Rare disease

Tricuspid-valve repair for pacemaker leads endocarditis

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Summary

In non-addicted patients, several states, such as permanent pacemakers, can provide the predisposing factors for tricuspid-valve endocarditis. In this report, we present a case of a 66-year-old man with pacemaker lead infection and tricuspid-native-valve endocarditis, related to *Staphylococcus hominis*, very rare cause of infective endocarditis that carries a high-mortality risk. Surgery was indicated for the patient due to persistent enlarging vegetation on the tricuspid valve, severe tricuspid regurgitation, septic pulmonary emboli and finally uncompensated respiratory and heart failure. Many ingenious methods have been devised to repair the tricuspid valve in patients with infective endocarditis. Valve replacement, however, is hazardous due to the possibility of prosthetic infection, and we choose to repair the native valve. The patient has now been well for 3 years.

BACKGROUND

Endocarditis of the tricuspid valve is unfortunately becoming more prevalent.¹ Infection of permanent pacing leads and other central venous catheters, sometimes can infect the tricuspid valve.² Sterilisation of the tricuspid valve is the treatment of choice.³ However, some patients are difficult to treat for the virulence of the infectious organisms and the repeated exposure to them.

When pacemaker leads become infected, they can spread the infection to the tricuspid valve at the contact point. Because of the anterior curvature of the pacemaker lead, the anterior tricuspid leaflet is probably more prone to infection than the posterior leaflet.

After removal of the infected pacing lead, the tricuspid valve will need intervention if vegetations are present. In this case, surgery was deemed necessary due to the deterioration of the clinical situation. Removal of the vegetations by excision and reconstruction of the cusps (including conversion to a bicuspid valve, edge-to-edge repair) proved to be useful.⁴

CASE PRESENTATION

A 66-year-old man was admitted to a central hospital, devoted to the prevention, diagnosis and care for infectious diseases, with dyspnoea (NYHA class III), fatigue and discontinuous fever for about 6 months. Previously, the patient had had coronary artery bypass grafting performed and a pacemaker with a ventricular lead inserted due to type III atrioventricular block. The patient was transferred to our Department, in stable hemodynamic conditions and after a long-term antibiotic therapy (daptomycin) administered in the referring hospital.

On admission, his temperature was 38°C, his pulse 81 beats/min and his blood pressure was 125/80 mm Hg. Cardiac examination revealed a grade III–IV pansystolic murmur at the fourth intercostal space on the left parasternal border.

Transthoracic and transoesophageal echocardiography demonstrated a 20×40 mm mobile vegetation on the anterior and posterior leaflets of the tricuspid valve with severe

regurgitation. Some vegetations on a pacing lead from a pacemaker implanted 13 years previously, were present. (figure 1) On the first day of admission, three blood cultures had been taken irrespective of body temperature, 1 h apart. These cultures were positive for *Staphylococcus hominis*; susceptibility testing in vitro shown to be susceptible to daptomycin. On this basis, a diagnosis of right-sided infective endocarditis was made and intravenous daptomycin therapy (6 mg/kg/day) was continued. During the evaluation for the reason for dyspnoea, he underwent spiral CT scanning, which demonstrated subsegmental perfusion defects at the anterobasal and laterobasal segments of both lungs. All these findings led to the diagnosis of pulmonary thromboemboli.

Antibiotics shown to be sensitive by blood-culture test were used before and after surgery. Antibiotic therapy was continued for 4 weeks after surgery. He had tachypnoea, tachycardia with worsening arterial blood gas parameters. A surgical intervention was indicated for the patient the day after a new control transthoracic echocardiography revealed persistent enlarging vegetation on the tricuspid valve, severe tricuspid regurgitation, septic pulmonary emboli and, finally, worsening of clinical condition (tachypnoea, tachycardia, worsening arterial blood gas parameters).

At the surgery, the fragile vegetation was attached to the anterior and septal leaflets and to the pacemaker electrode. The anterior leaflet of the valve showed ruptured chordae and the posterior leaflet was deeply ulcerated. The vegetation was cleaned off and adhesive structures were dissected and the lead was cut. The proximal end was retracted via the previous insertion venous site. The distal part of the pacing lead was pulled off but the final part indwelled into right-ventricle myocardium could not be removed due to strict adherence, so was cut and left in place.

The severe tricuspid regurgitation was due to anterior-leaflet prolapse for rupture of chordae and limited septal-leaflet free margin destruction. The vegetations on tricuspid valve were resected and the valve was reconstructed using a single-stitch triple-orifice technique.⁵ The choice not to replace the native valve was to avoid valve-related

Figure 1 Transthoracic echocardiogram showing vegetations in relation to the endocardial pacing lead.

