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CASE REPORT

Transcatheter treatment of pulmonary artery pseudoaneurysm using a PDA closure device

Priya Jagia, Sanjiv Sharma, Rajnish Juneja, Randeep Guleria

ABSTRACT
Aneurysm of the branch pulmonary arteries are rare. The treatment options vary from case to case and include either surgery or percutaneous transcatheter treatment. The authors report a case of a 13-year-old boy who presented with a large pseudoaneurysm arising from the left lower lobe pulmonary artery. It was treated successfully by occluding the neck of the pseudoaneurysm by endovascular deployment of a patent ductus arteriosus closure device across it. There were no complications and the repeat computed tomography angiography of the patient at 3 weeks followup revealed no flow inside the thrombosed smaller aneurysm.

Key words: • *pulmonary artery* • *aneurysm* • *pseudoaneurysm* • *interventional radiology*

From the Division of Cardiac Radiology (P.J. ✉ *rjuneja2@gmail.com*, S.S.), the Department of Cardiology (R.J.), and the Department Medicine (R.G.), All India Institute of Medical Sciences, Delhi, India.

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Pulmonary artery aneurysms are very rare with only 8 cases found in a review of 109,571 general necropsies (1). Common etiologies of pulmonary artery aneurysms and pseudoaneurysms are infection (fungal, tuberculosis [Rasmussen's aneurysm], syphilitic or bacterial), structural cardiac abnormalities (patent ductus arteriosus [PDA], atrial septal defect, ventricular septal defect, tetralogy of Fallot, pulmonary valve stenosis, pulmonary valve regurgitation, absent pulmonary valve, transposition of great arteries), vasculitis (Behcet disease, Hughes-Stovin syndrome), chronic pulmonary embolism, iatrogenic (e.g., malpositioned Swan-Ganz catheters), and post-traumatic.

Treatment options described earlier were predominantly surgical namely aneurysmectomy, lobectomy, patch repair or dacron graft replacement (2–8). Endovascular techniques like coil embolization (9–11), glue embolization (12, 13), balloon embolization (14), or stent graft placement (15, 16) have been used lately. These are less invasive with minimal damage to the normal lung parenchyma.

We deployed an Amplatzer PDA occluder in a 13-year-old boy with a calcified pulmonary artery pseudoaneurysm wherein the feeding artery was short and broad and hence did not appear amenable to coil embolization.

Case report

A 13-year-old boy was referred to the cardiology department with a diagnosis of pulmonary artery aneurysm of unknown etiology. He had been febrile for the past 15 days with no localizing symptoms. There was no history suggestive of vasculitis or tuberculosis in the child or in the family. The boy's physical growth was normal and routine biochemical and hematological investigations were unremarkable.

Posteroanterior chest radiograph revealed a well-defined spherical soft tissue opacity with calcified rims in the posterior left lower lobe (Fig. 1). Computed tomography (CT) angiography was done using nonionic contrast and revealed a saccular aneurysm of 3.8 x 3.7 x 3.3 cm arising from the left lower lobe pulmonary artery. This aneurysm had a short neck with a narrow ostium measuring 0.88 cm. There was a thin shell-like calcification of the wall and the cavity did not have a thrombus. The pulmonary artery branch before and beyond the aneurysm had a normal caliber and flow, suggesting it to be more likely a pseudoaneurysm. There was no parenchymal abnormality seen in the lungs (Figs. 2 and 3).

Cardiac catheterization was done with a view to block the pseudoaneurysm. Selective injections of the left lower lobe pulmonary artery revealed the feeder vessel clearly that did not appear to be amenable (Fig. 4) to coil embolization. Occluding the aneurysm by placing multiple coils in the sac also did not appear to be a good option given

Figure 1. Posteroanterior chest radiograph shows a well-defined rounded soft tissue mass in the left lower lobe. Thin shell-like calcification of the mass lesion wall is noted.

