Case report
Coronary angioplasty and stenting following heart transplantation with older donors.
Is this a rational approach?

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Abstract
The shortage of ideal donor hearts has led to an extension of the classical donor criteria of age. Higher incidence of focal coronary artery disease has been found in this older donor population requiring conventional angioplasty therapy. The authors present two patients with early coronary angiogram post transplantation, requiring angioplasty and stent in the lesions found. © 1998 Elsevier Science B.V. All rights reserved.

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1. Case report
Scarcity of donors and the increasing demand of organs for heart transplantation has led to a tendency to liberalize criteria like age for donations [1]. This has created a subgroup of patients called ‘marginal donors’. Many different studies have proved that in marginal donors, operative mortality is not increased, but long-term morbidity, secondary to allograft coronary artery disease, is higher than in patients in which conventional donors are used [2]. The risk of remaining on the waiting list justifies the use of older-donor hearts, as some groups have already demonstrated [3]. The authors describe two cases in which donor hearts required angioplasty a few months after transplantation due to coronary disease in the donor’s hearts.

2. Case 1
A 44-year-old donor hemodynamically stable with no inotropic drugs or history of cardiovascular risk factors, except for an unknown hypertension which was not treated. Macroscopically, there were no signs of any lesion and the aorta was soft and without major calcifications. The donor was accepted for transplantation and transplant was carried out with some post-bypass instability requiring major inotropic support. The recipient, a 51-year-old patient with coronary disease and diabetes, developed a postoperative renal failure from which he completely recovered, and was therefore discharged 3 weeks after the transplant. Follow-up was uneventful with routine biopsies in which no evidence of rejection was observed. As the authors usually do with the transplant patients, coronary angiography was scheduled between weeks 4 and 8. Surprisingly, the authors found a dominant right coronary artery with an 80% ulcerated stenosis in the second portion (Fig. 1). Some minor irregularities were found in the left anterior descending artery with a normal ejection frac-
tion (68%). During the procedure, the authors decided to carry out balloon angioplasty and placement of an intracoronary stent. The patient tolerated the procedure with no problems and excellent angiographic results (Fig. 2). He was discharged with calcium channel blockers and pentoxifylline added to his standard triple immunosuppressive therapy. After 7 months, the patient is doing well with a good ejection fraction measured by echocardiography.

3. Case 2

A 46-year-old donor without major cardiovascular risk except for a heavy history of smoking was accepted for heart transplantation. Hemodynamically, the patient was very stable with minimal inotropic requirement. At the time of harvesting heavy calcifications were found in the aorta and minor lesions were present in one of the marginal branches. Because the recipient, a 63-year-old patient with a history of coronary disease (previous coronary surgery 9 months before) was unstable and in critical situation, the donor was accepted for transplantation. There was transplantation with no complications and the patient was discharged home 3 weeks later.

Two months after the transplantation a thallium test was carried out because of the previous lesion seen at the time of harvesting, even if the patient was asymptomatic and in functional class I. The thallium proved there was some minor defect in the posterior wall close to the apex. Following a coronary angiogram, which showed distal stenosis of the circumflex artery with a very small right coronary artery. Angioplasty was carried out with good angiographic results. The patient was discharged and evolution was uneventful after 10 months.

4. Comment

The approaches were completely different for these two patients. The first case had a lesion on the right coronary artery which was unexpected during a routine follow-up angiogram. The decision of dilatation and stenting was made because the stenosis looked ulcerated and critical in a dominant right coronary artery even if the patient was asymptomatic without signs of cardiac failure. The second patient, as far as the authors suspect, had some possible lesions, a thallium test was carried out and previous angioplasty proved there was some degree of isquemia justifying the balloon angioplasty.

These two cases raise several questions with complicated answers. Should we accept old donors for transplantation? What kind of test should be carried out before harvesting to evaluate the quality of the heart? When we accept these donors, should we try to match them with older recipients? Finally, is it recommended to carry out coronary angiography 1 month after transplantation to ensure the quality of the coronaries?

