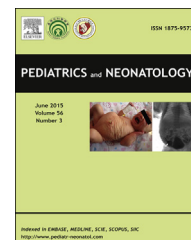


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## BRIEF COMMUNICATION

# Surgical Treatment of Giant *Candida albicans* Vegetation of Tricuspid Valve Endocarditis in a Preterm Baby



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## 1. Introduction

In recent years, fungal infections have been frequently encountered in preterm babies, because of the application of broad-spectrum antibiotics, central venous catheters, and total parenteral nutrition during long-term hospitalization in neonatal intensive care units (NICUs).<sup>1,2</sup> During the course of fungal infections, fungal endocarditis may develop in up to 5% of patients, and *Candida albicans* is responsible for nearly 50% of them.<sup>3</sup> We report a preterm baby presenting with a giant vegetation of the tricuspid valve due to *C. albicans* septicemia, which was refractory to medical treatment. After the surgical removal of the vegetation, the patient was successfully weaned off the antifungal agent 6 weeks later.

## 2. Case report

The patient was born at 31 weeks of gestation with a birth weight of 1100 g via an emergency cesarean section. He was treated with mechanical ventilation and broad-spectrum antibiotics in a local hospital, and he was on partial parenteral nutrition. At the 78th day of birth, he was referred to our hospital for a new heart murmur and persistent fever. His weight and length were 1950 g and 42.5 cm, respectively. His general condition was good. A grade 2/6 systolic murmur was heard over the left lower sternal border. A two-dimensional echocardiography revealed a large right atrial mass. The mass was 18 mm × 15 mm in size, with an irregular contour and heterogenous hyperechoic density. This large mass was found to be oscillating through the tricuspid valve, which caused partial occlusion of the tricuspid valve in diastole (Figure 1A and B) and severe tricuspid regurgitation in systole (Figure 1C). Two sets of blood cultures yielded *C. albicans*. Under the diagnosis of candida endocarditis, enoxaparin (2 mg/kg, q 12 h, subcutaneously) for anticoagulation and caspafungin (70 mg/m<sup>2</sup>/d, intravenously) for antifungal therapy were started. After 1 week of

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anticoagulation and antifungal treatment, this large mass remained unchanged in size on the two-dimensional echocardiography. Thus, surgical removal (Figure 1D) was undertaken under cardiopulmonary bypass. The right atrial mass was resected and the tricuspid valve was repaired. A histopathological examination of the resected specimen and culture of the resected vegetation on Sabouraud's agar confirmed the diagnosis of infective endocarditis caused by *C. albicans*. The antifungal treatment with caspafungin was continued for 6 weeks. The 8-month follow-up echocardiography showed residual trivial, tricuspid regurgitation.

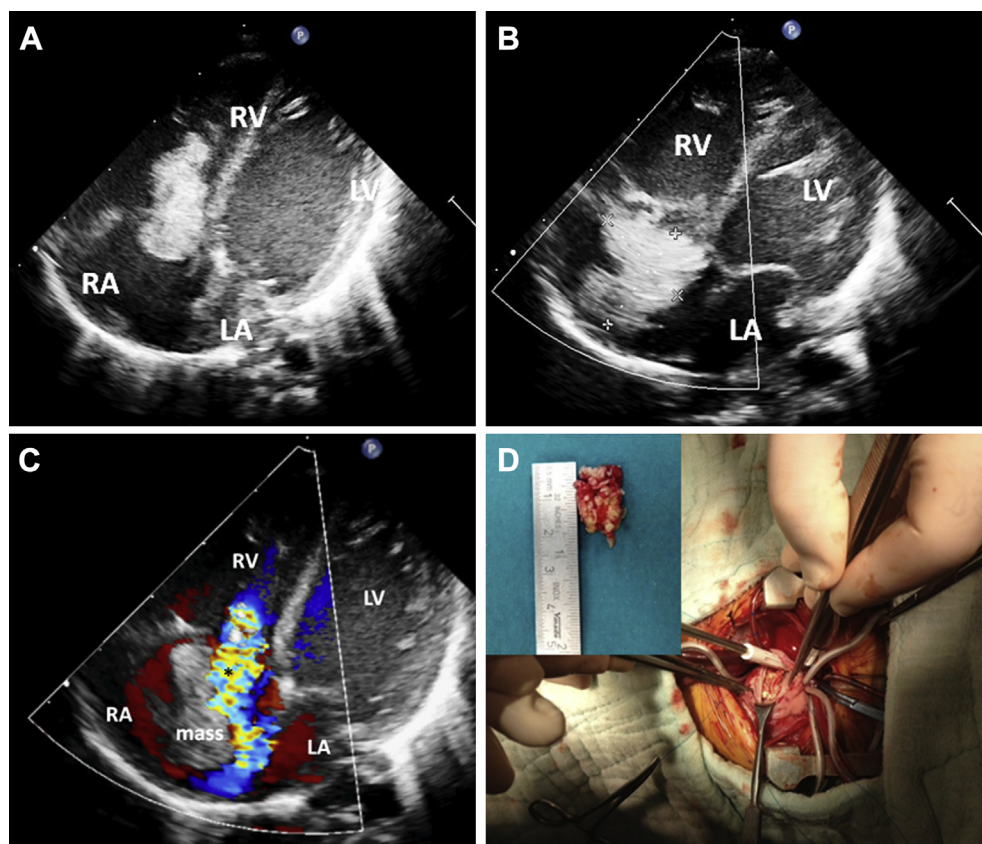
### 3. Discussion

Fungal infections are frequently encountered in the NICU. A significant portion of these fungal infections is caused by the *Candida* strains. The reported incidence of *Candida* infection in NICU is about 1%, but may increase to 4–15% in extremely low birth weight babies.<sup>4</sup> Fungal endocarditis is an uncommon complication of invasive *Candida* infection.<sup>5</sup> There has been an increased incidence of invasive *Candida* infection over the past 15 years.<sup>5</sup> Fungal colonization of the skin and the gastrointestinal tract usually precedes invasive fungal infection. Colonization is acquired vertically from maternal vaginal candidiasis or horizontally from caregivers hand colonization. Some units routinely screen for skin and rectal colonization of *Candida*. By reducing colonization,