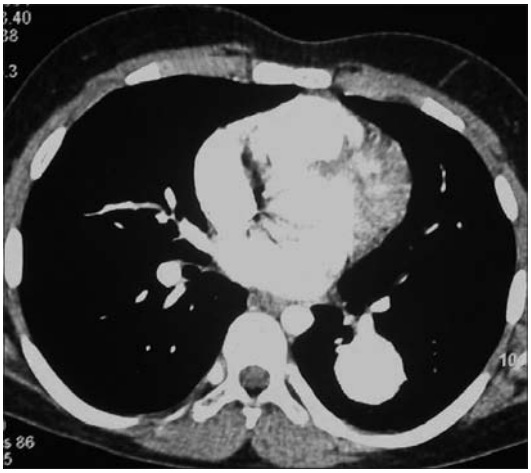

Figure 2. Axial CT angiogram shows the pseudoaneurysm arising from the left lower lobe pulmonary artery with a short neck. The aneurysm extends posteriorly.

Figure 3. Sagittal maximum intensity projection CT angiogram shows the pseudoaneurysm with the normal caliber of the pulmonary artery distal to the aneurysm.

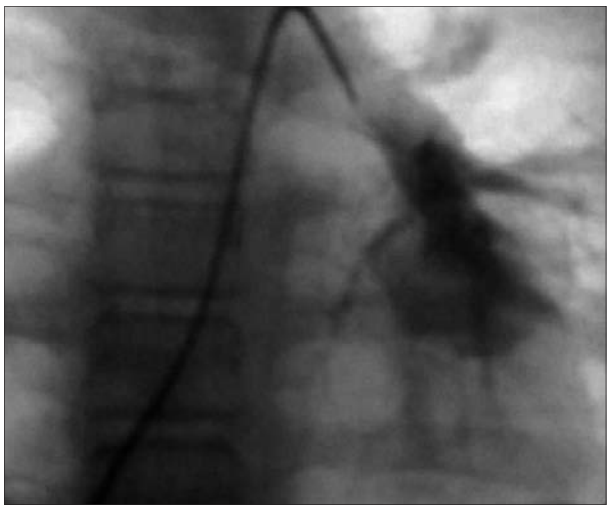

Figure 4. Selective left lower lobe pulmonary artery angiogram. Note the saccular pseudoaneurysm arising from the posterior lower lobe artery.

the thin walls, large number of coils required and therefore the risk of rupture. An Amplatzer PDA occluder was considered appropriate, as the aneurysm itself would hold the rims and an oversized plug part could block the feeder vessel. A 7 F Cournard catheter was used to enter the left pulmonary artery through which an 0.035 inch exchange wire (Radifocus, Terumo, Japan) was advanced into the aneurysm. A 7 F Amplatzer PDA sheath was advanced over the wire and the dilator and wire were removed. A 10 x 8 PDA device (having diameters of 10 mm and 8 mm at the aortic end and the pulmonary end of device, respectively) was then deployed in the usual manner (the rims were opened in the sac, the entire assembly withdrawn till the rims stopped further withdrawal and then the sheath was withdrawn to release the remaining part). No technical problems were encountered during the procedure. Post-deployment selective angiogram revealed minimal flow across the pseudoaneurysm neck with stasis of contrast in the aneurysm sac, suggesting successful embolization (Fig. 5). There were no peri-procedural complications and the patient was discharged after 24 hours.

A repeat CT angiogram was done 48 hours after the device closure of the pseudoaneurysm that revealed the device at the correct place with thrombus formation in the aneurysm (Fig. 6). The aneurysm had become smaller in size and measured 3.2 x 3.1 x 3.0 cm. There was normal flow in the distal pulmonary arterial branch (Fig. 7).

Discussion

Pulmonary artery pseudoaneurysms are rare and most often follow right-sided infective endocarditis with recurrent pulmonary artery embolization. The treatment options of such an aneurysm could be either medical, surgical or catheter embolization. When the main pulmonary trunk is involved, surgical intervention consists of aneurysmectomy or aneurysmorrhaphy (1). With peripheral lesions, embolotherapy has emerged as the treatment of choice, instead of lobectomy (1).

