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IMAGES IN INTERVENTION

Percutaneous Closure of a Pulmonary Arteriovenous Malformation in Young Patient With Cryptogenic Stroke

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A 44-year-old woman had a transient ischemic attack in 2010 and a subsequent ischemic stroke (while on a regimen of aspirin therapy) in May 2012 with evidence of an ischemic cerebral lesion

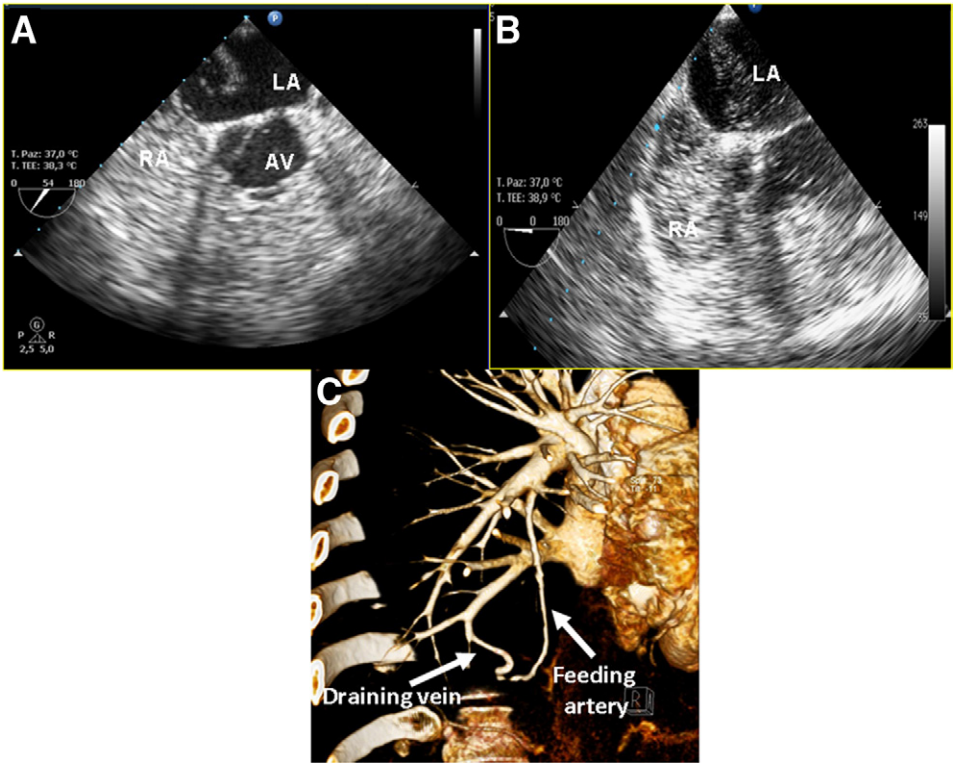

Figure 1. Pre-Procedural Diagnostic Evaluations

Multiplane transesophageal echocardiography **(A and B)**: this examination demonstrated late appearance of agitated saline microbubbles in the left atrium (LA) through a pulmonary vein in the short-axis view **(A)** and in the 4-chamber view **(B)**. The lack of shunt across the atrial septum during Valsalva maneuver excluded the presence of patent foramen ovale. Computed tomography imaging **(C)** showed a simple pulmonary arteriovenous malformation involving a feeding artery originating from the inferior lobar artery of the right pulmonary artery and a vein draining in the lower right pulmonary vein. AV = aortic valve; RA = right atrium.

