eventually releasing the proximal disc that will stay inside the right branch. Type II Amplatzer occluder devices—that have a better profile—can be used in defects $\leq$ 5 mm leaving in this case the body in the defect and a large retention disc in each side. If compliance of the defect and stability worry us due to its specific characteristics, interatrial communication occluder devices can be used. For the diameters needed in these cases, IAC devices have very large discs compared to the body of the device and defect that should be occluded. Depending on the diameter selected—7-Fr or 9-Fr sheaths—are needed, and probably more rigid guidewires, especially from femoral access.

In most cases, the exclusive closure of the connection with the branch is performed by preserving Fontan circulation, and opening a way for a seesaw high-pressure passage in the trunk. This type of flow barely generates any complications. In this case, and given the aneurysmal dilation of the trunk, and to prevent its progression, its closure at valvular and subavalvular stenosis level seems reasonable prior to the closure of the connection between trunk and branch (in procedures performed from the pulmonary artery). Such closure could be performed with an AVP-II device, and probably with a 6-Fr sheath and a standard or a little more rigid guidewire. We could even think of using an Amplatzer VSD occluder device. Its advantages are that it is more rigid and contains polyester fabric in the nitinol mesh thus promoting an earlier closure of flow through it compared to devices that don't have it except for a mesh like the AVP II. The use of an Amplatzer VSD occluder device would require 7-Fr or 8-Fr sheaths, and a more rigid guidewire.

In conclusion, very many different approaches can be used: antegrade (by fenestration), retrograde, femoral or jugular being the process of selection in elderly patients with non-complex anatomies less important. However, it is more relevant in younger patients or with complex anatomies in whom retrograde and jugular accesses often guarantee immediate support, which facilitates the procedure significantly.

FUNDING

None whatsoever.

CONFLICTS OF INTEREST

None.

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Percutaneous closure of fistula between pulmonary trunk and Fontan circulation. Case resolution

Cierre de fístula entre tronco pulmonar y circuito de Fontan de forma percutánea. Resolución

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CASE RESOLUTION

Traditionally, the percutaneous closure of this type of defects has been performed using coil embolization procedures and ductus arteriosus closure devices. However, since the appearance of the Amplatzer Vascular Plug (Abbott, United States) its effectiveness in the embolization of certain types of collaterals and fistulae in congenital heart diseases has been recognized.[1] Amplatzer Septal Occluders devices (Abbott, United States)—designed for septal defect closure—can be used in certain situations to close non-septal defects, among them, pulmonary systemic fistulae[2] and, in general, communications between systemic and pulmonary circulation.

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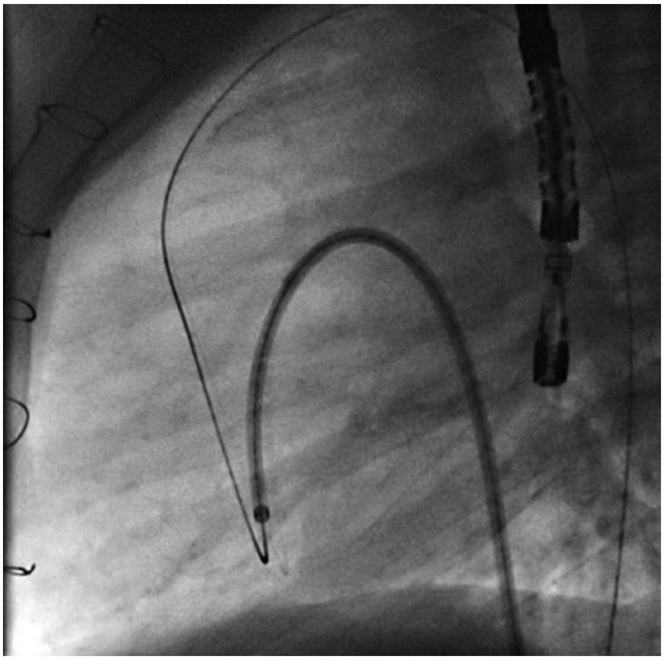

Figure 1. Ascent of the 180° 6-Fr Amplatzer TorqVue sheath towards the left ventricle.

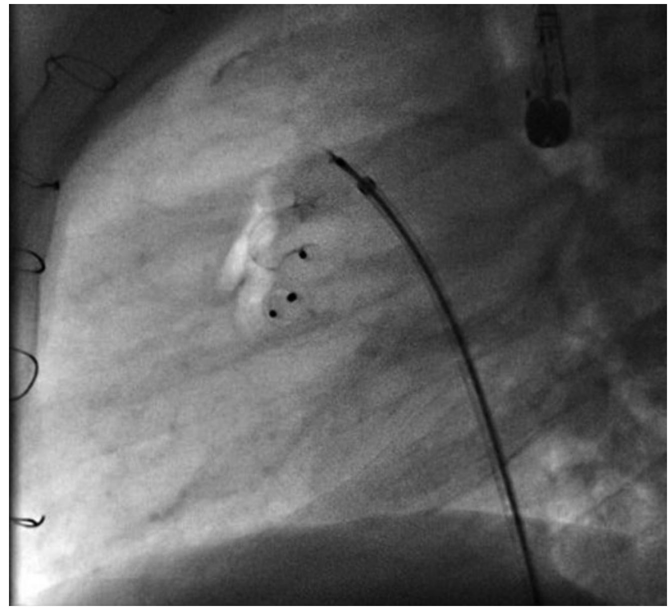

Figure 2. Muscular Amplatzer VSD occluder device implanted at subvalvular pulmonary stenosis level, and Amplatzer Septal Occluder implanted in the communication between the pulmonary trunk and the pulmonary branch.