In cases of large pseudoaneurysms, the high risk of rupture makes surgery hazardous. In such cases, embolization

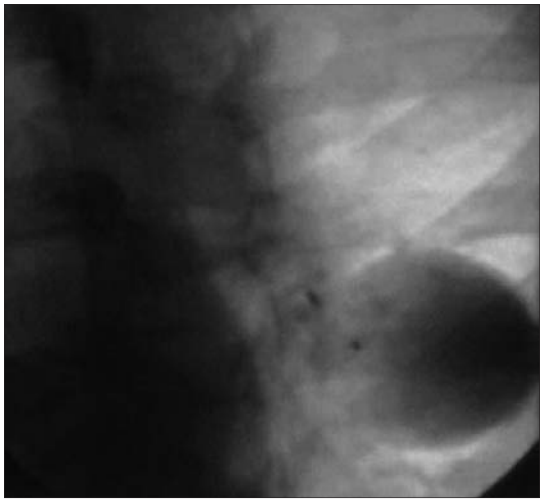

Figure 5. Catheter angiogram done after device deployment shows the device in place with stasis of contrast in the pseudoaneurysm suggesting successful occlusion of the aneurysm neck.

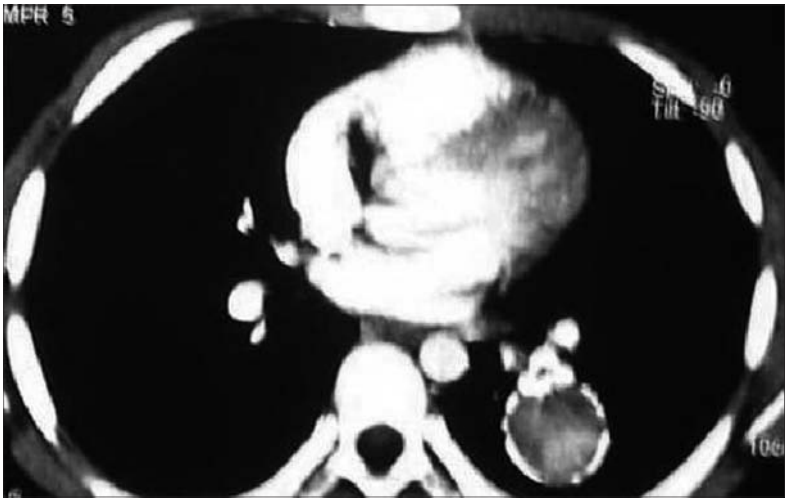

Figure 6. Axial CT section shows the PDA closure device at the neck of the aneurysm with no contrast opacification in the aneurysm suggestive of its complete thrombosis.

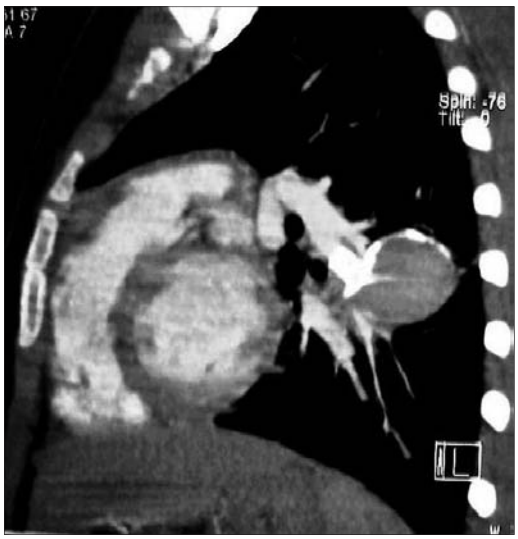

Figure 7. Sagittal oblique CT angiogram shows the device at the neck with no contrast in the aneurysm. The vessel distal to the aneurysm shows normal caliber and flow.

using coils, vascular plug or stent grafts may be a safer option. The choice of embolic agents or covered stents is highly dependent on number, location and neck width of the lesion. In our case, the pseudoaneurysm was solitary and had a short neck, making device closure an attractive and a safer option. Employment of the duct occluder is a one-step easy process that allows targeted precise delivery of the device within the artery.

