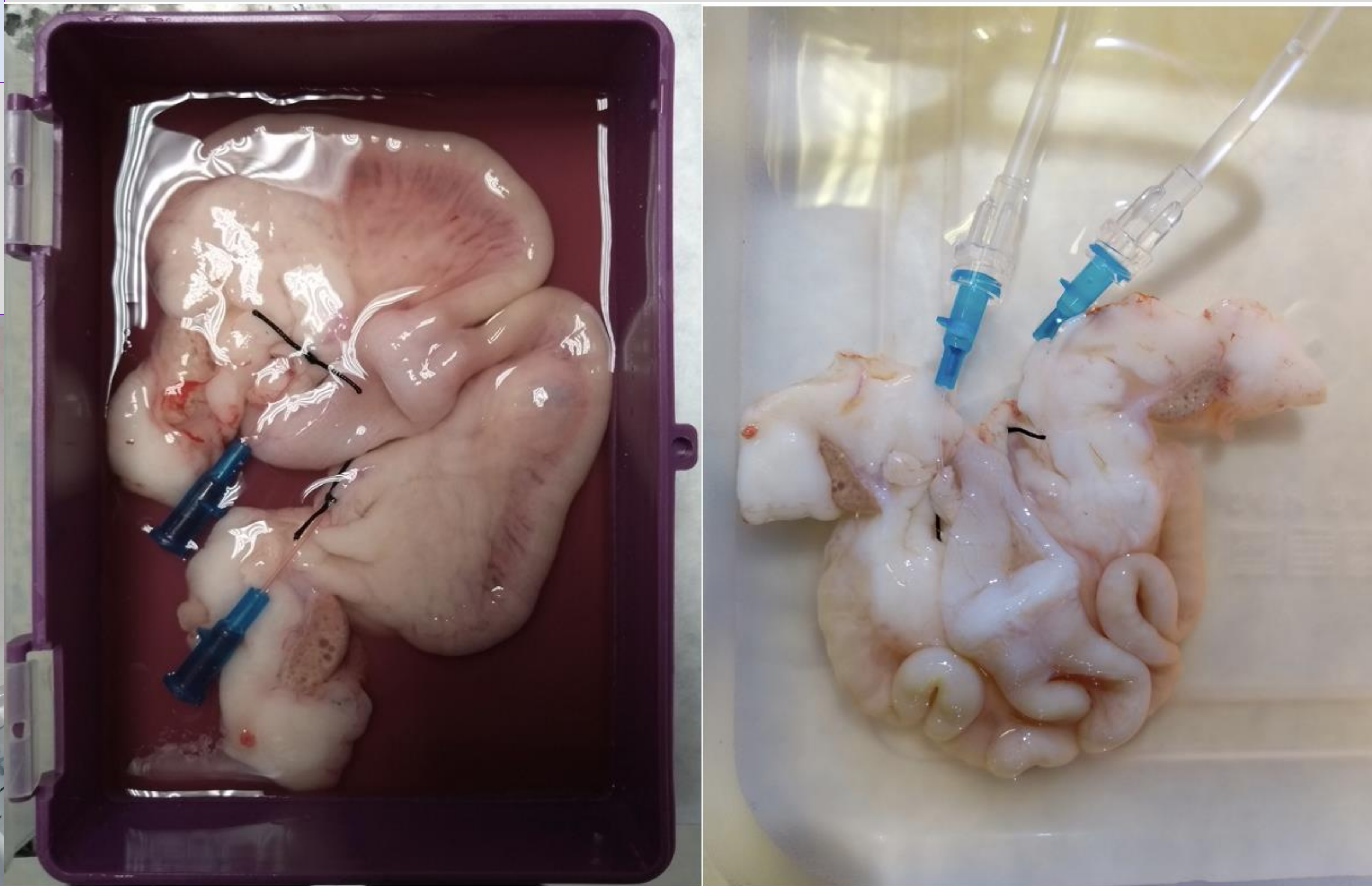


Figure 2 - Second case cannulated (left) and perfused with PBS (right)

