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Emergency Intraoperative Implantation of ECMO for Refractory Cardiogenic Shock Arising During Liver Transplantation as a Bridge to Myocardial Surgical Revascularization

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We read with interest the article by Braun et al[1] on the utility of extracorporeal membrane oxygenation (ECMO) after liver transplantation (LT).

Every ECMO application during LT is unique, and there should be mandatory reporting of every incident to build a body of experience for the benefit of all.

A 53-year-old male, with hepatocellular carcinoma on a background of hepatitis C virus-related cirrhosis, underwent LT from a brain-dead donor in July 2018.

The donor was a 60-year-old man with no comorbidities, body mass index of 27, who had died of a stroke; he had been in the intensive care unit 2 days before organ procurement. Liver biopsy showed only mild macrosteatosis (<20%) and no other histological abnormalities.

Before LT the recipient's cardiac assessment was performed according to our standard protocol. A transthoracic echocardiography showed a 71% left ventricular ejection fraction, while a rest/stress dipyridamole scintigraphy showed normal myocardial perfusion.

The estimated blood loss before reperfusion was 1800 mL, while the graft cold ischemia time lasted 8 hours and 30 minutes.

Upon graft reperfusion, we observed severe worsening of the hemodynamic profile that resulted in a cardiac arrest. Cardiopulmonary resuscitation was initiated by the surgeon, and after external cardiac massage (45 min), pharmacological treatment, and 4 transthoracic defibrillation attempts, the patient's hemodynamic responded to resuscitation recovering spontaneous cardiac rhythm.

Subsequently, the electrocardiogram showed diffuse signs of severe myocardial ischemia, while a transthoracic echocardiography showed severe hypoakinesia of the left ventricle.

At the end of the arterial anastomoses, recurring cardiac arrests necessitated continuation of cardiopulmonary resuscitation, making it impossible to proceed with the surgical procedure.

Given the severe cardiogenic shock and risk of intraoperative death, venoarterial (VA) ECMO was instituted by means of cannulation of the common femoral artery and vein by the cardiac surgeons.

The biliary anastomosis and abdomen closure were performed during the VA-ECMO support, after which the patient was transferred to undergo urgent invasive coronary angiography that showed an unexpected severe multivessel coronary artery disease.

Two coronary bypasses were performed during VA-ECMO support instead of a percutaneous approach to avoid the high bleeding risk associated with dual antiplatelet therapy in this clinical context.

The patient was successfully weaned off ECMO 4 days after the LT with a 55% left ventricular ejection fraction and no bleeding or thrombotic events.

Alanine aminotransferase and aspartate aminotransferase levels peaked at 1460 and 1240 IU/mL, respectively, on postoperative day 2, while bilirubin remained <10 mg/dL. Liver graft function improved gradually to normal before patient discharge. Despite exposure to perioperative and postoperative risk factors for acute kidney injury, the patient did not require posttransplant renal replacement therapy.

No complications of LT or VA-ECMO were found and the patient was discharged on postoperative day 26 and is still alive and well 10 months later.

Cardiovascular complications related to reperfusion syndrome contribute to nongraft–related intraoperative and perioperative mortality during LT.[2]

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Impaired hemodynamics during LT, exacerbated by significant reperfusion syndrome, can unmask latent cardiovascular disease either perioperatively or immediately after transplant.

Pretransplant cardiovascular risk assessment in LT recipients still holds a degree of uncertainty in pretransplant evaluation because current noninvasive tests to evaluate subclinical coronary artery disease have low sensitivity.[3] However, limited guidelines on the cardiac assessment of LT recipients have been reported.[3,4]

In the case reported, VA-ECMO proved an effective extreme strategy in the event of severe refractory cardiogenic shock during LT, allowing us to complete the transplant and provide a bridge to myocardial revascularization.

We would like to point out that effective collaboration within teams and between specialties was crucial to handle an extremely grave situation and facilitated positive patient outcome.

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