

Pulmonary valve endocarditis in a pregnant woman with a ventricular septal defect

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Bacterial endocarditis in pregnancy causes maternal and fetal mortality rates of 22.1% and 14.7%, respectively. The mortality rates differ according to the involved valves, and the size of vegetation has a prognostic correlation. This report is of a pregnant woman with an unrepaired ventricular septal defect and pulmonary valve endocarditis with a vegetation size of 3.29 cm. She and her baby were treated successfully. An emergency surgical plan would be appropriate for pregnant women in the third trimester with a large vegetation in the right side of the heart, and dental disease should be treated aggressively with appropriate prophylactic antibiotics.

Key words: Endocarditis, bacterial; Heart septal defects, ventricular; Pregnancy; Viridans streptococci

Introduction

The incidence of native valve bacterial endocarditis has been reported to be 1.7 to 5.5/100,000 person years [1-4]. Bacterial endocarditis in pregnancy has been reported to be 1/8000 pregnancies [5]. A literature review has shown the estimated maternal and fetal mortality rates to be 22.1% and 14.7%, respectively [6]. The valve-specific maternal mortality rates of bacterial endocarditis for the aortic, mitral, and tricuspid valves are 42.1%, 21.7%, and 9.5%, respectively [6]. For right heart endocarditis, larger vegetation size is associated with higher rates of mortality and morbidity than small vegetation size [7,8]; vegetation >2.0 cm is associated with high mortality [7]. This report is of a pregnant woman with an unrepaired ventricular septal defect (VSD) complicated with pulmonary valve endocarditis,

a large vegetation of 3.29 cm, and pulmonary embolism who was treated successfully.

Case Report

A 31-year-old woman, 31 weeks into her second pregnancy, was admitted to the Department of Obstetrics and Gynecology, Wan Fang Hospital, Taipei, Taiwan, in 2006, for evaluation and management of cough and intermittent fever for the previous 3 months. Her symptoms had exacerbated during the previous 2 weeks. She had delivered a full-term healthy female baby 18 months previously by cesarean section, and a large VSD was noted at the time.

The patient had visited her dentist 14 months previously, and a residual root in the left lower 6 tooth and caries with pulpitis in the left lower 7 tooth were noted (Fig. 1). Six months previously, open chamber and canal cleaning were done for the left lower 7 tooth; a single dose of cephalothin 2 g was given as prophylaxis. Dental extraction of the left lower 6 and right upper 8 teeth and canal cleaning of the left lower

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Fig. 1. Dental radiograph showing a residual root at the left lower 6 tooth and caries with pulpitis at the left lower 7 tooth.

7 tooth were done 4 months previously; a single dose, of cephalothin 2 g was given as prophylaxis.

At examination, the patient had pyrexia, hemoptysis, shortness of breath, a holosystolic murmur, low-grade pyrexia, marked anemia (hematocrit, 0.21; reference range, 0.35-0.45), and hypoxemia (oxygen saturation, <90% with room air). Urine analysis showed occult blood and no hematuria. Chest radiograph showed pulmonary infiltration in her left lower lung. Pneumonia was diagnosed, and she was given ampicillin 500 mg every 6 h and oxygen supplementation. Tests were done for serum *Mycoplasma* antibody and urine pneumococcal antigen.

Given her history of unrepaired VSD and dental problems, an echocardiogram was performed to check for endocarditis on day 2. The echogram revealed vegetation of 3.29 cm in the right ventricular area (Fig. 2), near the sub-aortic area. Following the diagnosis



Fig. 2. Echocardiogram showed a 3.29- × 2.00-cm vegetation in the right ventricular outflow area adjacent to the pulmonary valve.

of infective endocarditis with large vegetation and *Mycoplasma pneumoniae* pneumonia due to the presence of *M. pneumoniae* immunoglobulin M antibody, she was given intravenous erythromycin 500 mg every 8 h and intravenous penicillin G procaine 3,000,000 units every 4 h. A medical team of obstetric, cardiological, thoracic, cardiothoracic surgical, pediatric, and infectious disease specialists prepared a management schedule for the patient and her fetus.

As the hemoptysis was suspected to be a manifestation of pulmonary emboli, and she had a large vegetation with partial obstruction of the right ventricular outflow and respiratory distress, an elective surgical intervention plan was suggested. The mother received intramuscular dexamethasone 15 mg/day on days 2 and 3 to enhance fetal lung maturity. Low segmental transverse cesarean section under general anesthesia was performed on day 5, and she delivered a 1434 g female baby with Apgar scores of 7 and 8 at 1 and 5 min, respectively. The obstetric procedure was completed within 30 min, and cardiothoracic surgery was performed immediately. The first dose of gentamicin 80 mg was infused after delivery, and then penicillin 3,000,000 units every 4 h, erythromycin 500 mg every 8 h, and gentamicin 80 mg every 12 h were infused throughout the cardiac surgery, that lasted for 9.25 h.

