



# Tricuspid valve repair in infective endocarditis

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## Clinical vignette

A 37-year-old female with a history of chronic hepatitis B and C presented with fever (40 °C), chills and dyspnea. She had a history of intravenous drug abuse. The patient was taking buprenorphine to reduce symptoms of addiction and had not used other drugs for seven years. On admission, she presented with a respiratory rate 30 breaths/min, SpO<sub>2</sub> 90% and blood pressure of 80/40 mmHg. Physical examination revealed poor dentition, swelling over the left sternoclavicular articulation, and hepatosplenomegaly. Blood cultures were positive for methicillin-sensitive staphylococcus aureus (MSSA) and purulent material obtained from the left sternoclavicular yielded equivalent microbiological findings. Computed tomography of the chest confirmed bilateral cavitory pneumonia, bilateral hydrothorax, and multiple septic emboli.

Transesophageal echocardiography (TEE) showed large vegetations (1.5 cm × 1.3 cm) which were visualized on the anterior and posterior leaflets of the tricuspid valve (TV). There was severe tricuspid regurgitation (TR). The right atrium and right ventricle were dilated. Left ventricular function was normal and left-sided valves remained intact.

The patient was admitted to the intensive care unit (ICU) with the diagnosis of TV infective endocarditis (IE).

Intravenous empiric therapy with ceftriaxone and ampicillin (later deescalated to oxacillin) was started. Multiple dental extractions and drainage of the sternoclavicular joint abscess were performed. Despite initiation of targeted antibiotic therapy, the patient exhibited persistent bacteremia accompanied by recurrent septic pulmonary emboli. In light of persistent fever, recurrent lung emboli with associated respiratory insufficiency and severe TR the patient was considered a surgical candidate. The interval from hospital admission to surgical intervention was 18 days, allowing for initial stabilization while addressing ongoing septic complications in accordance with current recommendations for timing of surgery in IE (1).

## Surgical technique

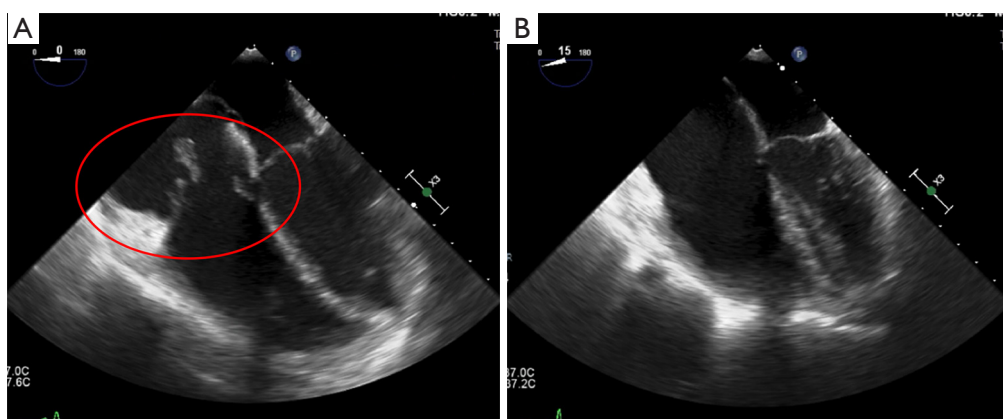
### Preparation

The operation was carried through median sternotomy. Cardiopulmonary bypass was established via bicaval and ascending aorta cannulation.

### Exposition

Antegrade root cold cardioplegia was administered and a

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**Figure 1** Pre- and postoperative echocardiogram after tricuspid valve excision. (A) Echocardiogram showing large vegetations on the tricuspid valve (encircled) and a dilated right ventricle. (B) Echocardiogram showing the absence of tricuspid valve after valvectomy.

right atriotomy was performed. Large fragile vegetations were observed on the anterior and posterior leaflets, with multiple chordal ruptures while the septal leaflet remained unaffected, thus confirming the echocardiographic findings. A patent foramen ovale was observed.

### Operation

All gross infected tissue was excised, preserving viable non-infected tissue. A modified bicuspidization technique was performed by approximating the anterior and posterior leaflets using 6-0 polypropylene sutures, effectively converting the valve into a functional bicuspid configuration while preserving the septal leaflet. This was followed by annuloplasty using a 30 mm Medtronic Contour 3D ring (Medtronic Inc. Minneapolis, MN, USA). This differs from the classical Kay bicuspidization, which involves posterior annular plication (2). The patent foramen ovale was closed. Intraoperative TEE confirmed satisfactory valve competence with mild residual TR.

