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PULMONARY ARTERIOVENOUS MALFORMATION: PERCUTANEOUS OCCLUSION BY VASCULAR PLUG

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Contribution
All the authors contributed significantly to the Case Report.

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ABSTRACT

Pulmonary arteriovenous malformation (PAVM) is a congenietal malformation resulting in right to left shunt. In this study we reported a 26 year old male who was referred for evaluation of central cyanosis, exertional dyspnea and nasal bleed. Past history was significant for transient ischemic attack (TIA). Chest x-ray revealed a mass lesion on left side which was shown to be arterio-venous malformation on CT- thorax. The patient has undergone a successful percutaneous occlusion using a vascular plug.

Key Words: Pulmonary arteriovenous malformation, Vascular plug

INTRODUCTION

Pulmonary arteriovenous malformation (PAVM) is a congenital abnormality, whereby pulmonary arteries and veins directly communicate with each other, resulting in right-to-left shunting and reduced arterial oxygen saturation.[1] Around 50-70% of PAVM are located in the lower lobes. 70% patients have unilateral disease, 36% have multiple lesions and 50% have bilateral disease.[2] Approximately 70% of PAVMs are associated with hereditary hemorrhagic telangiectasia (HHT), and about 15-30% of individuals with HHT have a PAVM.[3]Symptoms of PAVM vary from being totally absent to general fatigue, severe cyanosis, congestive heart failure, fulminant respiratory failure, epistaxis, dyspnea, hemoptysis, brain abscess, symptoms related to stroke and polycythemia[1,4]Although PAVMs used to be surgically treated, they are now often treated percutaneously by various techniques.[5,6] Here we report a case of PAVM which was occluded by a vascular plug.

CASE REPORT

A 26-year-old male referred for evaluation of central cyanosis since birth. He had history of episodes of nasal bleed, dyspnea on exertion, and transient ischemic attack (TIA). Clinically he was cyanosed with SPO_2 of 85% at room air, clubbed with a faint systolic murmur at 5th intercostal space in left mid clavicular line. He had no clinical stigmata of HHT. His X-ray chest revealed a rounded opacity near the left cardiac boarder in the left lower zone (Figure 1). He had a normal cardiac

anatomy on Transthoracic Echo-cardiography. His bubble contrast echo showed delayed right to left shunt suggestive of PAVM. Routine investigations were significant for an Hb of 21.5gm/dl with normal platelet count.

64 slice CT thorax revealed a single huge PAVM (Figure 2) with one feeding artery from the left lower lobe branch of left pulmonary artery measuring about 12mm at the narrowest point and a thick drainage vein, with a maximum diameter measuring 15mm draining into the left atrium.

The patient was planned for transcatheter occlusion of the feeding artery with a vascular plug. Patient was hydrated over night and was heparinized during procedure.

The patient provided informed consent. We confirmed the giant PAVM by left pulmonary arteriography (Figure 3) performed through a 6-Fr pigtail catheter (Medtronic Inc. Minneapolis, MN, USA 55432) placed in the left pulmonary artery using the right femoral venous approach. Configurations of the PAVM and the diameters of feeding arteries, the nidus and the draining vein corresponded to those previously evaluated on CT images.

A multi-purpose catheter 6 Fr (Cordis Corporation 14201 NW 60th Ave. Miami Lakes Florida 33014, USA) used to enter into the sac of AVM with the help of a terumo exchange length 0.035" wire. The catheter was exchanged with a AGA torqVue long delivery sheath 10Fr (AGA Medical corporation. 682 Mendelssohn Avenue golden valley, MN 55427 USA). A second generation vascular plug measuring 18mm (AGA Medical corporation. 682 Mendelssohn Avenue Golden Valley, MN 55427 USA) was deployed at the most distal location in the feeding artery. Care was taken to avoid occlusion of any branch of LPA supplying normal lung parenchyma. LPA angiogram 10 minutes after occlusion showed complete occlusion of the feeding artery with no residual flow into the AVM (Figure 4). The saturation increased to 96% immediately after occlusion. The patient developed diplopia due to right 3rd nerve palsy. MRI brain was normal. We started the patient on dual antiplatelet

