

# Repair of ascending aortic aneurysm following resection of subaortic membrane in a 4-year-old child

Mai A. Madkour

Department of Anesthesia, Cairo University, Cairo, Egypt

Correspondence to Mai A. Madkour, MD, 3 Mohamed Salem Street, Haram, Giza - 12555, Egypt Tel: +20 122 365 7694; e-mail : maimadkour@kasralainy.edu.eg

Received 24 April 2017

Accepted 20 July 2017

The Egyptian Journal of Cardiothoracic Anesthesia 2017, 11:25–27

Clinical findings of infective endocarditis in children may be nonspecific in the form of prolonged low-grade fever, weakness, and weight loss, all of which require careful investigations for infective endocarditis. Transoesophageal echocardiography was helpful in management of intraoperative repair of ascending aortic aneurysm as a complication of infective endocarditis in this child.

## Keywords:

ascending aortic aneurysm in pediatrics, infective endocarditis, transeoesophageal echocardiography

Egypt J Cardiothorac Anesth 11:25–27

© 2017 The Egyptian Journal of Cardiothoracic Anesthesia 1687-9090

## Introduction

Although infective endocarditis is relatively rare in children, its incidence may be increasing [1] partly due to the improved survival rate in children undergoing cardiac surgery for correction of congenital heart disease.

Clinical findings of infective endocarditis in children may be nonspecific in the form of prolonged low-grade fever, weakness, and weight loss, all of which require careful investigations for infective endocarditis [2–4]. Extracardiac manifestations are less common in children than in adults; renal infarcts can result from an embolic or immune complex-mediated process [1].

Transesophageal echocardiography (TEE) is useful for detecting the complications of endocarditis, especially if surgery is indicated; TEE should be considered for all patients with aortic valvular endocarditis and changing aortic root dimensions [2].

If surgery is indicated for repair for the cardiac complications of infective endocarditis, optimization of the functions of other organs should be taken into consideration to avoid possible postoperative organ failure.

## Case report

A 4-year-old male child presented to our hospital with fever (38.5°C), persistent vomiting, abdominal pain, and constipation for 2 days. Anuria was not noticed by the mother; however, the child presented with it too. The child underwent resection of subaortic membrane 2 months before, with uneventful hospital stay.

On the new admission, transthoracic echocardiography showed severe aortic regurgite and huge saccular ascending aortic aneurysm with no evidence of

dissection. The child entered peritoneal dialysis twice but was still anuric with no improvement in his renal functions. Renal biopsy was performed and showed diffuse cortical infarction. He underwent temporary hemodialysis, which ended when he had adequate urine output and creatinine decreased to 3 mg/dl. He was diagnosed with infective endocarditis with renal affection.

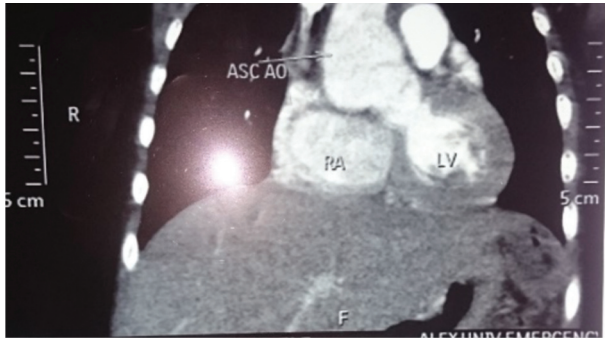
Computed tomography angiography for the thoracic aorta revealed sizable aneurysmal dilation of the ascending aorta measuring 43×37×35 mm in maximum dimensions and hence he was transferred for surgical repair (Fig. 1).

Decision was taken for surgical repair; the patient had no fever, stopped hemodialysis with last creatinine 3 mg/dl, adequate urine output, no acidosis, and no congestion. Anesthesia was induced using fentanyl 2 µg/kg, sodium thiopental 3 mg/kg, and pancuronium 0.1 mg/kg to facilitate intubation. Anesthesia was maintained using sevoflurane 0.3–1.5% in oxygen–air mixture (1 : 1 ratio), central line was inserted, two peripheral cannulae 18 and 20 G, right and left radial arterial cannulae were inserted showing no difference in readings following induction. TEE with frequency 5 MHz performed intraoperatively showed the presence of severe aortic regurgite and a huge ascending aortic aneurysm measuring 4.5 cm (Fig. 2).