To answer the first question, the authors think that they should not reject any potential donor just because of age. At least we are committed to carefully evaluating this heart trying to identify evidences of coronary lesions. That brings us to the second question of how to evaluate the donor hearts? Hemodynamic parameters and absence of cardiovascular risk factors, as shown before, are not enough to rule out coronary lesions. Echocardiography could show wall motions’ abnormalities suggesting ischemic injuries, but it is not enough to rule-out coronary lesions. The only way to clearly
detect coronary lesions are systematic coronary angiography carried out during harvesting. Technically and strategically speaking, this procedure is very difficult for two main reasons. Harvesting in many cases is carried out in hospitals that do not have enough structure and even when coronary angiography is provided, the risk of instability and consequently the possibility of losing other organs for transplantation is increased. Some groups carry out coronary angiography in marginal donors and coronary revascularization is done at the time of transplantation, if needed. So far none have done preharvesting angioplasty when coronary lesions were found, but that should consider another option to improve the number of marginal donors.

Assuming that we decide to accept the older organ: Should we try to match it with an old recipient? This seems logical to us, but again, we are adding more risk to the recipient who theoretically, just because of age, has an increased risk of morbidity. The study’s philosophy, as many other groups, is to try to always match hearts and recipients [4]. Heart donors with preexisting coronary artery disease does not accelerate the progression of transplant vasculopathy with similar short-term survival than transplanted patients with younger donors hearts [5].

Early coronary angiogram should be carried out in transplanted patients, or even more so when suspicion of coronary lesions was determinate during harvesting, or in older donors with a cardiovascular risk factor without preharvesting angiography studies. Correction of these lesions with angioplasty or intracoronary stent seems to be a good therapeutic option that will avoid damage in the donor heart making the outcome of the patient worse.

Older donors represent a potential immediate increase in the number of suitable hearts for transplantation that may be safely and effectively used when appropriately matched to the recipient by age and medical conditions. Donor-transmitted coronary disease is higher when the authors use older donors [6] but can successfully be treated by an early conventional therapy. Greater experience will help to determine optimal donor-to-recipient matches in the future.

5. Note added in proof

Patient number 1 has a follow up angiogram 1 year after stenting showing a good right coronary artery without any stenosis or lesion.

References


Editorial comment

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Doctor Rábago and colleagues have briefly presented two cases to introduce the controversial issue of the clinical use of the marginal donor heart. Here they have focused on transplanted coronary disease and successfully managed both patients by early angioplasty and stenting.
Four appropriate questions are posed by the authors and somewhat didactic answers given in their discussion:

1. Should we accept old donor hearts? This is out of context as neither of the cited donors were ‘old’, but they were complicated by coronary disease; obviously a problem more associated with the older donor heart. There is an increasing body of information describing the risk of using marginal donor hearts for transplantation [7] and in particular from 50-year-old donors and older. The risk of death rises with each decade above 50 years [8]. We fail to contrast these assessed risks to the potential recipient’s risk of death without transplantation, nor do we describe the results of the transplant surgery in appropriate terms: that of intention to treat by heart transplantation rather than outcome of treatments by transplantation. Addressed in this way we may agree with the very briefly argued conclusion of this question in this paper.

2. What kind of test prior to harvesting best describes quality of that donor heart? What do we mean by quality? The patient is interested in an effective pump to replace his failing one, but there is an implicit requirement in that request: that the short and at least mid-term risks are reasonable. It is this very area that this paper addresses all too briefly.

3. Let’s take their next two questions out of order. When should angiography be undertaken to identify transplanted coronary disease? A month after transplantation seems at least 1 month too late. To intervene at this time in the un-inervated heart must follow the sole argument of improved prognosis. Improvement in prognosis in this exceptional situation we do not know. Worse still we do not know the fate of transplanted coronary disease in the extraordinary circumstance of clinical heart transplantation. Will it have an impact upon early outcome? Probably it will, through the known behavior of ischemic myocardium and major surgery. What of its later role? Is there any relationship between transplanted coronary disease and chronic rejection? We do not know this either. We must agree that anatomical evaluation of the heart’s arteries may turn out to be of some benefit in apportioning this risk, so ‘yes’ to angiography but no to angiography at 1 month. Why not strive for this description of coronary architecture before or during transplantation?

4. Should such donors be matched to recipients? It is the belief of Hilel Laks and co-workers in California [9] that marginal donors should be directed towards recipients who would otherwise not benefit from transplantation: essentially the older recipient. This adds bias against the marginal donor heart in its clinical evaluation. If it fares well in this setting it is good news and will lead us to conclude that ageism should not come into play in its clinical use.

In our attempts to increase donor heart availability by broadening the criteria for donor heart selection we require reliable assessment of the risks imposed by their use. We will have to wait longer before a clear answer is available. Until then we must welcome and indeed encourage innovation, such as offered by Rábago and colleagues.