During surgery, a large vegetation with pulmonary valvular leaflet involvement and right ventricular outflow tract obstruction were noted. Evacuation of the vegetation and excision of the pulmonary valves without replacement were done. The VSD was located at the subaortic area and was 0.5 × 0.8 cm in size. Primary closure with plectets was done and she tolerated the procedure well.

Both blood and vegetation tissue grew viridans streptococci, identified as the *Streptococcus mutans* group, *Streptococcus sobrinus* (BBL Crystal™ Gram Positive ID System; Becton Dickinson, Franklin Lakes, NJ, USA). This strain was susceptible to penicillin and gentamicin. The patient was given gentamicin 80 mg every 12 h for 1 week and penicillin 3,000,000 units every 4 h for 8 weeks for endocarditis, and was discharged home on day 57. She received prophylactic intramuscular benzathine penicillin 2,400,000 units monthly for the initial 6 months. An echocardiogram 4 months after discharge showed no residual VSD shunt or mild pulmonary hypertension. She has been well for more than 12 months and continues to attend for follow-up.

The neonate had mild respiratory distress, but no infectious event during a stay in the neonatal intensive

care unit. She was transferred to the newborn nursery on day 45 of life at a weight of 2446 g and was discharged on day 53. The baby continues to attend for follow-up, and is in a healthy condition with age-correct body weight and height at the 50th percentile approximately.

Discussion

This report is of a woman undergoing an unusual pregnancy complicated by large vegetation adjacent to a VSD with extension to the pulmonary valve. The incidence of bacterial endocarditis complicating pregnancy has been reported as 1:8000 pregnancies [5], with maternal and fetal mortality rates of 22.1% and 14.7%, respectively [6].

There have been several reports of VSD-related endocarditis in pregnant women [6,9-11]. However, pulmonary valve involvement is uncommon [2]. Some patients with right heart endocarditis have been treated by surgical intervention when medical treatment has failed [2,6,9,11]. However, more urgent treatment may be required. One study reported that a fetus of 28 weeks gestation had a good chance of survival after the mother underwent surgery [12]. Open cardiac surgery has been performed immediately after cesarean section for a patient with a large vegetation located from the edge of a VSD to the pulmonary valve, that caused pulmonary valve dysfunction and right ventricular outflow tract obstruction [13]. She also had hemoptysis consistent with pulmonary embolic phenomenon. According to the clinical situation, emergency surgical intervention for both delivery and subsequent open-heart surgery were done. Both mother and baby had good postoperative responses and have recovered well after more than 1 year of follow-up.

In a review article for bacterial endocarditis complicating pregnancy, viridans streptococci was noted in 15.8% (3/19), 39.1% (9/23), and 4.8% (1/21) of patients with aortic, mitral, and tricuspid valve endocarditis, respectively [6]. The only patient in that study, with viridans streptococci on the tricuspid valve also had a large vegetation of 3.5×2.5 cm. These 2 pregnant women with VSD both had viridans streptococci endocarditis at gestational ages of 31 and 32 weeks. Both mothers and babies had excellent outcomes following discharge. The mother and baby in this report also recovered well after follow-up of more than 1 year. Large vegetations of more than

3.0 cm were noted on the tricuspid and pulmonary valves of the 2 patients. Elective cesarean section following steroid treatment in the initial stage resulted in an excellent outcome for the babies of these 2 patients. Surgical interventions were performed at the initial or late stage of medical treatment with good outcomes for both mothers. Low-grade pyrexia, anemia, shortness of breath, and large vegetation in the right heart with or without hemoptysis were consistent with the characteristics of VSD-related right heart endocarditis by viridans streptococci for these 2 patients. However, these symptoms could also be signs of other relatively low-virulence endocarditic pathogens causing right heart endocarditis. This report highlights that for patients with a VSD and pneumonia presenting with hemoptysis or low-grade pyrexia, examination for right heart endocarditis should be done.

