Cardiac transplantation remains the most effective therapy for end-stage heart failure in appropriate candidates, with a median posttransplant survival of 10 years. At any given point of time there are ≈3000 candidates on the heart transplant waiting list in the United States with annual mortality on the waiting list ≈15%. The number of heart transplants performed in the United States per year has been fairly constant at ≈2500. In spite of this, many donor hearts remain unused. Bench repair of mitral valve remains rarely practiced and significant mitral valve regurgitation (MR) remains a standard contraindication to use of a donor heart.

Case 1
A 53-year-old male donor who had a cerebral infarct became available for a 61-year-old man with blood group O who received left ventricular assist device, Heartmate II (Thoratec, Pleasanton, CA), for decompensated dilated cardiomyopathy. The donor coronary angiogram was normal. Donor transthoracic echocardiogram (TTE) showed inferior wall hypokinesis, interventricular septum 1.15 cm, left ventricular ejection fraction (LVEF) 55%, and moderate central MR. Intraoperative mitral valve analysis showed annular dilatation and tethering of P2, P3 scallops of posterior leaflet (type I and IIIb dysfunction). Bench repair was performed with a true-sized 27-mm ATS annuloplasty band. The heart was transplanted uneventfully. The predischarge TTE showed LVEF 65%, mild MR. At 18 months the patient remains well, in New York Heart Association class I with similar TTE.

Case 2
A 58-year-old woman with dilated cardiomyopathy with left ventricular assist device had a body mass index of 38 kg/m². A 30-year-old donor who had intracranial hemorrhage was identified. TTE showed good function, mild mitral valve prolapse, and moderate central MR. Intraoperative mitral valve analysis showed annular dilatation and tethering of P2, P3 scallops of posterior leaflet (type I and IIIb dysfunction). Bench repair was performed with a true-sized 27-mm ATS annuloplasty band. The heart was transplanted uneventfully. The predischarge echocardiogram 23 days after surgery showed LVEF 69%, minimal MR. At 14 months, he remained in New York Heart Association class I.

Case 3
A 29-year-old donor who had astrocytoma became available for a 58-year-old man with dilated cardiomyopathy, blood group O. Donor echocardiogram showed LVEF 53%, mild-to-moderate MR with slight bileaflet thickening with normal motion. Analysis of the donor mitral valve revealed annular dilatation. The heart was transplanted uneventfully after successful bench mitral valve repair with a 28-mm Carpentier-Edwards Physio ring (Edwards Lifesciences, Irvine, CA). The most recent TTE of this patient, 7 years after transplant, showed minimal MR with LVEF 75%.

Discussion
Risher et al¹ in 1994 first described mitral commissurotomy of donor heart before transplantation. Since then, over the last 17 years there have been only few cases of bench mitral valve repairs.²

The surgeon should review the donor echocardiogram to determine the exact nature and pathology of MR in otherwise acceptable donor hearts. If the mechanism of MR is simple,
then bench repair can be performed adding only a few more minutes to warm ischemia time before transplantation.

We extended donor criteria for predicted long wait times (blood group O, high body mass index) or concerns about complications of left ventricular assist device support. A heart with a bench-repaired mitral valve may provide better odds of long-term survival compared with continued waiting on the list.

Disclosures
Dr Adams is co-inventor of the Tri-Ad Annuloplasty Ring (Medtronic Inc, Minneapolis, MN) and coinventor of the Carpentier Edwards Physio II ring (Edwards Lifesciences, Irvin, CA). The remaining authors have no disclosures.

References

Key Words: heart transplantation ■ mitral regurgitation ■ ventricular assist device

Figure 1. Transthoracic echocardiogram of the donor heart in Case 1 before procurement shows moderate mitral valve regurgitation with a posteriorly directed jet in (A) long-axis and (B) 4-chamber views.

Figure 2. Intraoperative view of the donor heart in Case 1 showing (A) the placement of annuloplasty band sutures and (B) the completion of the mitral valve repair with the ATS annuloplasty band in place.
Bench Mitral Valve Repair of Donor Hearts Before Orthotopic Heart Transplantation
Amit Pawale, Gilbert H.L. Tang, Federico Milla, Sean Pinney, David H. Adams and Anelechi C. Anyanwu

Circ Heart Fail. 2012;5:e96-e97
doi: 10.1161/CIRCHEARTFAILURE.112.970962
Circulation: Heart Failure is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2012 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-3289. Online ISSN: 1941-3297

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circheartfailure.ahajournals.org/content/5/6/e96

Data Supplement (unedited) at:
http://circheartfailure.ahajournals.org/content/suppl/2012/11/19/5.6.e96.DC1
Supplemental Material

Supplemental Figure

Spectral Doppler tracing of mitral regurgitation in Case 1.

Video Legends

Movie 1. Transthoracic echo, long axis parasternal view of donor heart in Case 1.

Movie 2. Coronary angiogram of donor in Case 1; left main stem injection.

Movie 3. Coronary angiogram of donor in Case 1; right coronary artery injection.