Pulmonary and Aortic Valve Endocarditis in an Adult Patient With Silent Patent Ductus Arteriosus

Mehmet OZKOKELI,¹ MD, Mehmet ATES,² MD, Nevzat USLU,³ MD,
and Murat AKCAR,² MD

SUMMARY

Pulmonary and aortic valve endocarditis are uncommon especially in an adult patient with patent ductus arteriosus. A 27-year-old woman diagnosed with pulmonary and aortic valve endocarditis underwent surgical treatment. Here, we report our clinical and surgical experience in treating a case of double valve endocarditis with clinically silent patent ductus arteriosus. (Jpn Heart J 2004; 45: 1057-1061)

Key words: Infective endocarditis, Patent ductus, Pulmonary endarteritis

PULMONARY valve endocarditis is a rare disease, usually associated with congenital heart disease and especially with persistent ductus arteriosus (PDA). It accounts for 1.5 to 2.0% of all endocarditis.¹⁾ There is also little information concerning pulmonary and aortic valve endocarditis with a clinically silent patent ductus arteriosus. This is a potentially life-threatening condition with only one reported case in the literature.²⁾

CASE REPORT

A 27-year-old woman was admitted to hospital with a three month history of fever, lethargy, and abdominal distention. Her medical history revealed that she had been diagnosed with endocarditis 1 month earlier at another hospital. Three blood cultures were positive for α -hemolytic streptococcus. The organism was sensitive to penicillin and gentamycin. Transthoracic echocardiography (TTE) showed a large echodense mass (4 mm) on the noncoronary cusp of the aortic valve. She had initially received intravenous penicillin G (6×3.10^6 IU/d) and digoxin 1 (0.25 mg/tablet) qid for 23 days. She was discharged on procaine penicillin at a dose of 2×800.000 IU for 10 days. The symptoms abated after a 3

From the ¹Department of Cardiovascular Surgery, Abant Izzet Baysal University, Izzet Baysal Medical Faculty, Bolu, ²Department of Cardiovascular Surgery, ³Department of Cardiology, Siyami Ersek Thoracic and Cardiovascular Education and Research Hospital, Istanbul, Turkey.

Address for correspondence: Mehmet Ozkokeli, MD, Department of Cardiovascular Surgery, Aban Izzet Baysal University, Beskavaklar Mah. Sehit Murat Pacal Sok. Atakoy Sitesi D Blok D:3 Bolu, Turkey.

Received for publication April 8, 2004.

Revised and accepted June 17, 2004.

week course of intravenous antibiotics. She did well until one week before the next admission.

On admission to the intensive care unit, the patient was septic and dyspneic. On physical examination, her blood pressure was 100/60 mmHg, heart rate 120 bpm and regular, and her temperature was 38°C. Cardiac auscultation revealed a loud pulmonary second heart sound, and a diastolic murmur on the right sternal border. Physical examination revealed hepatomegaly (5 cm below left midcostal margin), splenomegaly (3 cm below left costal margin), and purpura of the lower extremities. Chest X-rays showed moderate cardiomegaly and abnormalities in the lung fields consistent with bronchopulmonary edema. An electrocardiogram demonstrated sinus tachycardia. Her complete blood count analysis revealed anemia and leukocytosis. Her white blood cell count, hemoglobin, hematocrit, and erythrocyte sedimentation rate were 16,500 mm³, 7.8 g/dL, 24.5%, and 51 mm/h, respectively. TTE showed a large echodense and very mobile mass on the right cusp of the aortic valve (13.6 × 6 mm), rupture of pulmonary valve vegetations on the pulmonary valve, and hyperechogenic vegetations attached to the wall of the pulmonary artery (Figures 1 and 2). Both valves showed mild regurgitations with a peak systolic pulmonary artery pressure of 50 mmHg. The patient was diagnosed as endocarditis due to α -hemolytic streptococcus. She was initially treated with intravenous penicillin G (4 × 6.10⁶ IU/d) and gentamicin (3 × 60 mg/d). On the 11th day of treatment, her clinical condition deteriorated despite appro-

Figure 1. Transthoracic echocardiogram shows a vegetation attached to the wall of the pulmonary artery.