Studies of right-sided endocarditis for size of vegetation versus outcome in non-pregnant women have been reported [7,8]. Vegetation >2.0 cm is associated with a significantly higher mortality rate than vegetation ≤ 2.0 cm (33.0% compared with 1.3%) [7]. The pulmonary embolism rates for patients with vegetation lengths of <1.0 cm, 1.0 to 1.5 cm, and >1.5 cm are 26%, 42%, and 70%, respectively [8]. The mortality and morbidity rates have been reported to be higher for right heart vegetation >2.0 cm. The unusual situation of a pregnant woman with a large vegetation >3.0 cm, as for this patient, must confer a higher risk. A multidisciplinary team working on the management plan resulted in an excellent outcome for this patient.

A history of recent dental work preceding a diagnosis of endocarditis in pregnancy has been noted previously [10,13,14]. This patient had had untreated caries and residual roots for at least 14 months. She hesitated to attend for treatment until 6 months previously, when she underwent dental procedures with a single prophylactic dose of cephalothin. The dental roots could have been the entrance port for viridans streptococci in this patient.

To have prevented this episode of endocarditis, repair of the VSD before pregnancy and an aggressive dental treatment plan would have been helpful. Dental problems are easily ignored and several pregnant women with VSD-related endocarditis have been reported in the literature. Anyone with both VSD and active dental illness would be at high risk for endocarditis. Pregnancy with endocarditis has higher mortality and morbidity rates for both the mother and the fetus. For this patient, a single dose of cephalothin 2 g

may have been insufficient for prophylaxis, although a full treatment course of antimicrobial agents might have been adequate. The issue of whether aggressive dental prophylaxis with treatment or prophylactic doses would be better for pregnant women with VSD is unclear and needs further study.

Some reports have discussed the possibility of endothelialization on the artificial material used for this surgery. This patient underwent primary closure with plects. It would take approximately 3 to 6 months for endothelialization to occur on the artificial material. The prophylactic antimicrobial agents were arranged for this patient based on this possibility, although this approach needs to be confirmed.

References

1. Mylonakis E, Calderwood SB. Infective endocarditis in adult. *N Engl J Med*. 2001;345:1318-30.
2. Edmond JJ, Eykyn SJ, Smith LD. Community acquired staphylococcal pulmonary valve endocarditis in non-drug users: case report and review of the literature. *Heart*. 2001;86:E17.
3. Berlin JA, Abrutyn E, Strom BL, Kinman JL, Levison ME, Korzeniowski OM, et al. Incidence of infective endocarditis in the Delaware Valley, 1988-1990. *Am J Cardiol*. 1995;76:933-6.
4. Hogevis H, Olaison L, Andersson R, Lindberg J, Alestig K. Epidemiologic aspects of infective endocarditis in an urban population. A 5-year prospective study. *Medicine (Baltimore)*. 1995;74:324-39.
5. Ward H, Hickman RC. Bacterial endocarditis in pregnancy. *Aust NZ J Obstet Gynaecol*. 1971;11:189-91.
6. Campuzano K, Roqué H, Bolnick A, Leo MV, Campbell WA. Bacterial endocarditis complicating pregnancy: case report and systematic review of the literature. *Arch Gynecol Obstet*. 2003;268:251-5.
7. Hecht SR, Berger M. Right-sided endocarditis in intravenous drug users. Prognostic features in 102 episodes. *Ann Intern Med*. 1992;117:560-6.
8. Di Salvo G, Habib G, Pergola V, Avierinos JF, Philip E, Casalta JP, et al. Echocardiography predicts embolic events in infective endocarditis. *J Am Coll Cardiol*. 2001;37:1069-76.
9. Dommissie J. Infective endocarditis in pregnancy. A report of 3 cases. *S Afr Med J*. 1988;73:186-7.
10. Deger R, Ludmir J. *Neisseria sicca* endocarditis complicating pregnancy. A case report. *J Reprod Med*. 1992;37:473-5.
11. Wilbur AC, Langer BG, Spigos DG. Diagnosis of sacroiliac joint infection in pregnancy by magnetic resonance imaging. *Magn Reson Imaging*. 1988;6:341-3.
12. Draper ES, Manktelow B, Field DJ, James D. Prediction of survival for preterm births by weight and gestational age: retrospective population based study. *BMJ*. 1999;319:1093-7.
13. Westaby S, Parry AJ, Forfar JC. Reoperation for prosthetic valve endocarditis in the third trimester of pregnancy. *Ann Thorac Surg*. 1992;53:263-5.
14. Payne DG, Fishburne JI Jr, Rufty AJ, Johnston FR. Bacterial endocarditis in pregnancy. *Obstet Gynecol*. 1982;60:247-50.