INTRODUCTION

An implantable central venous access port device (CVAPD), consisting of a subcutaneously implantable injection port and a central venous catheter, is an important tool for intravenous delivery of chemotherapeutic drugs in patients with cancer [1]. The use of a CVAPD improves patients’ quality of life, however, infections including site infection and bloodstream infection remain the most common complication of a CVAPD [2,3]. Infective endocarditis (IE), particularly IE in the right heart, following CVAPD infection is one of the most serious complications. Although most right-sided IE are conservatively resolved, a minority require surgical management [4].

In this paper, we report a case of isolated tricuspid valve IE resulting from infection of an implanted CVAPD, and discuss its surgical treatment by valve repair.

CASE REPORT

A 70-year-old man, who had undergone left hemicolectomy for a sigmoid cancer 4 months previously and implantation of a CVAPD 6 weeks after the operation, was referred because of an intermittent high fever attributed to subcutaneous pocket infection of an implanted central venous access port device caused by methicillin-resistant Staphylococcus aureus and subsequent bloodstream infection. Echocardiography revealed a large vegetation on the posterior tricuspid leaflet, annular dilatation and moderate-to-severe tricuspid regurgitation. Valve surgery was performed for persistent infection despite 8 weeks of antibiotics therapy. At operation, vegetations and torn chordae tendineae were found on the posterior tricuspid leaflet. After total resection of the posterior tricuspid leaflet, bicuspidualization valvuloplasty with prosthetic ring annuloplasty was achieved without relapse of the infection or residual regurgitation.

Key words tricuspid valve endocarditis, implantable central venous access port device, tricuspid regurgitation, right-sided infective endocarditis
from the venous blood with administration of vancomycin during the following 3 weeks. However, the elevated inflammatory signs with an intermittent high fever still continued even after sterilization of the bloodstream with antibiotic therapy (Fig. 1).

On admission, the patient was anemic, and no residual infection or fistula formation was observed on the subcutaneous pocket in the right subclavian space. His condition was stable without right heart failure. Auscultation revealed a systolic murmur with a Rivero-Carvallo’s sign at the right lower sternal border. A chest X-ray showed progressive enlargement of the cardiac silhouette from a cardiothoracic ratio of 44.3% at the implantation of the CVAPD to 51.2%. Transthoracic echocardiography (TTE) showed a mobile vegetation (a maximal length of 18 mm) attached to the posterior leaflet of the tricuspid valve, annular dilatation, and moderate-to-severe tricuspid regurgitation (TR), in addition to the intact left heart valves (Fig. 2). Multi-slice CT showed normal coronary arteries.

At surgery, the vegetation attached to the free edge of the posterior tricuspid leaflet, rupture of the chordae tendineae and annular dilatation were found, however perivalvular extension of endocarditis was not detected (Fig. 2). No pathologic changes were observed on the other two leaflets. The posterior leaflet of the tricuspid valve was completely resected, and bicuspidalization of the tricuspid valve with suture approximation of the anterior and the septal leaflet, followed by prosthetic annuloplasty, was performed (Fig. 3). No residual TR was detected on intraoperative transesophageal echocardiography. A histological study of the excised vegetation revealed bacterial foci of Gram positive coccus. Postoperatively, antibiotic therapy with vancomycin was maintained for 3 weeks until inflammatory signs were negative. TTE performed on postoperative month 5 showed no TR. He is doing well without relapse of IE 17 months after the operation.

**DISCUSSION**

A totally implanted CVAPD facilitates the safe delivery of chemotherapeutic drugs and contributes to
Fig. 2. (A) A transthoracic echocardiogram showing a vegetation (maximal length of 18 mm) attached to the posterior leaflet of the tricuspid valve.  (B) A Doppler echocardiogram showing moderate-to-severe tricuspid regurgitation LA; left atrium, LV; left ventricle, RA; right atrium, RV; right ventricle, TV; tricuspid valve, V; vegetation.

Fig. 3. (A) An operative photograph showing small vegetations attached to the free edge of the posterior tricuspid leaflet (large arrows) with rupture of the chordae tendineae (small arrows) and no perivalvular extension of endocarditis.  (B) An photopgraph showing bicuspidization of the tricuspid valve with prosthetic ring annuloplasty.

ATL; anterior tricuspid leaflet, PTL; posterior tricuspid leaflet.
the improvement of patients’ quality of life. However, infections remain the most common complication of a CVAPD [2,3], and the incidence of bloodstream infection and subsequent IE is substantially increasing in parallel with increased use of central venous catheters and other intravascular devices [5]. Although data on the number of complications in Japan are not available, in the United States approximately 35,000 cases of catheter-related Staphylococcus aureus bacteremia are reported to occur each year, and in 6% of them IE develops [6]. Staphylococcus aureus or coagulase-negative staphylococcus species is a common causative organism of IE related to a central venous catheter, involving the right heart, particularly the tricuspid valve, in two-thirds of these cases [5].

Generally, right-sided IE is resolved with medical treatment in 70 – 85% of cases, but valve surgery is recommended in the following situations; (1) right heart failure secondary to severe TR with poor response to diuretic therapy, (2) IE caused by organisms which are difficult to eradicate (e.g. persistent fungi), or bacteremia for at least 7 days (e.g. Staphylococcus aureus, Pseudomonas aeruginosa) despite adequate antibiotic therapy, (3) tricuspid valve vegetations >20 mm which persist after recurrent pulmonary emboli with or without concomitant right heart failure [7]. In our patient, persistent infection caused by MRSA despite 8 weeks of antibiotic therapy was the indication for surgical treatment. Differing from the recommendation in the valve guidelines [7], the prolonged antibiotic therapy over 7 days was performed in our patient because stable hemodynamic condition without heart failure was maintained with diuretic therapy. However, the timing of valve surgery, particularly early operation after one week of antibiotic therapy, should be carefully considered by a heart team consisting of cardiologists, cardiac surgeons and infection specialists.

Among several surgical techniques, valvulectomy, complete excision of the tricuspid valve, should be considered in the case of extensive damage to more than one leaflet of the valve, in which repair is not possible, particularly in drug abusers with a normal pulmonary artery pressure [4]. Considering the susceptibility to reinfection, vegetectomy and valve repair without a prosthetic material is the preferred surgical treatment. After aggressive debridement of the infected valve tissue, valve repair should be implemented using an autologous pericardial patch, artificial chordae and suture annuloplasty. In the case of tricuspid valve IE localized within the posterior leaflet, bicuspidalization valvuloplasty is another option. In our patient, bicuspidalization valvuloplasty with a prosthetic ring was performed because infectious involvement of the tricuspid valve was localized within the posterior leaflet and its chordae tendineae. When the repair is not technically feasible, valve replacement should be performed. It should also be noted that valve replacement with either a mechanical or a biological prosthetic valve theoretically exposes the patients to valve-related complications such as valve thrombosis and calcific degeneration and to some risk of recurrent IE.

In conclusion, we report a case of isolated tricuspid valve endocarditis resulting from an infected CVAPD. Persistent infection caused by MRSA was the indication of surgical treatment, and bicuspidalization valvuloplasty combined with prosthetic ring annuloplasty was performed without relapse of IE or residual TR.

REFERENCES