### Completion

The patient was transferred to the ICU where she was extubated after two hours. No catecholamine support was needed. The patient was treated in the hospital for two additional weeks with intravenous oxacillin 2 g/6 h. She was discharged in good condition and placed on oral trimethoprim-sulfamethoxazole 960 mg/12 h for two more weeks. During the follow-up visit on the third postoperative month, the patient had no complaints and control transthoracic echocardiography showed stable valvular

repair with trace residual TR.

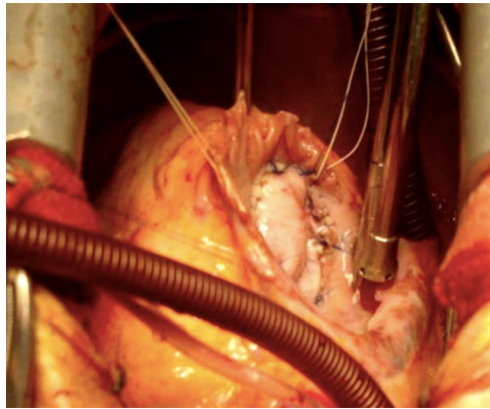
### Comments

#### Clinical results and advantages

It is well known that TVIE is uncommon, representing 5–10% of IE cases (3) and the majority of the cases of IE of the right side of the heart. The use of intravenous drugs is acknowledged as the most important cause of TVIE. The case presented herein is an illustrative example. Surgery is only required in a small proportion of patients as antibiotic therapy is successful in over 90% of cases. Tricuspid valvectomy in marginal cases (*Figure 1A,1B*) was initially a life-saving operation, although this is not currently a frequently performed operation (4). TV replacement with mechanical prostheses, bioprosthesis or even valve homografts have been performed over the past five decades (5,6). The outcomes of isolated TV surgery for IE are acceptable, with low perioperative mortality (5), and this has been our institutional experience.

Although TV replacement is a routine operation for TVIE, TV repair is the preferred approach when anatomy and clinical condition allow it, as in the case described herein. Removal of all gross infected tissue is a universally unchanged surgical principle.

In the present case, bicuspidization was selected due to the involvement of the anterior and posterior leaflets with preservation of the septal leaflet, allowing for a straightforward and durable repair strategy. Alternative techniques such as neochordae implantation or leaflet reconstruction with autologous pericardium (*Figure 2*)



**Figure 2** An example of pericardium leaflet replacement (illustrative example of an alternative reconstructive technique; not used in the present case).

may be considered depending on the extent and location of leaflet destruction (7,8). In cases where the septal leaflet is involved, repair becomes more challenging due to its anatomical characteristics, particularly the direct chordal attachment to the interventricular septum. Surgical options may include limited resection with preservation of viable tissue, patch augmentation using autologous pericardium, and selective use of neochordae. However, extensive septal leaflet destruction often limits reparability and may necessitate valve replacement (9).

There are clear advantages of TV repair, including hemodynamic benefits, decreased thromboembolic risk, decreased incidence of atrioventricular block and resistance to antibiotics. In anatomically selected patients, outcomes of TV repair at mid-term remain favorable (10,11).

Recent evidence from meta-analyses and large observational cohorts suggests that TV repair is associated with lower rates of recurrent infection, reduced reoperation rates, and improved survival compared to valve replacement, particularly in patients with a history of intravenous drug use (12,13).

The use of prosthetic material in the setting of active IE remains controversial. In this case, after thorough debridement of infected tissue, annuloplasty with a prosthetic ring was considered appropriate to restore annular geometry and improve repair durability. Alternatively, autologous pericardial annuloplasty may be considered to reduce the risk of prosthetic infection (14).

Catheter-based vegetation aspiration debulking techniques have been proposed as a bridge to surgery in selected high-risk patients to reduce septic burden and allow

leaflet healing. However, in the present case, the extent of valve destruction and severity of regurgitation warranted definitive surgical intervention (15). Debulking of right intra-atrial septic masses by aspiration currently is a Class IIb Level of Evidence C weak recommendation (1).

Right ventricular (RV) function plays a crucial role in outcomes of patients with acute severe TR. Preoperative stabilization, careful intraoperative myocardial protection, and avoidance of volume overload are essential. In this case, the absence of postoperative RV failure and lack of inotropic support reflect favorable RV adaptation following valve repair (16).

### Caveats

In people with persistent addiction, the risk of reinfection and need for repeat reoperation must be contemplated and often implies an ethical challenge.

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### Footnote

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*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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