



Tricuspid valve endocarditis

Mateo Marin-Cuartas, Martin Misfeld, Michael A. Borger, Bettina Pfannmüller

Leipzig Heart Center, University Department for Cardiac Surgery, Leipzig, Germany

Correspondence to: Bettina Pfannmüller, MD, PhD. University Department of Cardiac Surgery, Heart Center Leipzig, Struempellstrasse 39, 04289 Leipzig, Germany. Email: Bettina.pfannmueller@helios-gesundheit.de.



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Introduction

Right-sided infective endocarditis (RSIE) encompasses 5–10% of all infective endocarditis (IE) cases. Among them, about 90% involve the tricuspid valve (TV) (1). Major risk factors for TV infective endocarditis (TVIE) are intravenous drug use, pacemaker (PM) leads and indwelling vascular accesses (1,2). Only between 5–16% of RSIE cases require surgical intervention. Surgery for TVIE is indicated in the presence of TV vegetations >20 mm, decompensated right heart failure with severe tricuspid regurgitation (TR), recurrent pulmonary septic embolism and persistent bacteremia or sepsis due to aggressive and/or resistant microorganisms such as fungi and *Staphylococcus aureus* (3). Mortality of isolated TVIE is 0–15% (1). TV repair is the preferred surgical strategy; however, it is not always possible. This article presents the case of a patient with TVIE and focuses on the decision-making process and the TV operative techniques in the setting of TVIE.

Clinical vignette

A young male intravenous drug user (IVDU) without any important comorbidity presents with new onset dyspnea, fatigue and asthenia. Laboratory analysis shows an increase of inflammatory parameters. Transesophageal echocardiography demonstrates vegetations on the aortic valve and a severe aortic regurgitation (AR). Additionally, a mobile structure arising from the Eustachian valve of the inferior vena cava, a vegetation attached to the anterior leaflet of the TV and severe TR are observed. Chest computed tomography scan shows the presence of multiple pulmonary abscesses. Indication for surgery is defined by the presence of combined right and left-sided IE with severe AR and concomitant severe TR.

Surgical techniques

Preparation and exposition

TV surgery for TVIE may be performed through median sternotomy or minimally invasive through a right mini-thoracotomy. Minimally invasive surgery (MIS) requires full lung de-airing and collapse to allow visualization into the heart through the right mini-thoracotomy. Therefore, in patients with TVIE and multiple septic pulmonary embolisms, infarcts or abscesses, we prefer to perform median sternotomy as it allows the lung to be lightly ventilated during surgery. This reduces lung atelectasis thus facilitating an adequate postoperative mechanical ventilation and favoring early ventilator weaning and extubation. Median sternotomy is also advised in septic patients in whom a fast intervention and shorter surgery times are advocated. Regardless of the approach, the procedure is performed on total cardiopulmonary bypass. Cardiac arrest is not mandatory in the absence of atrial septal defect or patent foramen ovale thus making beating heart operations a feasible alternative.

In this case, due to the wide damage of the TV and the high complexity of the required reconstruction as well as the concomitant presence of aortic valve endocarditis with accompanying severe AR, we decided to perform a combined aortic and TV procedure through a median sternotomy, on total cardiopulmonary bypass and under cardiac arrest.

Operation and completion

Radical debridement of vegetations and infected tissue is of utmost importance and must be performed. Thereafter, the decision whether to repair or replace the TV predominantly

depends on the extent of destruction and the reparability of the TV. If feasible, we attempt to repair the TV by means of diverse valve repair techniques depending on the regurgitation mechanism. These include TV annuloplasty, polytetrafluoroethylene (PTFE) neochord implantation by means of the loop technique (4), and autologous pericardial patch augmentation of the destroyed TV leaflets. In those patients with annular dilatation, in whom TV annuloplasty is being considered, we prefer implantation of flexible annuloplasty bands. Nevertheless, IVDUs have high recurrence rates of TVIE (1). Hence, foreign material should be avoided to reduce the risk of recurrent infection. Therefore, De Vega/Kay suture annuloplasty is preferred in IVDUs, despite being associated with high rates of recurrent TR (1). The TV is often seriously damaged and valve repair is not feasible anymore, thus making TV replacement necessary. Nonetheless, TV replacement is associated with a higher risk of recurrent TVIE in IVDUs (1).

In this case, TV repair was deemed possible. Therefore, we removed all vegetations on the anterior tricuspid leaflet as well as on the Eustachian valve. Thereafter, we excised a wide segment of the anterior tricuspid leaflet and its main chordae tendineae. Then, we performed a pericardial patch augmentation of the anterior leaflet (leaving 1 cm of excessive/protruding pericardial patch to increase coaptation surface) and implanted four PTFE loops. Annuloplasty was not required. Intraoperative transesophageal echocardiography confirmed a satisfactory result with only trace remaining TR.

Comments

Right mini-thoracotomy is our preferred approach, however, median sternotomy is more often performed as patients often present with contraindications for MIS. The most common contraindications are: (I) concomitant procedures such as coronary bypass surgery or aortic valve or ascending aorta replacement, (II) more than mild AR, (III) severe pleural adhesions, (IV) prominent aortic calcifications or aortic aneurysm/dissection, (V) severe peripheral artery disease, and (VI) chest wall deformity. Additionally, as mentioned above, TV related contraindications for MIS must also be considered.

PM related IE is associated with mortality rates of up to 35% (1). In these patients, we always remove the leads and the generator, as early device removal is associated with improved outcomes (1,2). Insertion of new PM leads through the TV is avoided. Hence, permanent

epimyocardial PM electrodes or coronary sinus leads may be alternatively implanted.

We previously published our experience in patients undergoing surgery for isolated TVIE (2). In our study 56 patients presented with isolated TVIE. Nearly 20% of patients were IVDUs, approximately 27% had a previous PM, 5.3% had undergone implantation of contaminated devices, catheters or prostheses, and 7% had a congenital heart defect. Median sternotomy was performed in 78.6% and right mini-thoracotomy in 21.4% of patients. The 30-day mortality was 12.5% (6.7% in PM patients, 0% in IVDUs, and 20% in all other patients—the latter, often with severe accompanying comorbidities). The 5-year survival was 63.9%. TV repair was performed in 60.7% of the patients, with a total of 37.5% patients who underwent isolated TV leaflet repair and 23.2% patients who underwent TV leaflet repair with additional annuloplasty (14.2% De Vega/Kay annuloplasty and 9% ring/band annuloplasty). TV replacement was performed in 39.3% of the patients. Among them, 30.3% received a bioprosthesis and 9% received a mechanical prosthesis. The 5-year freedom from reoperation for recurrent TVIE was 91.7%±4.0% (95% CI, 152.3–179.3 months). We prefer the implantation of biological prostheses because life-long anticoagulation may be problematic, especially in patients in whom intravenous drug use is predominant and non-compliance is a major issue. Additionally, reoperation rates are similar for biological and mechanical prostheses in the tricuspid position in general population patients (1,5). In patients where implantation of a prosthetic valve is not desired due to previous multiple recurrences of TVIE, tricuspid valvectomy without valve replacement may be an alternative.

Our key message is that TVIE is an uncommon entity. Almost one third of these patients are IVDUs. There are high rates of recurrent TVIE among them. Hence, not only valve competence but also a sparing use of foreign material is of utmost importance to reduce the risk of recurrent TVIE.

Finally, our patient recovered without complications and was discharged 1 week postoperatively.

Acknowledgments

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest

to declare.

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