Surgical approach to the management of Brucella endocarditis

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Abstract

Objective: Brucella endocarditis is a rare complication of Brucella infection; however, it is the major cause of deaths in those infected with this disease. In this study, we aim to discuss the results of seven cases who underwent surgery for Brucella endocarditis in our clinic using the knowledge gathered through the literature.

Methods: We reviewed seven patients with Brucella endocarditis, who underwent surgery in our department between October 1990 and April 2007. Brucella endocarditis was diagnosed by physical examination, laboratory findings, serological tests, blood culture, transthoracic and trans-oesophageal echocardiography. All cases underwent surgery after 4—6 weeks of medical therapy. Antimicrobial treatment was maintained for an average of 6 months after surgery. The mean follow-up was 27.4 months.

Results: The mean age was 30 years (range, 5—47 years). Four of the patients were male. Of the cases, aortic valve replacement (AVR) was performed in three, mitral valve replacement (MVR) was performed in three and combined aortic and mitral valve replacement (AVR + MVR) was performed in one patient. Pericardial tube drainage was done in one patient because of pericardial effusion and cardiac tamponade that developed 13 days after surgery. One (14.3%) of our patients died 15 days after surgery. The others were discharged.

Conclusions: We concluded that medical and surgical treatment had to be performed simultaneously for the successful management of Brucella endocarditis, a fatal complication of Brucella infection.

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Keywords: Brucella endocarditis; Diagnosis; Surgical management

1. Introduction

Brucellosis is currently the leading infectious disease among the zoonoses. Human beings could be infected by contaminated milk and milk products or by direct contact with the animal itself, visceral organs of animals or secretions [1]. This disease is more common in rural areas. Definitive diagnosis is arrived at by the clinical picture of patients, repeated blood cultures and serological tests [2].

Brucella endocarditis is a rare complication of brucellosis and it constitutes the most important cause of deaths associated with brucellosis [3,4]. It occurs in less than 2% of Brucella cases [1,5]. Even though adequate medical therapy is available, Brucella endocarditis usually requires cardiac surgery. In the present study, seven cases were presented, in whom medical and surgical therapy was applied together.

2. Patients and methods

Between October 1990 and May 2008, seven patients with Brucella endocarditis underwent surgery at the Cardiovascular Surgery Department of Erciyes University. Four patients were male. The mean age was 30 years ranging 5—47 years (Table 1). Common symptoms were fever, weakness, headache and backache. Brucellosis was diagnosed by physical examination, laboratory findings, serological tests, blood culture, magnetic resonance imaging (MRI), transthoracic (TTE) and trans-oesophageal (TTE) echocardiography (Figs. 1 and 2). The diagnosis of Brucella endocarditis was made in accordance with Duke’s criteria [6]. Demographic characteristics, medical therapies and surgical procedures are summarised in Table 1. All cases underwent surgery after minimum 4—6 weeks of medical therapy (Fig. 3).

2.1. Surgical approach

All patients underwent surgery under general anaesthesia. After classical median sternotomy, double venous cannulation was performed in patients who would undergo...
mitral valve replacement, while two-stage venous cannulation and ascending aorta cannulation was performed in patients who would undergo aortic valve replacement. Cardiac arrest was achieved by cold crystalloid cardioplegy with potassium after placement of aortic cross clamps following systemic hypothermia. The infected valve was explored after classical aortotomy or left atriotomy depending on the type of contemplated valve surgery. Vegetations were seen in all cases. The valves were excised. Bileaflet valves were replaced by using pledget sutures. Following standard de-cannulation process, all patients were taken into the intensive care unit by closing sternotomy incisions in the normal fashion.

