Successful Percutaneous Closure of an Aneurismal PDA by Aortic Grafting and ASD Closure Device Implantation


1Pediatric Cardiology Department, 2Cardiology Department, 3Radiology Department, 4Cardiac Surgery Department

Beirut Cardiac Institute, Al Rassoul Hospital, Beirut, LEBANON

Background

Patent ductus arteriosus (PDA) represents 5 to 10% of all congenital heart disease. It is usually diagnosed and treated in childhood or early adulthood. When left untreated it may lead to heart failure, severe pulmonary hypertension and Eisenmenger syndrome. In older patients, a PDA could be aneurismal, which render its surgical closure hazardous due to the vulnerability of its wall and the associated aortic calcifications, yielding a high risk of rupture. We report a case of lady with such PDA that was percutaneously treated with success.

Clinical Case

A **63 year old woman** was referred to our institution for the closure of her aneurismal PDA. She is known to have hypertension, coronary artery disease on medical treatment, chronic renal failure on hemodialysis and COPD requiring home oxygen therapy. She presented with acute pulmonary edema complicated by cardio-respiratory arrest during her dialysis session. After successful resuscitation and stabilization, her cardiology work-up revealed on **echocardiography**, a mildly dilated left ventricle with normal systolic function, a mild aortic stenosis, with no other significant valvulopathy and mild pulmonary hypertension. Her **coronarography** showed a single significant stenosis of the right coronary artery, that was later stented.

A **chest angio-CT** was performed, revealing pulmonary atelectasis, bilateral pleural effusion and a large aneurismal PDA (figure 1) measuring 35x31mm with a peri- ductal hematoma that suggests acute fissuration. The aortic wall had scattered calcifications, parietal infiltration without aneurism. The left subclavian artery was stenotic, and the left vertebral artery was patent.

**Fig 1:** Aneurismal PDA with peri- ductal hematoma. PDA: Patent Ductus Arteriosus. PA: Pulmonary Artery.

**Fig 2:** Control CT after PDA closure showing the aortic stent graft and the Amplatzer closure device at the pulmonary orifice

**Fig 3:** Control CT done 6 months after the procedure showing the prostheses in their position. The PDA is completely closed and free of contrast

Intervention and Evolution

We first implanted an **aortic stent graft** via trans-femoral arterial access. An **Amplatzer ASD (Atrial Septal Defect) occluder device** was than implanted via the femoral vein, in order to close the pulmonary artery orifice of the PDA. The control angiography showed only mild residual shunting and the control Angio-CT (figure 2) confirmed the good positioning of the devices. An occlusion of the left sub-clavian artery was detected, and required to be managed surgically by a salvage carotido-sub-clavain bypass under general anesthesia with a good clinical evolution. A second control CT-Scan (figure 3), done 6 months later, confirmed the stability of the prostheses position and the complete involution of the PDA.

Discussion

The endovascular approach has been proved successful in the treatment of PDA. In our case, a classical PDA occluder or the use of coil embolotherapy is not adequate, due to the large diameter of the duct, since these techniques are indicated in smaller PDAs (less than 12mm in diameter). Besides, percutaneous closure is considered highly risky in our case, because the wall of the aneurismal duct is thin and prone to dissection and perforation. Thus, we used an Amplatzer ASD closure device to close the pulmonary orifice combined with a covered aortic graft stent to completely isolate the PDA. The positioning of the later is often complicated by the covering of the orifice of the left sub-clavain artery. This was the case in our patient, and it was followed by surgical implantation of a carotido-sub-clavain graft. The evolution was otherwise smooth and free of complications.

Conclusion

We reported a case of an aneurismal PDA closure, using an aortic stent graft and an ASD Amplatzer closing device to cover both orifices of the duct. This technique is safe, reliable and simple when used in an elderly patient.

To our knowledge this is the first time such an approach is described to treat these kind of patients.