Figure 1: X-ray Chest Showing a Rounded Opacity (Arrow) near the Left Cardiac Boarder in the Left Lower Zone

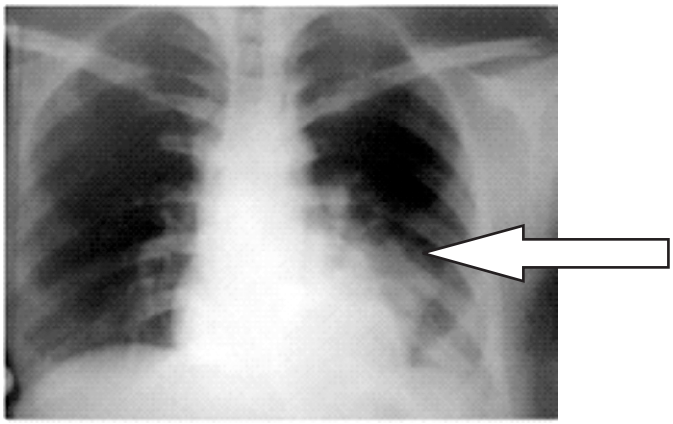


Figure 2: CT- 64 Slice Thorax Showing Single Large PAVM (Arrows) with One Feeding Artery and a Draining Vein.

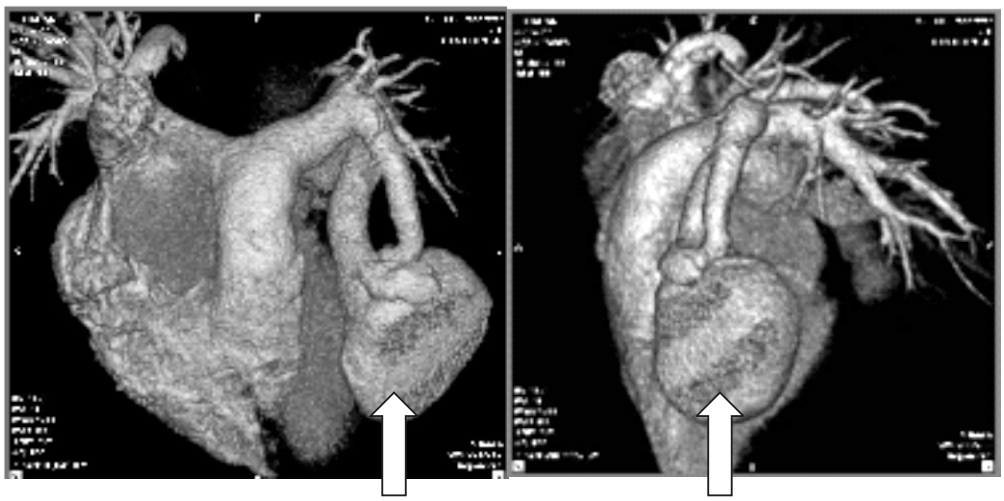


Figure 3: Pulmonary Angiogram Showing Huge PAVM (Arrow) with the Feeding Artery (small Arrow) Arising from Lower Branch of Left Pulmonary Artery. The Draining Vein is also Visible

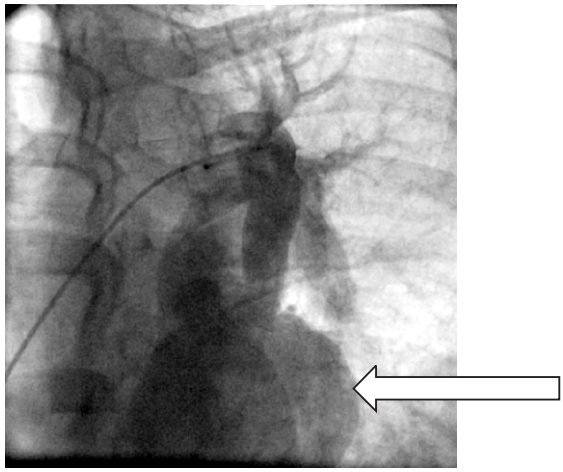


Figure 4: Pulmonary Angiogram after Deployment of the Vascular Plug (Arrow). There is no Residual Flow into SAC of AVM