Once the fistula between the pulmonary artery trunk and Fontan circulation was diagnosed, the procedure was performed under general anesthesia, and fluoroscopy and transesophageal echocardiography guidance. Cardiac catheterization was performed via right femoral vein (6-Fr) and right femoral artery (5-Fr).

The retrograde ascending aortic route was used. The left ventricle was accessed and a 0.014 in moderate support guidewire (PT2) (Boston, United States) was used to pass antegradely the subpulmonary stenosis, and the pulmonary trunk until the superior vena cava passing through the fistula. After capturing the border of the guidewire using a 20 mm Gooseneck snare (EV3), an arteriovenous loop was created to facilitate the placement of an 0.035 in Emerald guidewire (CORDIS, United States) and the ascent of a 180° 6-Fr Amplatzer TorqVue sheath (Abbott, United States) via venous access (figure 1).When the border of the sheath was placed inside the left ventricle, a 10 mm muscular Amplatzer VSD occluder device (Abbott, United States) was implanted at subvalvular pulmonary stenosis level followed by a 10 mm Amplatzer Septal Occluder that was successful and uneventfully implanted in the communication between the pulmonary trunk and the pulmonary branch (figure 2) reducing Fontan pressures down to 14 mmHg without flow obstructions towards the branches (videos 1-3 of the supplementary data). The muscular Amplatzer VSD occluder device implanted at subvalvular pulmonary stenosis level was selected for its greater consistency to withstand the hemodynamic stress at that area. The Amplatzer Septal Occluder implanted between the pulmonary trunk and the pulmonary branch was selected for its proper size and morphology regarding the defect. Both devices were implanted so that the jet of pulmonary stenosis would not dilate the pulmonary trunk or triggered the formation of thrombi.

Finally, left ventriculography revealed the absence of contrast passage towards the pulmonary trunk and Fontan circulation, and the presence of a pseudoaneurysm already present in a former study (figure 3) with a 24 mm × 26 mm orifice opening and a 32 mm × 36 mm saccular formation with calcification in its anterior side. The patient remained on the same treatment prior to the procedure (acetylsalicylic acid, and enalapril), and antiplatelet therapy was reinitiated 24 hours later. The imaging modalities performed at the follow-up confirmed the absence of pseudoaneurysm development, which is why a conservative approach has been adopted ever since.

The patient's corresponding informed consents—that remain on file—were obtained to conduct this study.

FUNDING

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AUTHORS' CONTRIBUTIONS

J.M. Blanco Borreguero drafted and reviewed the manuscript. I. Guillén Rodríguez assisted the patient and supervised the manuscript. L. Marcos Fuentes assisted the patient and provided the images. A. Capilla Miranda drafted and reviewed the manuscript. J.F. Coserria Sánchez supervised the manuscript, assisted the patient, and provided the images.

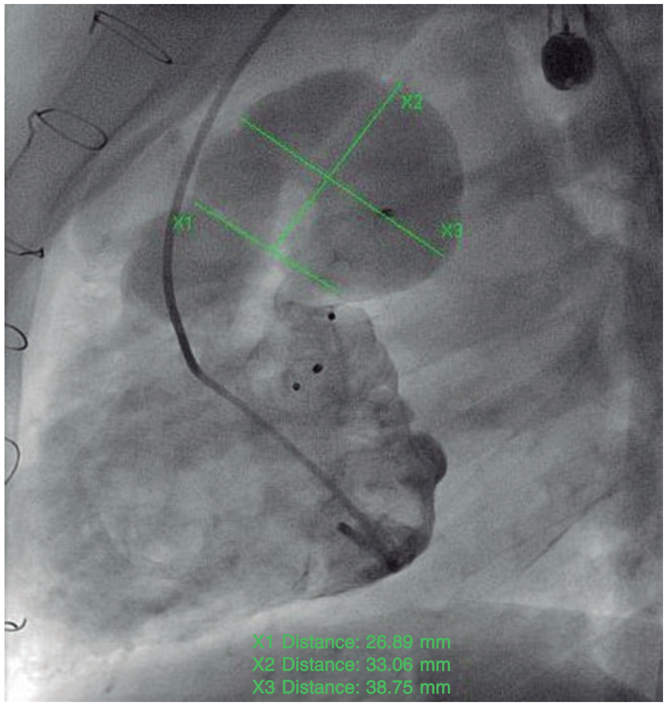

Figure 3. Ventriculography after device implantation showing the aneurysm of pulmonary trunk with visualization of the pseudoaneurysm.

CONFLICTS OF INTEREST

None reported.

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found in the online version available at https://doi.org/10.24875/RECICE.M22000302.

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