Cardiopulmonary bypass (CPB) was initiated after full heparinization at a dose of 400 IU/kg to achieve an activated clotting time of 450s followed by

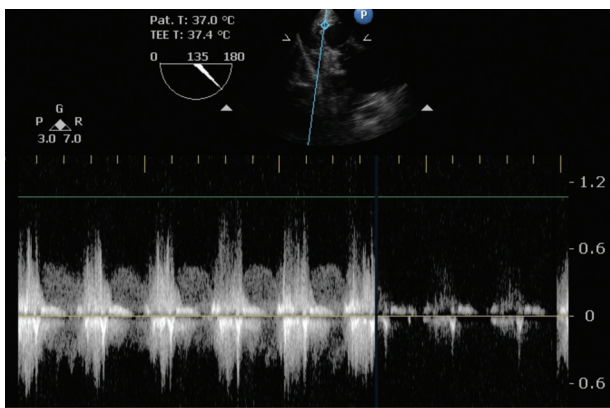
This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work noncommercially, as long as the author is credited and the new creations are licensed under the identical terms.

Figure 1



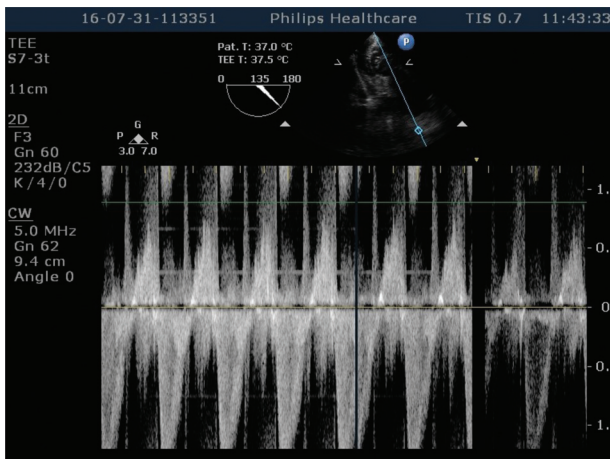
Computed tomography scan showing the ascending aortic aneurysm

Figure 2



Continuous wave Doppler showing severe aortic regurgite in trans-gastric view

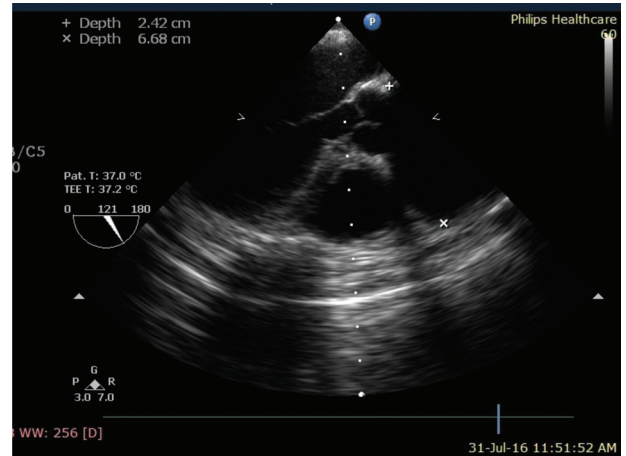
Figure 3



Continuous wave Doppler showing severe aortic regurgite

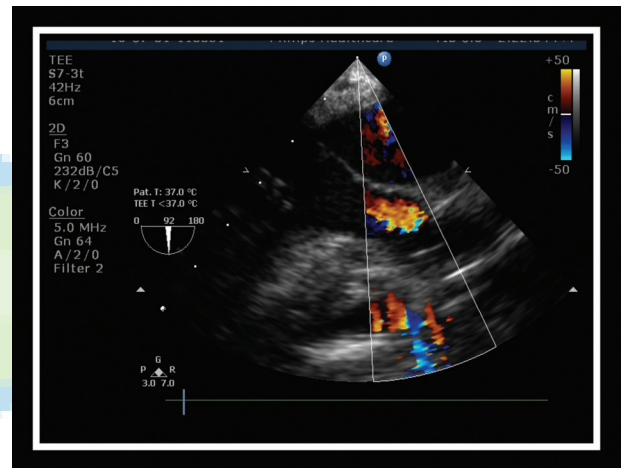
the standard aortobicaval cannulation. A membrane oxygenator (Minimax Plus; Medtronic Inc., Anaheim, California, USA) and a nonpulsatile roller pump (model 10.10.00; Stöckert Instruments, Munich, Germany) were used. Deep hypothermia 25°C was

Figure 4



Severe aortic dilatation by transoesophageal echocardiography

Figure 5



Mild-to-moderate aortic regurgite detected using transesophageal echocardiography after cardiopulmonary bypass

applied during the replacement of the ascending aorta with a prosthetic graft, followed by repair of the aortic valve leaflets. Cold blood cardioplegia was instilled as a single dose of 40 ml/kg into the aortic root after cross-clamping. Modified ultrafiltration of 400 ml was carried out during bypass for preservation of the kidney function.