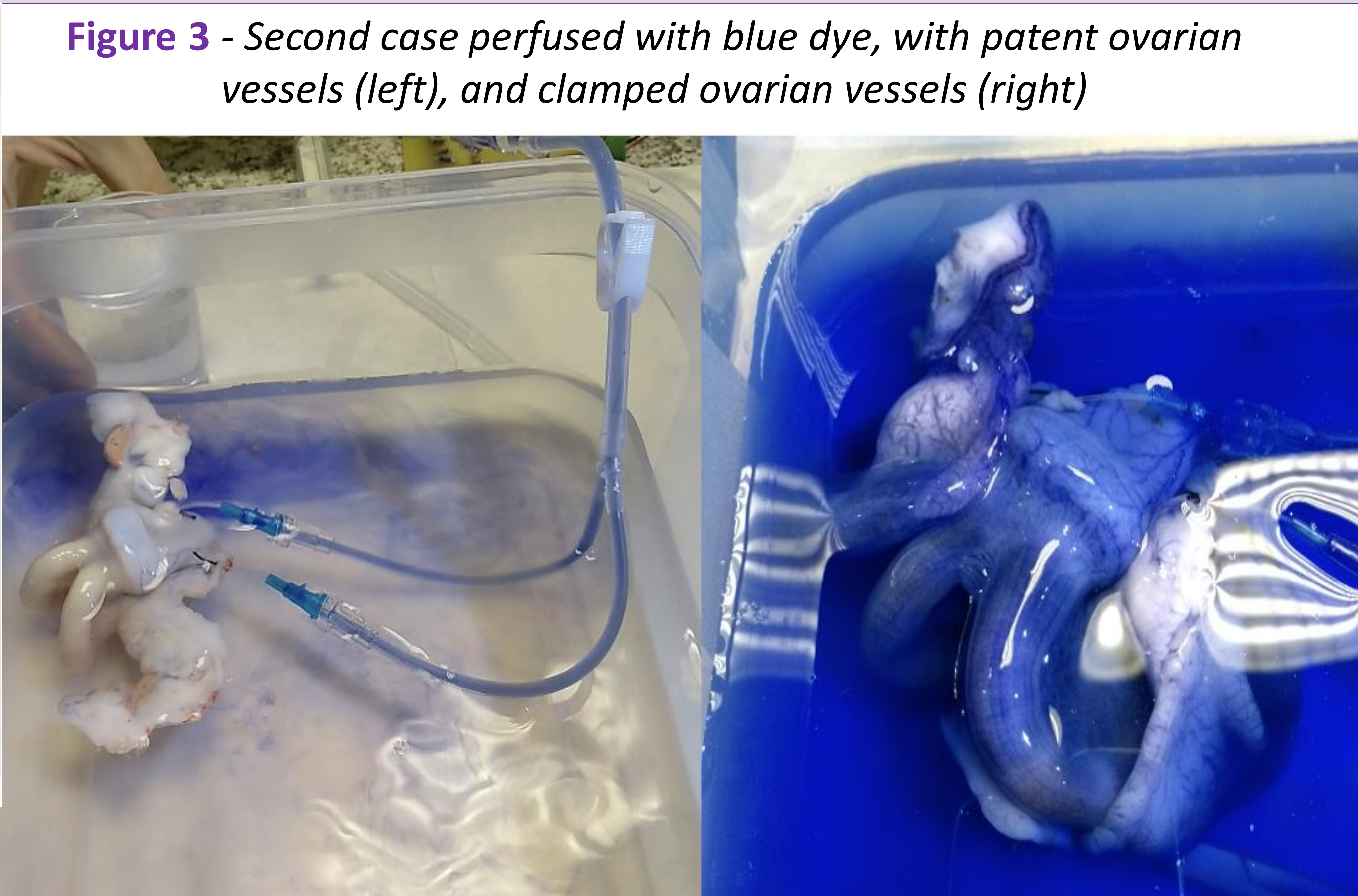


Figure 3 - Second case perfused with blue dye, with patent ovarian vessels (left), and clamped ovarian vessels (right)

Conclusion

This study confirmed NMP is feasible in rabbit uteri and established a circuit and proposed cannulation sites for further studies. In the context of UTx, prolonged preservation in the absence of a clinically indicated waiting list, would facilitate the nationwide optimisation of tissue matching between donor and recipient. Longer preservation periods would also permit more efficient allocation and scheduling of clinical personnel and resources.