Table 1

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
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<tr>
<td>Year/sex</td>
<td>Case 1</td>
<td>38/Fa</td>
<td>Case 2</td>
<td>34/Fa</td>
<td>Case 3</td>
<td>5/Ma</td>
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<tr>
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<td>Mitral stenosis</td>
<td>Mitral regurgitation</td>
<td>Aortic stenosis</td>
<td>Aortic regurgitation</td>
<td>Aortic stenosis</td>
<td>Aortic regurgitation</td>
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<td>Surgical approach</td>
<td>MVR (no: 27 Sorin)</td>
<td>AVR (no: 21 Sorin)</td>
<td>AVR (no: 22 St Jude)</td>
<td>MVR (no: 27 Sorin)</td>
<td>MVR (no: 25 Sorin)</td>
<td>MVR (no: 27 Carbomedics)</td>
</tr>
<tr>
<td>Medical treatment</td>
<td>Doxycycline, Rifampisin, Ceftriaxone, Siprofloksasin</td>
<td>Doxycycline, Rifampisin, Ceftriaxone, Siprofloksasin</td>
<td>Rifampisin, Trimethoprin-SX, Ceftriaxone</td>
<td>Doxycycline, Rifampisin, Ceftriaxone, Siprofloksasin</td>
<td>Doxycycline, Rifampisin, Ceftriaxone, Siprofloksasin</td>
<td>Doxycycline, Rifampisin, Ceftriaxone, Siprofloksasin</td>
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Fig. 1. A T2-weighted MR image demonstrates vegetation at aortic valve.

Fig. 2. Two-dimensional echocardiography showing vegetation at subaortic area in a patient with Brucella endocarditis.
were performed, while one case underwent combined AVR and MVR. Re-MVR was performed in one case that had vegetations on the previously replaced mechanical mitral valve. One aortic valve was bicuspid, but the others were normal without any degenerative or rheumatismal structures. A small annular abscess was exhibited in one patient with aortic valve endocarditis. While vegetations on the aortic position were small, mitral valves had been destroyed by multiple and large vegetations. While one patient’s vegetation was on a previously replaced mechanical mitral valve, the other affected mitral valves were morphologically normal. In a 5-year-old boy, St Jude mechanical bileaflet valve (no: 17) replacement was performed with dilating left ventricle outlet by the Manouguian procedure. No problem occurred in a 9-year follow-up period of this patient. In a 34-year-old female patient, pericardial tube drainage was performed because of pericardial effusion and cardiac tamponade, which developed 13 days after operation. Only one patient needed temporary pacemaker implantation because of complete A-V block that developed after surgery. One patient died from complication 15 days after operation. While his clinical course was stable, he suddenly deteriorated with haemodynamic compromise. A comprehensive transthoracic and trans-oesophageal echocardiography examination demonstrated the dehiscence of the mitral prosthesis with severe para-prosthetic leak. Surgical re-operation was planned but the patient died in the course of preparation for the surgery. Mortality rate was 14%. All other cases were discharged after successful treatment.

Antimicrobial therapy was maintained for an average of 6 months (ranging 2—12 months). Mean postoperative follow-up was 27.4 months (ranging 2—108 months). The patients were observed weekly in the first month and monthly for the rest of the follow-up period. Physical examination, transthoracic echocardiography, chest X-ray, complete blood count, erythrocyte sedimentation rate (ESR) and Brucella agglutination tests were performed. Any late cardiac problems or recurrence of Brucella endocarditis were monitored.

3. Results

We retrospectively studied seven patients (four men, three women, mean age: 30 years; ranging 5—47 years) with Brucella endocarditis. Aortic valve replacement (AVR) in three and mitral valve replacement (MVR) in three of cases were performed, while one case underwent combined AVR and MVR. Re-MVR was performed in one case that had vegetations on the previously replaced mechanical mitral valve. One aortic valve was bicuspid, but the others were normal without any degenerative or rheumatismal structures. A small annular abscess was exhibited in one patient with aortic valve endocarditis. While vegetations on the aortic position were small, mitral valves had been destroyed by multiple and large vegetations. While one patient’s vegetation was on a previously replaced mechanical mitral valve, the other affected mitral valves were morphologically normal. In a 5-year-old boy, St Jude mechanical bileaflet valve (no: 17) replacement was performed with dilating left ventricle outlet by the Manouguian procedure. No problem occurred in a 9-year follow-up period of this patient. In a 34-year-old female patient, pericardial tube drainage was performed because of pericardial effusion and cardiac tamponade, which developed 13 days after operation. Only one patient needed temporary pacemaker implantation because of complete A-V block that developed after surgery. One patient died from complication 15 days after operation. While his clinical course was stable, he suddenly deteriorated with haemodynamic compromise. A comprehensive transthoracic and trans-oesophageal echocardiographic examination demonstrated the dehiscence of the mitral prosthesis with severe para-prosthetic leak. Surgical re-operation was planned but the patient died in the course of preparation for the surgery. Mortality rate was 14%. All other cases were discharged after successful treatment.