Figure 2. Transthoracic echocardiogram revealing vegetation on the aortic and pulmonary valves.

priate antibiotic therapy. She developed congestive heart failure and underwent emergency surgery through a median sternotomy. Following the initiation of cardiopulmonary bypass (CPB) and after application of an aortic cross-clamp, under mild systemic hypothermia, the heart was arrested with cold blood cardioplegia. When the pulmonary artery was opened transversely above the level of the commissures, we observed patent ductus arteriosus. Afterwards, deep hypothermic circulatory arrest (TCA) was employed (20°C). PDA measuring 5 mm in diameter was also noted and closed from within the main pulmonary artery with interrupted sutures. Her temperature was then elevated to 32°C. Multiple vegetations were removed and an infected pulmonary valve was excised. Ascending aortotomy was performed by an S shaped incision and multiple vegetations were removed from the right coronary cusp of the aortic valve and the infected aortic valve was excised. A mechanic valve prosthesis with a diameter of 21 mm was implanted. Finally, aortic and pulmonary arteriotomies were closed with direct sutures and CPB was terminated. The heartbeat resumed spontaneously and the patient was weaned from CPB smoothly. Surgical inspection and histopathologic examination of the surgical material confirmed the preoperative echocardiographical findings, and α -hemolytic streptococcus was isolated in the prosthesis culture.

The postoperative course was uneventful. The patient was discharged after a 14 day course of antibiotic therapy and repeated blood cultures remained sterile.

Echocardiography performed one month after the operation demonstrated normal function of the aortic prosthesis without any signs related to the recurrence of the infection. The patient had grade 4 pulmonary regurgitation. The PDA was closed. Right ventricular end-diastolic diameter measurements demonstrated mild right ventricular dilatation with 20 mmHg right atrium (RA) pressure.

At a 10-month follow-up visit, the patient was in a good state of health and in New York Heart Association functional class II, and follow-up echocardiography revealed no right ventricular failure.

DISCUSSION

During the preantibiotic era, infective endocarditis (IE) was a fatal complication of PDA and the common cause of death (42-45%) in patients with PDA.^{3,4)} With ongoing improvements in diagnostic tools, especially in echocardiography, antibiotic therapy, and surgery, the risk of IE in patients with PDA seems to have declined.⁵⁾

Although two-dimensional echocardiography has been shown to be of great value in the diagnosis of patients with IE, echocardiographic detection of vegetation within the pulmonary artery is extremely rare.^{6,7)}

Documentation of endocarditis with a clinically silent PDA implies that the risk of endarteritis with a PDA may not be dependent on size.^{6,8)} PDA was clinically silent in our case and we were not aware of PDA before intervention because there was no information regarding PDA in transthoracic echocardiography (TTE). Even though Thilen, *et al* have suggested that there is no reason to close PDA for the sole purpose of preventing infective endarteritis, the risk is still prevalent even in a small ductus, as was observed in the present case.⁵⁾

The presence of severe valvular insufficiency, calcification, and vegetations on the valve cusps also made it easy for the physician to overlook the congenital anomalies on echocardiography.⁹⁾

Turbulence and endothelial damage predispose congenital heart patients to bacterial seeding and subsequent development of vegetation.¹⁰⁾ We suggested that the pathophysiological events of double valve endocarditis appeared due to the existence of PDA. Both aortic and pulmonary artery velocity and blood flows were increased by PDA and blood flow demonstrates a turbulence pattern. Turbulent blood flow was regarded as a major predisposing factor for the development of pulmonary valve endocarditis and subsequent distribution of vegetation of the aortic valve.

