CASE REPORT

Embolized amplatzer duct occluder to aorta: Retrieval technique

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A 4-year-old girl had an Amplatzer duct occluder embolized to the descending aorta immediately after closure of patent ductus arteriosus: a novel technique of retrieval.

Keywords: Amplatzer duct occlude, Embolization, Patent ductus arteriosus, Retrieval

Introduction

In recent times, transcatheter device closure of patent ductus arteriosus has become the treatment of choice [1]. However, it can, on rare occasions, lead to catastrophic complications such as embolization. These may occur early or late and in either the pulmonary artery or descending aorta [1–3]. Retrieval is either by surgery or transcatheter technique using biotomes and goose snares [1–3]. We report the retrieval of an Amplatzer duct occluder from the descending aorta using a delivery sheath, guiding catheter, delivery cable, and screwing the device.

Case report

A 4-year-old girl, weighing 15 kg, was diagnosed with a moderate patent ductus arteriosus. She was asymptomatic with, on examination, a wide pulse pressure and a continuous murmur in her left infraclavicular area. Electrocardiogram indicated left axis deviation with left atrial and ventricular dilatation. Transthoracic echocardiogram showed a moderate sized patent ductus arteriosus with left to right shunt and dilated left atrium and ventricle. During cardiac catheterization aortic angiogram indicated a conical type A patent ductus arteriosus (Fig. 1A) with a diameter of 3 mm at its narrowest point and ampulla of 12 mm. The Qp to Qs ratio was 3:1 and the mean pulmonary artery pressure was 15 mmHg. The patent ductus arteriosus was crossed antegradely by a 5-Fr Judkin catheter (Cordis Corp., Johnson & Johnson, FL, USA) with the help of a Terumo wire (Terumo Medical Corp., NJ, USA) and positioned into the descending aorta. Later the catheter was exchanged for a 6-Fr delivery sheath (AGA Medical Corporation, Golden Valley, MN, USA). Amplatzer duct occlude, size 6–8 mm, was deployed and released under

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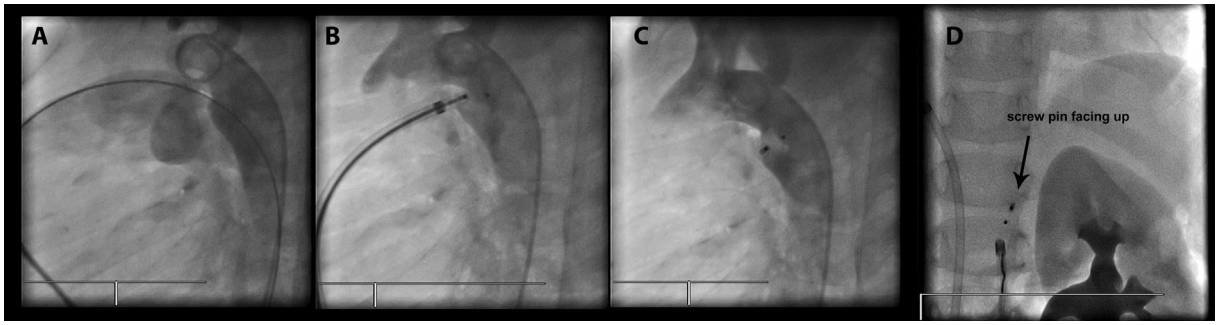

Figure 1. Aortic angiogram. (A) Aortogram anterio–posterior view still image showing moderate size conical patent ductus arteriosus with a wire crossing it; (B) still image showing delivery sheath and cable still attached to the device; (C) still image, lateral view, showing patent ductus arteriosus device moved to the ampulla completely with an awkward position; and (D) still image showing device embolized to abdominal aorta with screw pin facing cranially (arrow head).