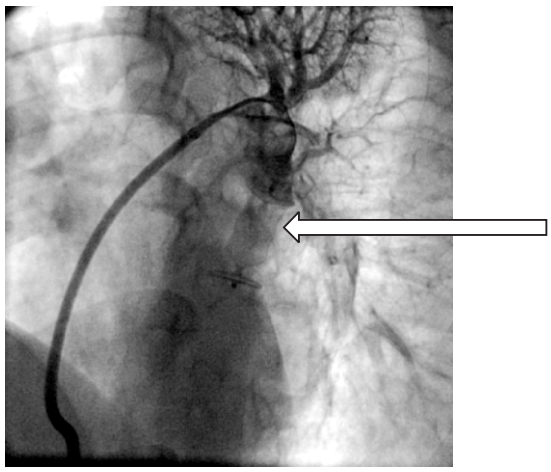
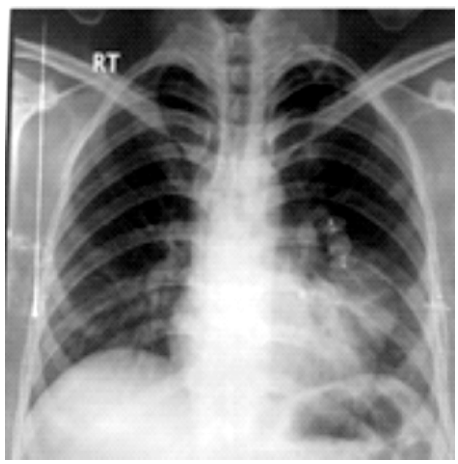


Figure 5: Post Procedure X-ray Chest Showing Vascular Plug in SITU



therapy along with warfarin. At 1-month follow up he had no residual neurological deficit.

DISCUSSION

Pulmonary AVM treatment is recommended for symptomatic patients or those AVMs with a feeding artery diameter ⩾ 3 mm.[6] Between 1942 and 1977, surgery was the only method of treatment; ligation, local excision, segmentectomy, lobectomy, or pneumonectomy was performed in most cases with perioperative mortality ranging from 0 to 9.1%.[4] Today most of these lesions are treated percutaneously by various techniques and has virtually replaced surgery. These methods are safe with a reported success rate of 98.7% and few complications that are infrequent and self-limited. Furthermore, these methods are minimally invasive, performed under local analgesia and without need of convalescence.[4,6]

Embolization is usually performed with coils, but years ago detachable silicone balloons were also used.

Pushable coils come in all sizes and a huge variety of shapes. Recanalization or primary insufficient embolization after use of coils has, however, been described in about 8%-15% of cases. Detachable coils are even more precise and safe to deliver and can be retracted and replaced if necessary before final delivery, but they are more expensive and are usually not routinely used. The vascular plug, now increasingly used is a self-expandable, cylindrical nitinol wire-mesh occlusion device. A microscrew is welded to the plug and attached to a delivery wire. In most cases, multiple coils are necessary to achieve complete occlusion while one plug often will do the job, and it is more time consuming to deliver multiple coils than one plug. The potential for recanalization or incomplete occlusion by the plug is probably lower than that of the coils, especially if it is not possible to pack the coils properly.[7]

Smaller feeding vessels may become enlarged after successful embolotherapy of larger AVMs. Therefore, long-term follow up, including chest CT examinations every 1 to 2 years, is recommended.[6]

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