we may reduce the incidence of invasive fungal infection prophylaxis of antifungal agents.<sup>5</sup> Risk factors for invasive candidiasis in the neonatal period include low gestational age, insertion of central venous catheter, use of broad-spectrum antibiotics, intubation and mechanical ventilation, and administration of total parenteral nutrition.<sup>5</sup> All these risk factors were present in our patient. Among the antifungal agents for fungal endocarditis, amphotericin B has varying degrees of effectiveness in neonates with *Candida* infections.<sup>6</sup>

According to the modified Duke criteria,<sup>7</sup> the patient fulfilled two major criteria (2 sets of positive blood culture and echocardiographic finding of an oscillating mass) and one minor criterion (fever  $> 38^{\circ}\text{C}$ ) of infective endocarditis. The patient was diagnosed with fungal endocarditis, and antifungal treatment was initiated. It is a well-known fact that penetration of antifungal agents (notably, amphotericin B) into the infection site is poor, and surgery is almost always needed in most of the elderly patients. By contrast, in neonates a consensus for the appropriate management of fungal endocarditis is lacking.<sup>7,8</sup> A combination of medical and surgical approach has been advocated to treat infants who have ultimately survived *Candida* endocarditis.

The general indications for surgery in infective endocarditis were stated in previous reports.<sup>9</sup> According to these indications, our patient had "a very large vegetation ( $>15$  mm)," persistent sepsis (fever or positive blood



**Figure 1** Apical four-chamber view of two-dimensional echocardiography showed a large right atrial mass was found oscillating to and fro through the tricuspid valve in (A) diastole and (B) systole. (C) Severe tricuspid regurgitation. (D) Surgical exposure of the mass was shown. \* Tricuspid regurgitation. LA = left atrium; LV = left ventricle, RA = right atrium; RV = right ventricle.

cultures persisting for >5–7 days), and difficult kind of organism (fungal). Several factors should be considered in choosing the treatment modality, including the risk of perioperative mortality (if surgical intervention is being considered), the severity of the neonate's illness, the side effects of the antifungal treatment, the hemodynamic status of the patient, and the presence of any blood flow obstructions.<sup>8,9</sup> The optimal timing for the surgery was also stated previously.<sup>9</sup> Patients with large vegetations (>15 mm) should be operated on urgently (within days), and those with fungal infections that are resistant to medical treatment should be operated on during the hospitalization period. In the present case, surgical removal of the mass was undertaken after consideration of the risks and unresponsiveness to medical treatment.

In conclusion, surgical removal of giant vegetation of tricuspid valve endocarditis caused by *C. albicans* should be considered as an alternative in preterm babies who react poorly to antifungal agents.

### Conflicts of interest

None.

### References

1. Chapman RL. *Candida* infections in the neonate. *Curr Opin Pediatr* 2003;15:97–102.
2. Rabalais GP, Samiec TD, Bryant KK, Lewis JJ. Invasive candidiasis in infants weighing more than 2500 grams at birth admitted to a neonatal intensive care unit. *Pediatr Infect Dis J* 1996;15:348–52.
3. Millar BC, Jugo J, Moore JE. Fungal endocarditis in neonates and children. *Pediatr Cardiol* 2005;26:517–36.
4. Noyola DE, Fernandez M, Moylett EH, Baker CJ. Ophthalmologic, visceral, and cardiac involvement in neonates with candidemia. *Clin Infect Dis* 2001;32:1018–23.
5. Manzoni P, Farina D, Leonessa M, d'Oulx EA, Galletto P, Mostert M, et al. Risk factors for progression to invasive fungal infection in preterm neonates with fungal colonization. *Pediatrics* 2006;118:2359–64.
6. Odio CM, Araya R, Pinto LE, Castro CE, Vasquez S, Alfaro B, et al. Caspofungin therapy of neonates with invasive candidiasis. *Pediatr Infect Dis J* 2004;23:1093–7.
7. Baddour LM, Wilson WR, Bayer AS, Fowler Jr VG, Bolger AF, Levison ME, et al. Infective endocarditis: diagnosis, antimicrobial therapy, and management of complications: a statement for healthcare professionals from the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, Council on Cardiovascular Disease in the Young, and the Councils on Clinical Cardiology, Stroke, and Cardiovascular Surgery and Anesthesia, American Heart Association: endorsed by the Infectious Diseases Society of America. *Circulation* 2005;111:e394–434.
8. Citak M, Rees A, Mavroudis C. Surgical management of infective endocarditis in children. *Ann Thorac Surg* 1992;54:755–60.
9. Prendergast BD, Tornos P. Surgery for infective endocarditis: who and when? *Circulation* 2010;121:1141–52.