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Valve reconstruction or replacement for long-term biopsy-induced tricuspid regurgitation following heart transplantation

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Abstract Tricuspid regurgitation following heart transplantation can become a severe problem in a subset of patients, where medical therapy fails. Operative findings are described and results of subsequent results with surgical intervention including repair and replacement are analysed. Although follow-up is short, tricuspid replacement seems superior to reconstruction following heart transplantation. Best results are obtained, if replacement is performed, before right ventricular function deterioates.

Key words Tricuspid value failure Valve reconstruction · Valve replacement · Endomyocardial biopsies

Introduction

Tricuspid regurgitation following heart transplantation is a well known entity, which can be demonstrated soon after the primary transplantation in most patients [1, 2, 5]. In some cases, however, progressive deterioration leads to clinical symptoms and the necessity for surgical reintervention if medical therapy fails. The valve insufficiency can be caused by various factors. Apart from the implantation technique used, patient-related factors including rhythm, pulmonary hypertension, cardiac-size matching, pericardial support and the number and size of endomyocardial biopsies have been discussed as causative factors [1, 4, 5]. It was the aim of this retrospective analysis to outline underlying causes and to investigate the results achieved with reinterventions for tricuspid valve failure in cardiac transplant patients.

Patients and methods

From 1983 to 1994, 12 out of 505 patients (2.4%) following heart transplantation underwent either tricuspid reconstruction (n = 4)or replacement (n = 8) for severe tricuspid regurgitation, $5.8 \pm$ 2.7 years following cardiac transplantation. The mean age of the patients was 52 ± 10 years and 10 patients were male while 2 patients were female. The underlying diagnosis prior to the initial transplantation was dilative cardiomyopathy in 9 patients and ischemic disease in 3 patients. All primary transplant operations were performed using standard cardiopulmonary bypass with aortal and bicaval cannulation and hypothermia of 30°C. All donor hearts were preserved with St. Thomas' Hospital solution cardioplegia and anastomosed using the original cuff technique as it was described by Shumway. All patients were on triple-drug immunosuppression including cyclosporine A 3-10 mg/kg azathioprine 1-2.5 mg/kg and prednisolone 0.1-0.5 mg/kg. All patients were monitored by routine endomyocardial biopsy on a scheduled basis. The mean number of biopsies in the first postoperative year was 24 ± 8 . The mean total number of biopsies in patients in the study group was 38 ± 20 . The status of the heart was assessed by routine echocardiography for cardiac function and valve competence. Apart from applying a four chamber view using transthoracal echocardiography for the verification of right atrial and ventricular enlargement, transoesophageal echocardiography was used on a routine basis [3]. In addition, the diagnosis of right heart failure was also assessed based on clinical symptoms. Liver and renal functional data were analysed on a longitudinal basis throughout the routine outpatient visits. The decision to intervene surgically was made if tricuspid insufficiency was progredient and reaching grade III/IV. Apart from the echocardiographic diagnosis, severe clinical symptoms had to be present which could not be managed by conservative means.

All patients were scheduled for elective reintervention. A CT scan of the thorax was performed to define the distance of the cardiac structures from the sternum. Reoperations were preferably done by resternotomy using bicaval cannulation and moderate hypothermia of 25 °C. Valve repair was evaluated in each patient. If no repair was feasable, valve replacement was performed using a bioprosthesis. In these cases, multiple pledgeted sutures of 2/0 dacron with teflon were placed around the valve circumference. Postoperatively, all patients were followed by routine echocardiographic examination and the tricuspid valve function assessed.

Results

All patients survived the reintervention. A total of four reconstructions and eight replacements was performed. Operations were performed without cardioplegia in 9/12 patients. Valve failure, as assessed from the intraoperative findings, included ring dilation in 11/12 patients, ruptured chordae in 6/12 patients and almost no septal leaflet in 3 of 12 patients. One patient received additional coronary and bypass grafting including implantation of the left internal mammaria artery to the LAD. Operative complications included phrenic nerve palsy in 2, one with repair and 1 with replacement, respectively. Atrioventricular block requiring pacemaker therapy occurred in 1 patient following valve replacement. Postoperative intubation was necessary for 1.6 ± 1.2 days. The mean intensive care unit stay of all patients was 6.5 ± 5.5 days. Two patients died within 1 year postoperatively, 10 patients are alive 3-21 months postoperatively. Echocardiographic examination after 1 year showed moderate tricuspid regurgitation grade II/III in 3/4 patients following reconstruction. Adequate valve function was assessed in almost every patient undergoing valve replacement except 2 where a mean gradient of 7 mm Hg was measured across the implanted valve. Excellent remodelling of right ventricular dimensions was observed in all patients following valve replacement. Right ventricular enlargement persisted in the group who underwent valve reconstruction despite clinical improvement.

Discussion

Our experience demonstrates that cardiac reinterventions for tricuspid valve repair or replacement can be performed with a low operative risk after prior transplantation. In most cases a valve replacement seems necessary due to the extensive structural valve failures observed [3, 5]. Injuries by the biopsy forceps have to be suspected as the main cause of the severe changes observed in this small subgroup of patients [4]. In our opinion, valve replacement offers the better causative treatment, since remodelling less frequently achieved good results in the group who underwent reconstruction due to persistent moderate regurgitation. In addition, the life span of modern bioprostheses will probably exceed the possible freedom from transplant vasculopathy in most patients. We, therefore, have adopted replacement as the primary choice of curative treatment in this subgroup of patients.

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