Case Report
Volume 14:03, 2024

Journal of Clinical Case Reports

ISSN: 2165-7920 Open Access

Reconditioning of a Heart Allograft after Interrupted Procurement with Machine Perfusion: A Case Report

Ivan Novokhatskiy[1]*, Achim Koch[1], Nikolaus Pizanis[1], Simon Wernhart[2], Lars Michel[2], Payam Akhyari[1] and Markus Kamler[1]

[1]*Department of Thoracic and Cardiovascular Surgery, West German Heart and Vascular Center, University Hospital Essen, 45147 Essen, Germany*
[2]*Department of Cardiology and Vascular Medicine, West German Heart and Vascular Center, University Hospital Essen, 45147 Essen, Germany*

Abstract

Heart donation rates lag behind a growing number of recipients. Therefore, transplant programs increasingly accept organs from extended criteria donors. Donor age ≥ 47 years and allograft ischaemic time ≥ 2-4 hours are linearly associated with a higher risk of death at 1 year after heart transplantation. *Ex vivo* Machine Perfusion (MP) of heart allografts offers the opportunity to evaluate and optimize extended criteria donor hearts, while also reducing cold ischemic time, with the aim to maximize eligible allograft pool. We describe a case of cancellation of the ongoing procurement due to acute donor instability and subsequent evaluation and successful reconditioning of the heart with MP.

Keywords: Heart transplantation • Machine perfusion • Cardio-thoracic surgery

Introduction

Heart donation rates lag behind a growing number of recipients. Therefore, transplant programs increasingly accept organs from extended criteria donors [1]. Donor age ≥ 47 years and allograft ischaemic time ≥ 2-4 hours are linearly associated with a higher risk of death at 1 year after heart transplantation [2]. *Ex vivo* Machine Perfusion (MP) of heart allografts offers the opportunity to evaluate and optimize extended criteria donor hearts, while also reducing cold ischemic time [3], with the aim to maximize eligible allograft pool. We describe a case of cancellation of the ongoing procurement due to acute donor instability and subsequent evaluation and successful reconditioning of the heart with MP.

Case Presentation

Recipient and donor profiles

The recipient was a 67-year-old male (BMI 22.6 kg/m^2), listed for Heart-Tx for 11 months due to ischemic heart disease after left ventricular assist device implantation as bridge to heart transplantation. Comorbidities included a history of previous percutaneous coronary interventions, type 2 diabetes mellitus, arterial hypertension, and chronic kidney disease with a creatinine level of 1.76 mg/dl.

The donor was a 49-year-old male (BMI 26 kg/m^2), with Donation after Brain Death (DBD) due to intracranial bleeding. After previous resuscitation, the patient was stabilized with low-dose alpha-adrenergic support (norepinephrine 0.1 µg/kg/min). Echocardiography revealed a non-dilated left and right ventricle with discrete left ventricular hypertrophy and good biventricular function (LVEF 60%). No regional wall motion abnormalities or valve dysfunction were observed. Coronary angiography showed not relevant signs of arteriosclerosis. The heart offer was accepted for further evaluation at the donor-site.

***Address for Correspondence:** Ivan Novokhatskiy, Department of Thoracic and Cardiovascular Surgery, West German Heart and Vascular Center, University Hospital Essen, 45147 Essen, Germany, E-mail: Ivan.Novokhatskiy@uk-essen.de*

Received: 30 April, 2024, Manuscript No. jccr-24-133657; **Editor Assigned:** 02 May, 2024, PreQC No. P-133657; **Reviewed:** 16 May, 2024, QC No. Q-133657; **Revised:** 22 May, 2024, Manuscript No. R-133657; **Published:** 30 May 2024, DOI: 10.37421/2165-7920.2024.14.1599

Heart procurement

Just before the arrival of the explant team, the donor's condition deteriorated, resulting in critical hypotension. Emergency therapy included the administration of red blood cell concentrates and the escalation of norepinephrine to approximately 1 mg/kg/min.

The explant team was informed of the cancellation of the donation due to the reasons described above while they were arriving in the donor clinic parking lot. In the case of conventional heart procurement with cold storage, this would have been a definitive and unquestionable decision.

The team decided on immediate procurement. The allograft then was evaluated and reconditioned by means of machine perfusion [4].

After sternotomy, a normal-sized heart was observed. All coronary arteries were clearly visible and showed no abnormalities upon palpation. The heart was accepted for retrieval despite hemodynamic instability and connected

Figure 1. The heart allograft on the machine perfusion.

to machine perfusion (Organ Care System TransMedics®, Inc.). The return transport was by airplane. Graft monitoring revealed satisfactory coronary flow (mean 840 ± 60 mL/min), a mean aortic pressure of 79.3 ± 7.2 mmHg, mean heartrate 87.7 ± 9.6 bpm and stable metabolic parameters (maximum arterial lactate levels reached 4.84 mmol/L and venous lactate levels reached 4.9 mmol/L, respectively). After thorough evaluation of the heart allograft, decision was made to proceed with heart transplantation. The total out-of-body time was 407 min, with a total ischemia time of 47 min and a machine perfusion time of 360 min (Figure 1).

Results and Discussion

Heart transplantation and outcome

Surgery was straightforward using bicaval technique [5]. Cardio-pulmonary bypass time was 226 minutes. Extubation was on postoperative day 2, Continuous Veno-Venous Hemo Dialysis (CVVHD) was needed for 9 days and ICU stay was 11 days. After 14 days, the graft showed a good function. Endo Myocardial Biopsy (EMB) revealed a mild rejection, graded as 1R. The patient is currently in stable clinical condition. After follow-up of 5 years and 9 months the LVEF is 55% and no signs of rejection in follow-up EMBs were noted.

Conclusion

A major advantage of *ex vivo* heart perfusion is the expansion of the donor pool by utilizing hearts that are considered unsuitable for transplantation. In this case, the donor organ would have been discarded, if the opportunity to evaluate the organ by machine perfusion would had not been given. The donor heart could be safely evaluated despite the hemodynamically unstable retrieval conditions and deemed transplantable after observation of 360 min perfusion time under optimized metabolic conditions.

This case report emphasizes the possibilities of mobile machine perfusion of donor hearts, which allows for further functional evaluation and reconditioning in critical conditions and in case of uncertainity concerning transplantability of extended criteria donor organs.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Khush, Kiran K. "Donor selection in the modern era." *Ann Cardiothorac Surg* 7 (2018): 126.
2. Lund, Lars H., Kiran K. Khush, Wida S. Cherikh and Samuel Goldfarb, et al. "The registry of the international society for heart and lung transplantation: Thirty-fourth adult heart transplantation report—2017; focus theme: Allograft ischemic time." *J Heart Lung Transplant* 36 (2017): 1037-1046.
3. Bryner, Benjamin S., Jacob N. Schroder and Carmelo A. Milano. "Heart transplant advances: *Ex vivo* organ-preservation systems." *JTCVS open* 8 (2021): 123-127.
4. Pinnelas, Rebecca and Jon A. Kobashigawa. "*Ex vivo* normothermic perfusion in heart transplantation: A review of the TransMedics® Organ Care System." *Future Cardiol* 18 (2022): 5-15.
5. Miniati, Douglas N. and Robert C. Robbins. "Techniques in orthotopic cardiac transplantation: A review." *Cardiol Rev* 9 (2001): 131-136.

How to cite this article: Novokhatskiy Ivan, Achim Koch, Nikolaus Pizanis and Simon Wernhart, et al. "Reconditioning of a Heart Allograft after Interrupted Procurement with Machine Perfusion: A Case Report." *J Clin Case Rep* 14 (2024): 1599.