With this novel use of the PDA closure device, the pseudoaneurysm was treated in a cost-effective manner, in a short duration, and with immediate procedural success, without any complications. Our case further underlines the need for utilizing the newer prosthetic devices for treatment of such conditions.

References

1. Deterling RA, Clagett T. Aneurysm of the pulmonary artery: review of the literature and report of a case. Am Heart J 1947; 34:471–499.
2. Bartter T, Irwin RS, Nash G. Aneurysms of the pulmonary arteries. Chest 1988; 94:1065–1075.
3. Remy J, Smith M, Lemaitre L, Marache P, Fournier E. Treatment of massive hemoptysis by occlusion of a Rasmussen aneurysm. AJR Am J Roentgenol 1980; 135:605–606.
4. Kuwaki K, Morishita K, Sato H, Urita R, Abe T. Surgical repair of the pulmonary trunk aneurysm. Eur J Cardiothorac Surg 2000; 18:535–539.
5. Agarwal S, Chowdhury UK, Saxena A, Ray R, Sharma S, Airan B. Isolated idiopathic pulmonary artery aneurysm. Asian Cardiovasc Thorac Ann 2002; 10:67–69.
6. Williams TE, Schiller M, Craenen J, Hosier DM, Sirak HD. Pulmonary artery aneurysm: successful excision and replacement of the main pulmonary artery. J Thorac Cardiovasc Surg 1971; 62:63–67.
7. Casselman F, Deferm H, Peeters P, Vanermen H. Aneurysm of the left pulmonary artery: surgical allograft repair. Ann Thorac Surg 1995; 60:1423–1425.
8. Garcia-Rinaldi R, Howell JF. Aneurysm of the main pulmonary artery: long-term survival after aneurysmorrhaphy and closure of a ventricular septal defect. Ann Thorac Surg 1976; 21:180–183.
9. Karak P, Dimick R, Hamrick KM, Schwartzberg M, Saddekni S. Immediate transcatheter embolization of Swan-Ganz catheter-induced pulmonary artery pseudoaneurysm Chest 1997; 111:1450–1452.
10. Golzarian J, Dussaussois L, Ait Said K, Abada HT, Dereume JP, Struyven J. Embolization of large aneurysms with long wire coils. Cardiovasc Intervent Radiol 2002; 25:26–29.
11. Liddell. RP, Patel S, Neuwirth M, Hebert J, Arepally A, Hofmann LV. Transcatheter coil embolization of large pulmonary artery pseudoaneurysms in a child J. Vasc Interv Radiol 2003; 14:923–927.
12. Cil BE, Geyik S, Akmangit I, Cekirge S, Besbas N, Balkanci F. Embolization of a giant pulmonary artery aneurysm from Behcet disease with use of cyanoacrylate and the "bubble technique". J Vasc Interv Radiol 2005; 16:1545–1549.
13. Cil BE, Turkbey B, Canyiğit M, Kumbasar OO, Celik G, Demirkazik F. Transformation of a ruptured giant pulmonary artery aneurysm into an air cavity after transcatheter embolization in a Behçet's patient. Cardiovasc Intervent Radiol 2006; 29:151–154.
14. Renie WA, Rodeheffer RJ, Mitchell S, Balke WC, White RI. Balloon embolization of a mycotic pulmonary artery aneurysm. Am Rev Respir Dis 1982; 126:1107–1110.
15. Hannan RL, Miyaji K, Burke RP , Zahn EM. Endovascular stent graft treatment of a pulmonary artery pseudoaneurysm. Ann Thorac Surg 2001; 71:727–729.
16. Wilson N, Mcleod K, Hallworth D. Exclusion of a pulmonary artery aneurysm using a covered stent. Heart 2000; 83:438.