Case report
Heart allograft transplanted twice
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Received 24 March 2008; received in revised form 5 June 2008; accepted 11 June 2008; Available online 3 August 2008

Abstract
We present the case of a man who underwent successful heart transplantation with an allograft that was obtained from a donor who had already received heart transplantation.

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Keywords: Heart transplantation; Allograft

1. Introduction
The number of individuals who would benefit from heart transplantation is limited due to the scarce availability of the donor organs. The paucity of allografts justifies means to maximize the use and sharing of available ones. We report one such instance where a heart from a donor, who had recently been the recipient of a heart transplant but succumbed neurologically in the postoperative period, was transplanted into a third person.

2. Case report
A 45-year-old O blood type 183 cm man who weighed 123 kg had New York Heart Association class IV heart failure due to left ventricular non-compaction. He was on chronic infusion of dobutamine at 5 mcg/kg/min intravenously and had undergone chronic resynchronization therapy with a pacemaker-defibrillator insertion with equivocal help.

An appropriate donor heart became available after he had been on the heart transplantation waiting list as a status 1B candidate for 12 months. This heart was transplanted into another recipient one week previously following an approximate 3 h ischemic time. This was a 38-year-old 185 cm man who weighed 92 kg. The original donor was a 22-year-old male. The heart transplant operation was performed uneventfully with the biatrial technique. There was immediate recovery of excellent heart function in the operating room. The first recipient was weaned off all inotropes and on a regular ward when he had brain death due to a cerebral bleed 5 days postoperatively. Left ventricular ejection fraction was 64% by transthoracic echocardiography that also showed adequate right ventricular function. The patient was not on inotropes. The heart transplant operation was performed uneventfully with the biatrial technique.

This already transplanted heart appeared to have good right ventricular function on inspection by our donor team. The heart transplant procedure in our recipient (second recipient for this heart) was performed with an allograft ischemic time of 3 h and 17 min. The aortic cross-clamp time was 58 min and total cardiopulmonary bypass time was 77 min. The procedure was performed with the biatrial technique. This was anatomically imperative because of the previous transplant procedure, although we use the bicaval technique routinely.

There was prompt and excellent heart function upon removal of the aortic cross-clamp. The patient had received a bolus of 1 g of methylprednisolone intravenously shortly prior to this point. He was induced with a 7-day course of thymoglobulin and subsequently was maintained on tacrolimus, mycophenolate mofetil, and prednisone orally. He was discharged on postoperative day 12. His surveillance endomyocardial biopsies showed no or minimal (grade 1A) cellular rejection to date. A right heart catheterization on postoperative day 16 showed a central venous pressure of 8, pulmonary artery pressure of 32/16 with a mean of 23 mmHg and a cardiac index of 3.68 l/min/m². He is alive and well 13 months postoperatively.
3. Discussion

As of March 13, 2007, there were 2852 patients awaiting heart transplantation in the United States (The Organ Procurement and Transplantation Network, The United Network for Organ Sharing, www.unos.org). There were 3037 additions to the heart transplantation waiting list in the U.S. in 2006 while 2192 of such procedures were performed in the same year. The disparity between the patients on the heart transplantation waiting list and the available organs justifies maximizing the use of the available ones. A good example of this philosophy is the traditional ‘domino heart transplantation’ whereby the heart explanted from the recipient of a heart—lung transplant is transplanted into another recipient. This has been able to be performed with acceptable outcomes, though currently with less frequency [1]. In the case of a domino heart transplant, unlike our case, the heart is subjected to a single ischemic period.

This case makes a good example of the aggressive policy to utilize the available organs, as previously reported by Meiser and associates [2]. We have been unable to find a previous report describing the reuse of other solid organs, although it is conceivable that this has been performed previously. Despite an aging heart transplant population [3], excellent early outcomes following heart transplantation make the early reuse of an allograft a possible but unlikely occurrence.

The fact that the allograft would be subjected to two ischemic periods within the course of a week was a concern in this case. There was good heart function following the first transplant. We have observed the ventricular, especially the right ventricular, function carefully during the procurement. We have made the assumption that an allograft that has already been subjected to one ischemic period with good resulting function should tolerate a second one well. Timing of the re-allocation seems critical. The heart was allocated 6 days after the first transplantation and this made the second donor operation feasible. If this were done after the onset of fibrin deposition and scar formation, such as a month following the initial procedure, obtaining the allograft would be associated with an increased risk of lacerations. In other words, performing the re-allocation procedure under later redo-sternotomy conditions may be discussed controversially. A pre-procurement coronary angiography may be justified in this setting if the allograft has been in the first recipient for sufficient time to warrant investigating angiopathy.

The immunologic considerations in our recipient are complex. An immediate consideration is that our patient may be subject to a more profound immune response. This may be due to the fact that the allograft has been subjected to two hosts, with the immune components of both. Nevertheless, these dynamics may not be relevant. The second recipient may have been exposed to only one set of donor antigens given that the first recipient was immunosuppressed. Conversely, one may put forward that this situation may induce graft tolerance. Previous studies show that the administration of high dose or repeated administration of lower dose alloantigens may actually induce graft tolerance [4]. No rejection episodes were observed in our patient so far, with excellent graft function. This patient received the routine immunosuppressive induction and maintenance therapy that is prescribed to every heart transplant recipient in our institution.

We believe that every effort should be made to increase donor organ utilization. A cardiac allograft with good function, especially in the early postoperative period, can be reused if the first recipient succumbs to a non-cardiac event.

References