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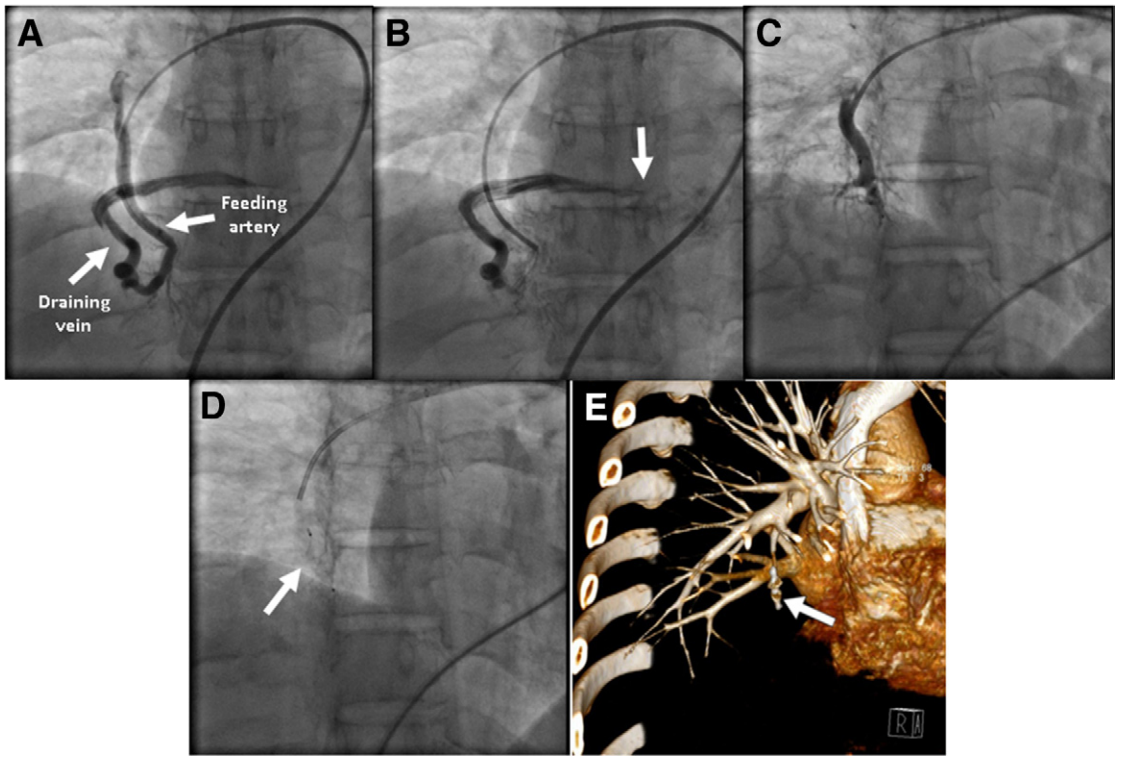

Figure 2. Peri-Procedural and Post-Intervention Images

(A) Pre-procedural selective angiography with the feeding artery and the draining vein of the pulmonary arteriovenous malformation. **(B)** Drainage of the vein in the left atrium **(arrow)**. **(C)** Post-procedural angiography demonstrating complete closure of the anomaly. **(D)** Implanted vascular plug **(arrow)**. **(E)** Computed tomography imaging confirming complete closure of the anomaly by the vascular plug **(arrow)**.

at magnetic resonance imaging. Thrombophilic screening tests showed factor V Leiden homozygosis. Transesophageal echocardiography revealed an atrial septum aneurysm without shunt during Valsalva maneuver after injection of agitated saline solution in the right antecubital vein; however, there was a late (after 5 cardiac cycles) appearance of agitated saline microbubbles in the left atrium through a pulmonary vein (Figs. 1A and 1B). An arteriovenous malformation was thus suspected, and this was confirmed by computed tomography imaging, showing a simple communication in the right lower pulmonary lobe between an inferior lobar artery of the right pulmonary artery and a vein draining in the lower right pulmonary vein (Fig. 1C). Percutaneous closure of the malformation was considered indicated and successfully performed with implantation of a 7-mm Amplatzer Vascular Plug 4 (St. Jude Medical, St. Paul, Minnesota) (Fig. 2). Prevalence of pulmonary arteriovenous malformations is approximately 2 to 3/100,000 persons, but this is higher in patients with cryptogenic stroke (1). These malformations are usually congenital, and 47% to 80% of the cases are associated with Osler-Weber-Render disease (1). The presence of a pulmonary arteriovenous malformation has to be kept in mind as a possible cause of paradoxical embolism, especially in young adults with cryptogenic stroke (2), particularly in the presence of a thrombophilic genetic pattern. In our patient, transesophageal echocardiography—initially performed to possibly diagnose a patent foramen ovale—strongly suggested the presence of a pulmonary arteriovenous malformation, which was confirmed at computed tomography imaging. According to guidelines (3) that recommend treatment of these malformations when considered responsible for a cerebral ischemic event, we performed percutaneous closure of the anomaly for secondary prevention.

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Key Words: arteriovenous malformation ■ percutaneous closure ■ stroke.