Acute aortic dissection as a late and fatal complication of transcatheter persistent ductus arteriosus occlusion: a case report

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Background Persistent ductus arteriosus (PDA) is a common congenital heart defect, of which, the preferred treatment in children and adults is transcatheter occlusion. This report describes the first reported case of acute aortic dissection as a late complication of transcatheter PDA occlusion.

Case summary A 66-year-old healthy woman, with a history of transcatheter PDA closure 12 years previously, died suddenly at home. Post-mortem revealed pericardial tamponade complicating an acute aortic dissection, with a large intimal tear identified adjacent to the PDA occluder.

Discussion Transcatheter occlusion is accepted as a safe and effective treatment in older children and adults, important in preventing haemodynamic sequelae such as heart failure and pulmonary hypertension. Complications are uncommon and mostly acute, including device embolization and haemolysis. Aortic dissection has been reported as an acute complication but only in the setting of incorrect device deployment. This is the first description of aortic dissection as a late complication of transcatheter PDA occlusion and although rare has important ramifications given it is a potentially fatal outcome of a common procedure.

Keywords Persistent ductus arteriosus • Device occlusion • Complication • Aortic dissection • Case report

Learning points

- Transcatheter occlusion of patent ductus arteriosus is the preferred treatment option for older children and adults, proven to be safe and effective with major complications seen in <1% of cases.
- This is the first reported case of aortic dissection as a late complication of transcatheter patent ductus arteriosus closure and should be recognized as a rare and potentially fatal outcome.

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Introduction

The incidence of persistent ductus arteriosus (PDA) is estimated to be 1 in 2000 births and accounts for 5–10% of all congenital heart disease.¹ In children and adults, transcatheter occlusion for PDA is the preferred method of closure, shown to be safe and effective with complete closure rates >98% at 12 months. Recognized complications include device embolization (<1%) and rare reports of haemolysis, arrhythmia, and endarteritis.² Luminal stenosis of the left pulmonary artery or aorta can occur in the young but has not been reported in adults. The vast majority of these complications occur at the time or shortly after device insertion with late complications being exceedingly rare. This is the first description of acute aortic dissection as a late complication of transcatheter PDA occlusion.

Case presentation

A 66-year-old healthy woman collapsed suddenly at home and could not be resuscitated. She had a past medical history of well-controlled hypothyroidism on supplementation. Twelve years prior, at another institution, she had a PDA successfully closed with an Amplatzer duct occluder (ADO). The cause of death, confirmed by post-mortem, was pericardial tamponade secondary to thoracic aortic dissection originating at the site of the closure device—Figure 1. Adjacent to the ADO, the pathologist visualized a large intimal tear along with focal atherosclerotic changes, not seen elsewhere in the aorta. There was no evidence to suggest underlying aortopathy on history, pathological examination or post-mortem computed tomography imaging.

Discussion

This is the first reported case of aortic dissection as a late complication of PDA device occlusion. The identification of a large intimal tear adjacent to the duct occluder, the associated focal atherosclerotic changes, and the absence of traditional risk factors for aortic dissection all suggest the PDA occluder played an important role in regards to the aetiology of this fatal outcome.

There have been two reports of aortic dissection as an immediate complication following device insertion.³,⁴ Both cases occurred in adults and involved deployment or migration of the aortic retention skirt within the PDA. Aortic dissection was regarded as a mechanical complication with mismatch between device and duct shape/size.

One patient has been described with an aortic dissection occurring 4 years following transcatheter PDA occlusion.⁵ This patient, however, had previous surgery for thoracic aortic aneurysm, a clear risk factor for future aortic aneurysm and dissection, relegating the PDA occluder to potential bystander.

Despite this report, the overwhelming evidence for transcatheter PDA occlusion advocates it as a safe and effective procedure.

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Timeline

| 12 years prior | Date of death | 6 days following |
|---------------|--------------|-----------------|
| Patient undergoes transcatheter closure of patent ductus arteriosus | Witnessed arrest at home, unable to be resuscitated | Post-mortem reveals pericardial tamponade secondary to aortic dissection originating at the site of PDA occluder |

Figure 1 Post-mortem computed tomography imaging of pericardial tamponade (black arrowhead) complicating aortic dissection (white arrowhead) which originated at the aortic end of an Amplatzer duct occluder (white arrow). (A) Sagittal, (B) axial, and (C) coronal plane.
important in preventing haemodynamic sequelae such as left ventricular dysfunction and pulmonary vascular disease. Despite its rarity, interventionalists and patients need to be aware of this potential adverse outcome given its severity. Adults are potentially at greater risk of this rare, late complication due to ductal calcification, tortuosity, and the higher prevalence of risk factors for aortic dissection such as aortic atherosclerosis, hypertension, and underlying aortopathy. The majority of studies involving PDA occlusion in adults include follow-up periods of only 1–2 years with the longest being 5 years. Whether the presence of a PDA occluder increases risk of aortic dissection as patient’s age is unknown. This is important to consider as transcatheter procedures increase and the paediatric population, who receive most of these devices, grow up.

Conclusion
This is the first description of aortic dissection as a late and fatal complication of transcatheter PDA occlusion, of which interventionalists and patients should be made aware.

Lead author biography
Dr David W. Baker is a Cardiologist living and working in Sydney, Australia. Following completion of a Bachelor of Biomedical Science and a Bachelor of Medicine/Bachelor of Surgery, he underwent medical and cardiology training in Newcastle, Australia. He is currently undertaking further fellowship training in adult congenital heart disease at the Royal Prince Alfred Hospital in Sydney, Australia.