Finally the cross-clamp was removed, and careful deairing was performed through needle puncture of the prosthetic graft. After complete rewarming, sinus rhythm was restored and TEE showed mild-to-moderate aortic regurgite (Figs. 3–5). Adrenaline 0.05 µg/kg/min and nitroglycerine 2 µg/kg/min were started to improve cardiac contractility. Urine output was maintained after CPB until transfer to the ICU. The patient was extubated on the second day after assuring adequate urine output without need for

hemodialysis, and creatinine was same as preoperative as well as absence of neurological deficits.

After extubation the patient remained in the ICU for another 2 days due to the presence of unilateral lung collapse and need for physiotherapy and then the patient was discharged.

---

## Discussion

Mycotic aneurysms of great arteries are one of the complications of infective endocarditis that usually require urgent surgery in most of cases, especially if associated with congestive heart failure.

They usually result from septic embolization or from the spread of infection from contagious tissues to the adjacent arterial wall [5,6].

However, in this patient the priority was to restore the kidney functions that were compromised by the diffuse cortical infarction causing complete anuria. The patient was put under peritoneal dialysis followed by hemodialysis together with blood pressure control and nondialytic therapy in the form of diuretics, antibiotic therapy, and antipyretics with follow-up for urine output until it reached 2 ml/kg/min with improvement in kidney functions and systemic manifestations, with no detectable acidosis in his arterial blood gases; therefore, the decision for surgery was taken.

The plan for anesthesia for this surgery was to maintain hemodynamics to avoid rupture of the aneurysm and to protect the borderline kidney functions with the possibility of hemodialysis again postoperatively. Urine output was maintained until starting CPB with fluid management, diuretics, and blood pressure control. During CPB, ultrafiltration was applied to reduce the water accumulation during CPB and reduce donor blood [7].

Low-flow CPB was initiated instead of deep hypothermic circulatory arrest as children who have hypothermic circulatory arrest are more prone to neurological insults (e.g. seizures) [8].

The decision was taken for a repair of the aortic valve instead of replacement due to the very young age of the patient. Weaning from CPB was facilitated by adrenaline building up a blood pressure enough for kidney perfusion but not too high to avoid bleeding from the aortotomy.

The patient ICU stay passed without the need for hemodialysis and without any increase in creatinine level compared with the preoperative value.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

---

## References

- 1 Ferrieri P, Gewitz MH, Gerber MA, Newburger JW, Dajani AS, Shulman ST, *et al.* Unique features of infective endocarditis in childhood. *Circulation* 2002; 105:2115–2126.
- 2 Stull TL, LiPuma JJ. Endocarditis in children. In: Kaye D, editor *Infective endocarditis*. 2nd ed. New York, NY: Raven Press; 1992. 313–327.
- 3 Saiman L, Prince A, Gersony WM. Pediatric infective endocarditis in the modern era. *J Pediatr* 1993; 122:847–853.
- 4 Karalis DG, Bansal RC, Hauck AJ, Ross JJ Jr, Applegate PM, Jutzy KR, *et al.* Transesophageal echocardiographic recognition of subaortic complications in aortic valve endocarditis: clinical and surgical implications. *Circulation* 1992; 86:353–362.
- 5 Bayer A, Bolger AF, Taubert KA, Wilson W, Steckelberg J, Karchmer AW *et al.* Diagnosis and management of infective endocarditis and its complications. *Circulation* 1998; 98:2936–2948.
- 6 Jain D, Dietz HC, Oswald GL, Maleszewski JJ, Halushka MK. Causes and histopathology of ascending aortic disease in children and young adults. *Cardiovasc Pathol* 2011; 20:15–25.
- 7 Eliot MJ. Ultrafiltration and modified ultrafiltration in pediatric open heart operations. *Ann Thorac Surg* 1993; 56:1518–1522.
- 8 Greeley WJ, Kern FH, Ungerleider RM, Boyd JL 3rd, Quill T, Smith LR, *et al.* The effect of hypothermic cardiopulmonary bypass and total circulatory arrest on cerebral metabolism in neonates, infants, and children *J Thorac Cardiovasc Surg* 1991; 101:783–794