Figure 2 Transthoracic echocardiography image postsurgical treatment.

complications and the high risk of recurrent endocarditis.⁶ A pacemaker lead was implanted epicardially and brought subcutaneously in the abdomen, where a pocket, for the new generator, was created. Surgical extraction of the lead under direct vision via surgical procedure using cardiopulmonary bypass is a more comfortable and safer way. This method eliminates the risk of mechanical injury to the tri-

cuspid valve and right-ventricle embolisation of the vegetation to the lungs.⁷ There were no complications during the surgery. Postoperative course was uneventful and the patient remained afebrile. Postoperative echocardiographic finding showed good function of the repaired valve. (figure 2) *S hominis* was isolated from the culture of the pacing lead vegetation and histopathology revealed numerous

budding organisms. After surgical and medical therapy, the patient was dismissed. It is 3 years that the patient is clinically stable, with trivial tricuspid regurgitation and no recurrence of infection.

DISCUSSION

Presently, most deaths from infective endocarditis are due to heart failure secondary to destruction of the cardiac valves. Early surgical correction or replacement of such valves may be life saving. Surgery was necessitated because of the rapid clinical and hemodynamic deterioration and septic embolisation.

Staphylococcal endocarditis is an uncommon disease and it carries a high-mortality risk.

Several states such as: alcoholism, immunodeficiency states, prolonged intravenous hyperalimentation, permanent pacemakers and some congenital heart diseases can provide the predisposing factors for tricuspid-valve endocarditis and right-sided infective endocarditis.

The growing number of patients with antiarrhythmic devices, such as implantable defibrillators and pacemakers, have considerably increased the number of patients at risk for right-sided endocarditis.

Surgical options for patients with tricuspid endocarditis vary from complete excision of the valve to tricuspid-valve repair. Valve excision results in massive tricuspid regurgitation, limiting the quality of life and exposes patients to valve-related complications and to the risk of recurrent endocarditis.

Furthermore, valve replacement in patients with pacemakers may preclude the possibility of endocardial pacing, which is still the most effective method of cardiac stimulation.

To avoid the use of foreign materials, thus reducing the incidence of recurrent infection and obviating the need for long-term anticoagulation, we performed a repair consisting of leaflet resection and reconstruction.

Bacterial endocarditis generally results in large vegetations and tends to be more invasive to the valves, destroying adjacent tissue and promoting embolism formation. Most of the symptoms and signs are non-specific, however, resembling the common cold, except for the length and recurrence of symptoms.

Although diagnosis can be difficult, it is important to arrive at an accurate assessment as soon as possible and given the treatment right away. Any foreign body inside the cardiovascular bed has to arouse the suspicion of endocarditis in the presence of unexplained fever.

Some reports point out that medical treatment alone may be sufficient for the treatment of *S hominis*; most of the literature still supports the notion that a diagnosis of bacterial endocarditis is an absolute indication for surgery, with complementary prolonged medication. The presented case supports this argument.⁸

Surgical extraction of the lead under direct vision via surgical procedure using cardiopulmonary bypass is a more comfortable and safer way. This method eliminates the risk of mechanical injury to the tricuspid valve and right-ventricle embolisation of the vegetation to the lungs.⁵

The appropriate valve substitute for this severe infection is difficult to determine for the high-reinfections rate of prosthetic materials.

We chose to repair the valve even in the presence of severely damaged leaflets and we decided not to use a tricuspid ring, to stabilised the correction, to avoid prosthetic material in this septic patient.

The method used for repairing tricuspid valve is easy to perform and can be used in patients who have tricuspid insufficiency due to pacemaker lead infection.

We decided to apply an epicardial pacemaker lead, with the proximal end localised in a pocket of the abdominal wall, for the immediate need of the patient placed. Pacemaker related endocarditis carries a high risk of mortality if left untreated. The pacemaker system must be removed in cases of endocarditis caused by infected pacemaker lead.

There is general consensus that once there is pacemaker pocket or lead infection, removal of the whole pacemaker system followed by a course of appropriate antibiotics results in the best prospect for long-term eradication of infection. When pacemaker lead or pocket infection is complicated by vegetations on the leads, heart valves or chamber endocardium or when there is secondary pulmonary embolism, removal of the entire device is more urgently indicated.

We have extracted all pacemaker material and, for the existence of a type III atrioventricular block, a new permanent pacemaker needs to be inserted. During hospitalisation the new device was supervised for eventual subsequent infection.

The extravascular location of the lead gave the patient the possibility of not having intracardiac foreign material and distortion of the repaired tricuspid leaflets and seemed to be safe regarding infection relapse.

Learning points

- ▶ Unexplained fever in a patient with a pacemaker should prompt an investigation of bacterial endocarditis.
- ▶ Valve repair without replacement can result in significant postoperative morbidity, and replacement is hazardous due to the possibility of prosthetic infection. If severe valve destruction is seen and the hemodynamic condition of the patient deteriorates it will be time to operate.
- ▶ Right-sided endocarditis is one of the manifestations of the staphylococcal infection.

Competing interests None.

Patient consent Obtained.

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