

Organ Care System for Heart Procurement and Strategies to Reduce Primary Graft Failure After Heart Transplant



Masaki Tsukashita, MD, PhD, and Yoshifumi Naka, MD, PhD

Primary graft failure is a rare, but often fatal complication of heart transplantation. Although exact mechanism of primary graft failure has yet to be elucidated, prolonged ischemia time is one of the risk factors of early dysfunction of the donor heart. Organ Care System is the only device available for ex vivo perfusion of human donor hearts in a warm beating state. In this article, we provide step-by-step instructions of its use.

Operative Techniques in Thoracic and Cardiovascular Surgery 20:322-334 © 2016
Published by Elsevier Inc.

KEYWORDS heart transplantation, Organ Care System, ex-vivo heart perfusion, primary graft failure

Introduction

Heart transplantation is the gold standard treatment for end-stage heart failure. However, the number of heart transplantations in the United States has been peaking at roughly 2300 per year, although the number of new active candidates on the waiting list has been increasing. In 2013, 3300 new candidates were listed for heart transplant.¹ One of the limiting factors of maximizing donor heart utilization is distance between the donor hospital and the recipient hospital. Traditionally, the donor hearts are harvested and transported in a cold storage. Prolonged cold ischemia time is known to be one of the risk factors for primary graft failure and early mortality.² Therefore, donor hearts have been allocated to the recipient hospitals at the distance at which transport does not take long especially for recipients with mechanical circulatory support or from marginal donors.

Organ Care System (TransMedics, Inc, Andover, MA) is the only ex vivo heart perfusion platform with warm, oxygenated, and nutrient-enriched donor blood. With the Organ Care System, warm oxygenated blood is pumped into the aorta, perfusing the coronary arteries. The coronary sinus flow then passes through the tricuspid valve and is ejected by the right ventricle into a pulmonary artery cannula, and returned to the blood reservoir. The perfusate includes insulin, antibiotics methylprednisolone, sodium bicarbonate,

multivitamins, and fresh donor blood. Pulsatile flow is generated by a diaphragmatic pump. The system shortens the cold ischemia time by maintaining the heart in warm perfused state during transport and might increase safe retrieval distance, decrease the incidence of primary graft failure, and potentially allow for increase in number of heart transplantation. A prospective, multicenter, open-label, and randomized trial has confirmed noninferiority of this system compared to the standard cold storage.³ Here, we review heart procurement by using Organ Care System in step-by-step manner. Owing to limitations of space, we just focus on the surgical part and do not touch how to use and manage the device in detail. It can be found in the vendor's instructions (Figs. 1-11).

Operative Technique

Donor Heart Management During Transport

Hemodynamic (coronary flow, mean aortic pressure, heart rate, and electrocardiography) and chemical parameters (arterial blood gas, electrolyte, and glucose) are checked regularly during the donor heart transport to the recipient hospital. Target mean aortic pressure is between 65 and 85 mm Hg, coronary flow is between 650 and 850 mL/min, and total arterial lactate less than 5 mmol/L. Those parameters are corrected by adjusting pump flow, maintenance solution rate, epinephrine infusion, pacing rate, and gas flow. On arrival to the recipient hospital, the donor heart is arrested with 1 L of cold cardioplegia and disconnected from the system for implantation into the recipient.

Division of Cardiothoracic Surgery, New York Presbyterian Hospital, Columbia University Medical Center, New York, NY.

