Case report

Mycotic pseudoaneurysm of the ascending aorta after mediastinitis in an infant

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Received 18 February 2002; received in revised form 23 June 2002; accepted 26 June 2002

Abstract

Mycotic pseudoaneurysm of the aorta is a rare disease in children. We report our experience with a postoperative mycotic pseudoaneurysm of the ascending aorta secondary to mediastinitis after a modified Fontan procedure. The pseudoaneurysm was successfully repaired using an autologous pericardial patch through a right thoracotomy under total circulatory arrest. During 6 months of postoperative follow-up, there were no recurrences of pseudoaneurysm formation.

Keywords: Mycotic pseudoaneurysm; Mediastinitis; Methicillin-resistant Staphylococcus aureus; Fontan procedure

1. Introduction

Mycotic pseudoaneurysm of the aorta is an uncommon disease in children. Several cases have been reported and most of them were seen secondary to bacterial endocarditis [1–3]. Here we report a case of postoperative mycotic pseudoaneurysm in the ascending aorta secondary to mediastinitis caused by methicillin-resistant Staphylococcus aureus (MRSA) after a modified Fontan procedure.

2. Case report

The patient is a 3-year-old boy who was diagnosed with pulmonary atresia with intact ventricular septum, sinusoidal communication of the right ventricle and coronary arteries, and severe hypoplastic right ventricle. He underwent a right modified Blalock–Taussig shunt (polytetrafluoroethylene (PTFE) 3.5 mm) as a neonate. Because of increasing cyanosis, a bidirectional cavopulmonary shunt was performed at the age of 2 years and a modified Fontan procedure (extracardiac total cavopulmonary connection (TCPC) without fenestration, PTFE 18-mm graft) 1 year later. After bypass, the patient remained hemodynamically stable with the SVC and IVC pressure (CVP) of 11 mmHg and common atrial pressure (LAP) of 4 mmHg.

He was extubated on the second postoperative day; however, he persisted with a continuous pericardial discharge from his drainage tubes. On the fifth postoperative day, he had a sudden massive amount of blood loss from the mediastinal drainage tube, requiring cardiopulmonary resuscitation and opening of the chest. The bleeding was found to originate from the air-venting needle site in the ascending aorta and was controlled with a 4-0 polypropylene mattress suture. Cultures of the pericardial fluid confirmed that the mediastinum was infected with MRSA sensitive to vancomycin. The patient subsequently returned to a good hemodynamic condition. A mediastinal debridement was performed, and a continuous irrigation system was placed in the mediastinum. After 10 days of irrigation and antibiotic therapy (intravenous administration of vancomycin 20 mg/kg per day), the patient’s white blood cell count (WBC) and C-reactive protein (CRP) returned to normal levels, and a delayed sternal closure was achieved. Seven weeks later, a cardiac catheterization was performed demonstrating excellent hemodynamics of the Fontan circulation, however, a left ventriculogram revealed a pseudoaneurysm of the ascending aorta. Three-dimensional computed tomography of the ascending aorta also showed a defect of the aortic wall (7×8 mm) and pseudoaneurysm formation (Fig. 1). The patient also had a low-grade fever with a normal WBC count and CRP. After 1 week of further antibiotic therapy (intravenous administration of vancomycin 20 mg/kg per day), a repair of the pseudoaneurysm was undertaken.

2.1. Operative procedures

Because the pseudoaneurysm was located adjacent to the
sternum, a right thoracotomy was preferred. A 4-cm incision was made in the patient’s right groin and the right iliac artery was dissected and encircled. It was then determined that the iliac vessels were smaller than expected and questionable as an ideal aortic cannulation site. After a right anterolateral thoracotomy in the third intercostal space, the innominate artery and vein, SVC and TCPC graft were all dissected free. We found a right Blalock-Taussig shunt graft (PTFE 3.5 mm), which had been taken down during the previous bidirectional Glenn shunt procedure. The graft was 2 cm in length and a preoperative aortography showed that the proximal anastomosis of this graft was patent. We decided to use this graft as our second arterial cannulation site utilizing a 8-F arterial cannula. Once cardiopulmonary bypass was initiated, blood flow through the right iliac artery was confirmed as inadequate and the cannulated graft was then used in order to achieve full bypass flows. The patient was then cooled down to 18°C and a left atrial vent placed. During cooling the ascending aorta just distal to the pseudoaneurysm was carefully dissected. An occlusion balloon (5 cc) was placed to occlude the ascending aorta and using crystalloid cardioplegia the heart was arrested.

After institution of circulatory arrest, the pseudoaneurysm was entered. The aneurysm was located just beneath the sternum and its size was 20 × 15 mm. The defect of the aortic wall was 7 × 8 mm. The autologous pericardial patch was harvested and secured to the defect using a 6-0 polypropylene running suture. However, the superior rim of the defect looked weak and another pericardial patch was secured using 6-0 polypropylene running sutures to reinforce the fragile aortic wall. The patient was then placed back on cardiopulmonary bypass and rewarmed. The total circulatory arrest time was 57 min. The patient remained hemodynamically stable after separation from bypass with an SVC pressure of 12 mmHg.

2.2. Postoperative course

Patient’s postoperative course was uneventful. There was incomplete palsy of the right phrenic nerve and a late wound infection of the thoracotomy incision. Follow-up computed tomography scans performed at 2 and 6 months after surgery showed no recurrence of the pseudoaneurysm. Now the patient is well and active with no signs of infection, and the phrenic nerve palsy has resolved.

3. Discussion

Mycotic pseudoaneurysm of the aorta is a rare disease in children and infants. In our case, the pseudoaneurysm was secondary to mediastinitis caused by MRSA after a modified Fontan procedure. This is the first report of a successful repair of a pseudoaneurysm secondary to mediastinitis.

Neck cannulation for repair of thoracic artery aneurysms in infants has been reported with excellent results [4]. Other authors reported using the left common iliac artery for a pseudoaneurysm of the ascending aorta in a 16-month-old girl [2]. In our case the pseudoaneurysm was also located in the ascending aorta but our patient’s right common iliac artery was small as well. The critical issue was what aortic cannulation site to use in order to achieve sufficient cardiopulmonary bypass flow. The common iliac artery was selected as the first aortic cannulation site; as expected, our maximum bypass blood flow through this iliac artery proved inadequate and the previous shunt graft on the innominate artery was then utilized to achieve full body perfusion. The right thoracotomy enabled this unique approach and facilitated access to the SVC or TCPC conduit.

Selective cerebral perfusion during circulatory arrest could also have been applied via the shunt graft. The patient’s Fontan circulation was preserved and the pseudoaneurysm was successfully repaired under total circulatory arrest without any serious neurological complications.

References