We used a mechanical valve in the aortic position because the resulting mechanic prostheses for native aortic valve endocarditis are excellent.¹¹⁾ The need for pulmonary valve replacement (PVR) to correct pulmonary insufficiency

remains controversial. The best results were achieved with homografts for replacement of the pulmonary valve. The benefits of a homograft include excellent hemodynamics, resistance to infection, lack of a need for anticoagulation, ease of handling, option of using artery branches, and decreased thromboembolic events.¹²⁾ Llosa, *et al* reported that pulmonary valvectomy without replacement has been highly successful.¹³⁾ In a group of isolated pulmonic endocarditis patients, surgery (primarily valvectomy) was needed in 33% with no deaths in the surgical patients, while the overall mortality rate in this series was 19%.¹⁾ Due to the limited availability of homografts, and because mechanical prostheses of the right heart chamber are associated with the risk of early thrombosis despite maximum anticoagulation therapy,¹⁴⁾ our patient underwent pulmonary valvectomy without replacement. She was weaned from CPB without difficulty and had no problem at the postoperative follow-up.

In this report, we describe an unusual case of pulmonary and aortic valve endocarditis with a clinically silent patent ductus arteriosus. She was treated successfully with surgical intervention.

REFERENCES

1. Ramadan FB, Beanlands DS, Burwash IG. Isolated pulmonic valve endocarditis in healthy hearts: a case report and review of the literature. *Can J Cardiol* 2000; 16: 1282-8.
2. Ciliberto GR, Danzi GB, Pezzano A, Quaini E, Pellegrini A. Echocardiographic diagnosis of infectious endocarditis on patent ductus arteriosus with involvement of the pulmonary artery and the pulmonary and aortic semilunar valves. Description of a case. *G Ital Cardiol* 1986; 16: 795-7.
3. Campbell M. Natural history of persistent ductus arteriosus. *Br Heart J* 1968; 30: 4-13.
4. Bilge M, Uner A, Ozeren A, *et al*. Pulmonary endarteritis and subsequent embolization to the lungs as a complication of a patent ductus arteriosus—a case report. *Angiology* 2004; 55: 99-102.
5. Thilen U, Astrom-Olsson K. Does the risk of infective endarteritis justify routine patent ductus arteriosus closure? *Eur Heart J* 1997; 18: 503-6.
6. Balzer DT, Spray TL, McMullin D, Cottingham W, Canter CE. Endarteritis associated with a clinically silent patent ductus arteriosus. *Am Heart J* 1993; 125: 1192-3.
7. Farsak B, Yilmaz M, Oc M, Ozkutlu S, Demircin M. Non-valvular isolated pulmonary artery vegetations. *Med Sci Monit* 2002; 8: CS39-41.
8. Yanyk A, Yetkin E, Lleri M, Yetkin G, Penen K, Goskel S. Vegetation due to streptococcus viridans in the pulmonary artery in a child with patent ductus arteriosus. *Int J Cardiol* 2000; 72: 189-91.
9. Qi CH, Yong GW, Bing TZ, Zi LC, Ji GG, Wei WY. Right ventricular and septal anomalies. Complicated by subacute bacterial endocarditis. *Tex Heart Inst J* 2000; 27: 401-4.
10. Dodo H, Child JS. Infective endocarditis in congenital heart disease. *Cardiol Clin* 1996; 14: 383-92.
11. Aranki SF, Santini F, Adams DH, *et al*. Aortic valve endocarditis. Determinants of early survival and late morbidity. *Circulation* 1994; 90: 175-82.
12. Bielefeld MR, Bishop DA, Campbell DN, Mitchell MB, Grover FL, Clarke DR. Reoperative homograft right ventricular outflow tract reconstruction. *Ann Thorac Surg* 2001; 71: 482-8.
13. Llosa JC, Gosalbez F, Cofino JL, Naya JL, Valle JM. Pulmonary valve endocarditis: mid-term follow up of pulmonary valvectomies. *J Heart Valve Dis* 2000; 9: 359-63.
14. Miyamura H, Kanazawa H, Hayashi J, Eguchi S. Trombosed St Jude Medical valve prosthesis in the right side of the heart in patients with tetralogy of Fallot. *J Thorac Cardiovasc Surg* 1987; 94: 148-50.