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4. Discussion

Brucellosis has been observed predominantly in Latin America, Africa, Middle East, North Asia and rarely in East Asian countries [3]. A total of 500 000 new Brucella cases are encountered per year despite eradication programmes. It is supposed that many other cases are either not-diagnosed or reported [7]. Brucella is localised to the reticulo-endothelial system, liver and spleen. The endocardium is less frequently involved [4,8].

Brucella endocarditis is a rare complication of brucellosis which is the most important cause of deaths in conditions related with brucellosis. It is seen approximately 0.3—2% of cases. When treated by antibiotics alone, this complication is fatal. This is generally a result of heart failure resulting from aortic and/or mitral regurgitations. A combination of medical and surgical therapy is necessary for successful treatment of Brucella endocarditis [1,4].

Diagnosis of Brucella endocarditis is based on high Brucella antibody titres, positive blood cultures and vegetations of cardiac valves as those seen on echocardiography with symptoms such as fever, fatigue, head and back pain. Blood culture is a specific test; however, its sensitivity ranges between 17% and 85% [1,8]. Diagnosis could be delayed because symptoms are nonspecific and serological confirmation could made after beginning antibiotic treatment [2—4].

Brucella can implant on a valve which has been damaged by previous rheumatic fever or a congenital malformation; but it can also infect and damage normal valves [2]. Severe destructive valvular lesions could develop frequently. The aortic valve is the most commonly affected cardiac valve (about 80% of the cases). It can also affect the other valves but there should be a triggering mechanism such as pacemaker [1,2,9]. In our study, the affected aortic valve is the cardiac valve with the most-frequent infection by Brucella. In the case with double-valve replacement, although vegetations were seen only on the aortic valve, combined AVR and MVR was performed due to significant mitral failure. The mitral valve was affected in three other cases. Vegetations were removed on the previously replaced mechanic valve in one of these cases. There was no problem in the postoperative 4.5-month follow-up period after repeated mechanic valve replacement.

Although antibiotic therapy alone seems usually inadequate in Brucella endocarditis, some reports in the literature suggest that successful conservative antibiotic therapy could be enough for treatment [2,10,11]. Patients with Brucella endocarditis should be operated after antibiotic treatment when the clinical state of patient becomes normal. Immediate surgery and valve replacement is needed in the cases in which cardiac failure develops and the clinical state become worse during
antibiotic therapy [2,4,12]. We adhered to these treatment principles in our cases. So, we operated upon all patients because we believe that antibiotic therapy alone usually fails to control Brucella endocarditis, and surgical replacement of the infected heart valve is necessary for effective management of the disease. Doxycycline, rifampicin, streptomycin and trimethoprim/sulphmethoxazole seem as advisable combinations in antibiotic therapy [2,3].

It is suggested to maintain antibiotic treatment after surgical removal of infected cardiac valve and valve replacement [3]. In literature, there are reports that suggest that the duration of antibiotic therapy should be long (2—12 months) in the postoperative period as micro-organisms that cause Brucella endocarditis settle into the intracellular compartment [2,7]. All of our cases received antibiotic treatment after surgery and the treatment was maintained until the body temperature returned to normal, the clinical state become normal and Brucella agglutination titres decreased. This can explain why we had no recurrence in any of our patients.

In conclusion, the timing of surgery is important for the success of treatment in patients with Brucella endocarditis. Clinical outcome becomes better by controlling the infection with suitable antibiotics and performing prosthetic valve replacement in the early stage after clinical state becomes normal. Antibiotic treatment should be maintained until specific Brucella tests and the clinical state become normal.

References