Address reprint requests to Yoshifumi Naka, MD, PhD, Division of Cardiothoracic Surgery, New York Presbyterian Hospital, Columbia University Medical Center, 177 Fort Washington Ave, MHB Suite 7 GN-435, New York, NY 10032. E-mail: yn33@cumc.columbia.edu

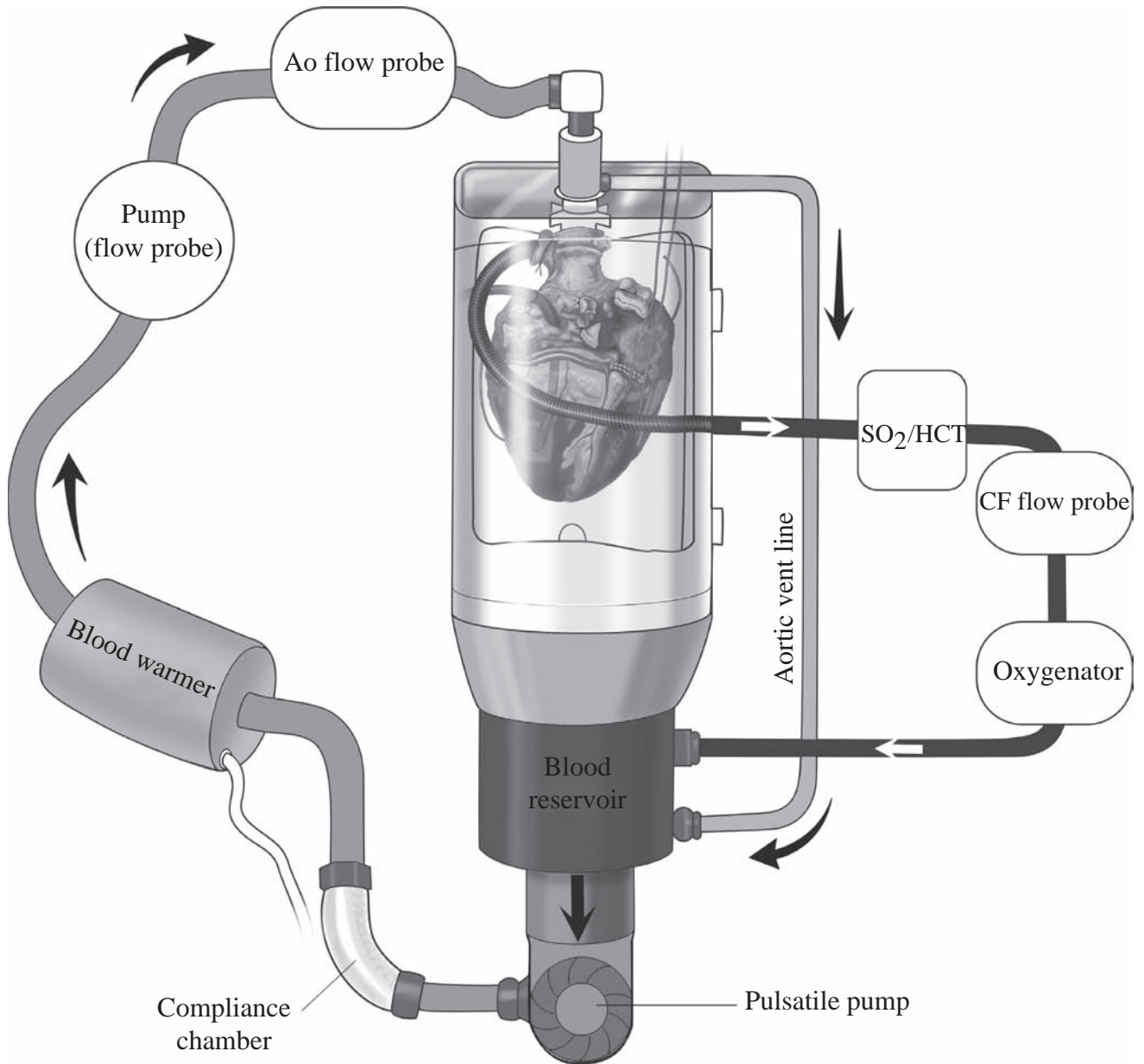


Figure 1 Organ Care System overview.

Download English Version:

<https://daneshyari.com/en/article/3004741>

Download Persian Version:

<https://daneshyari.com/article/3004741>

[Daneshyari.com](https://daneshyari.com)