fluoroscopy guidance. This was inadvertently released prematurely into the ductal ampulla (Fig. 1B). A repeat angiogram showed the device to be in the ampulla with minimal residual shunt. After device release, it was noticed that the position of the device changed; it had moved completely to the ampulla (Fig. 1C), and subsequently embolized to the descending aorta. Repeat fluoroscopy showed the device to be in the abdominal aorta with the retention screw facing cranially (Fig. 1D). Several attempts were made to retrieve the device, with help of a gooseneck snare, but all failed. Thus, we opted to change the direction of the retention screw caudally in order to position it in a manner that enabled screwing, with the delivery system cable, to be utilized (Fig. 2A). Through the arterial access a 6-Fr Mullins sheath was introduced and positioned below the device (Fig. 2B). Thereafter, a 6-Fr guiding catheter was advanced through the Mullins sheath and positioned on to the retention screw ensuring that it was aligned in a manner that facilitated reconnection of the device to the delivery cable (Fig. 2C and D). After reconnection, the whole assembly was withdrawn in to the Mullins sheath successfully (Fig. 2E). Subsequently, the patent ductus arteriosus was closed by a 6×4 mm Amplatzer duct occluder with no residual shunt (Fig. 2F). Follow up at 3 years showed good positioning of the device with no residual shunt.

Discussion

Transcatheter device closure of patent ductus arteriosus is a standard therapy and well established technique [1,2]. Various coils and devices are used to close patent ductus arteriosus such as detachable coils, Gianturco coils, and Amplatzer duct occlude [1]. Percutaneous device closure of patent ductus arteriosus using Amplatzer duct occluder is safe and well established technique [1]. The success rate is high with minimal, either major or minor, complications [1–3]. Major complications are embolization and protrusion of the retention disc into either the aorta or pulmonary artery causing obstruction. The embolization can be either to the pulmonary artery or aorta and is thought to be due to under sizing of the device, improper position of the device, or abnormal morphology of the patent

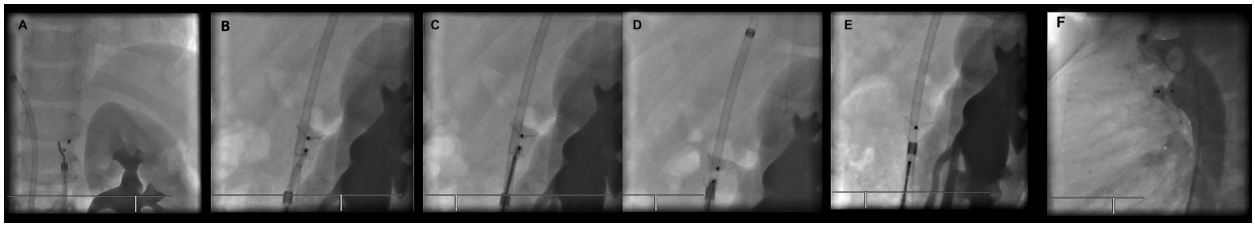

Figure 2. Aortic angiogram. (A) still image, anterio–posterior view, showing the sheath and snare near the screw of patent ductus arteriosus device; (B) still image, lateral view, showing the guiding catheter and delivery cable positioned near the screw of the device; (C) still image, lateral view, showing delivery cable screwed to the pin of the device; (D) still image showing the rescrewed device at the tip of the delivery cable; (E) angiogram cine image showing the re-screwed device partially pulled in to the sheath; and (F) aortogram lateral view still image of patent ductus arteriosus device in place.

ductus arteriosus such as type C and D duct [3–7]. The retrieval of an embolized device from the pulmonary artery by snaring technique has been described and there are various reports regarding the successful retrieval of patent ductus arteriosus devices either by surgery, a percutaneous method using various snares or biotomes, or by a sheath in the sheath technique [1,5]. Drawbacks to snaring include difficulty in catching the retention screw, possible distortion of the device during snaring, and damage to the vessel wall. Successful retrieval of the duct occluder from the descending aorta has been described by sheath in sheath technique [3]. We did not opt to retrieve the device antegradely as the course of sheath would have been long and possibly prone to complications. Additionally, it might have led to strain on the heart and hemodynamic compromise. In our case, the embolized device was screwed to the delivery cable, withdrawn in to the sheath, and removed successfully without complications. The guiding catheter advanced through the delivery sheath which helps to approximate the delivery cable to the retention screw. This technique is very effective if the retention screw of the embolized device faces caudally, otherwise the operator has to change the position of the retention screw first to have better approximation between the delivery cable and the retention screw. Using a large-size sheath on the arterial side may lead to femoral artery injury, arterial spasm, or thrombosis—all of which required consideration, but in our situation no vascular complications developed.

Conclusion

Retrieval of an embolized duct occluder from the descending aorta is feasible with the help of a long sheath, guiding catheter, and rescrewing.

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