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Images in Congenital Heart Disease

Temporary implantation of a pulmonary arterial stent to facilitate the Fontan circulation

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Keywords: Pulmonary arterial stenosis; self-expanding stent

A BOY WITH DISCORDANT VENTRICULO-ARTERIAL connections, ventricular septal defect, subpulmonary stenosis, dysplastic mitral valve, hypoplastic left ventricle and bilateral superior caval veins underwent palliation with a 4.0 millimetre right modified Blalock-Taussig shunt for progressive cyanosis at one month of age. Echocardiography prior to this procedure documented confluent pulmonary arteries, no sign of a persistently patent arterial duct, and no evidence of obstruction in the left pulmonary artery.

At 2 years of age, cardiac catheterization, with a view to elective bilateral bidirectional cavopulmonary anastomoses, demonstrated severe stenosis and diffuse hypoplasia of the proximal left pulmonary artery (Fig. 1). As shown on a radio-labelled albumen perfusion scan, the left lung received 5 percent of the pulmonary blood flow. As these findings clearly precluded surgery, a self-expanding Easy Wallstent (Schneider [Europe] AG), 8 millimetres in diameter and 20 millimetres long, was implanted into the left pulmonary artery through the modified Blalock-Taussig shunt. The low profile and flexibility of the delivery system for this stent was chosen to avoid damage to the shunt, or displacement of the stent off the balloon while advancing it through the modified Blalock-Taussig shunt. This immediately improved flow to the left lung (Fig. 2), although the distal end of the stent could not be fully expanded in the hilum, even with dilation to 8 millimetres using a high-pressure balloon (Fig. 3). The patient remained on aspirin following implantation of the stent.

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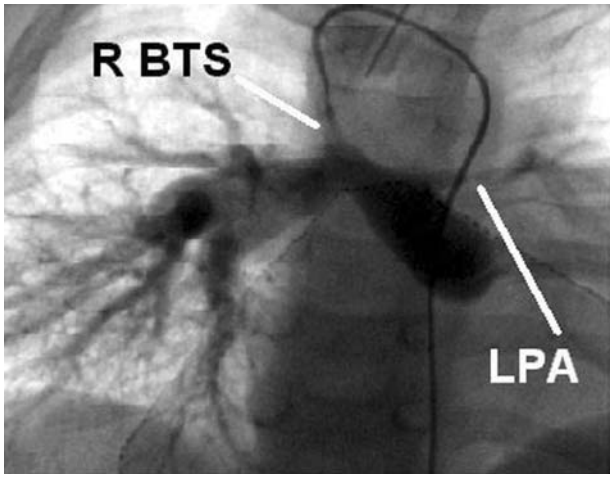

Figure 1.
Pulmonary angiography via the Right modified Blalock-Taussig shunt (RBTS) demonstrating confluent pulmonary arteries with a severly hypoplastic left pulmonary artery (LPA).

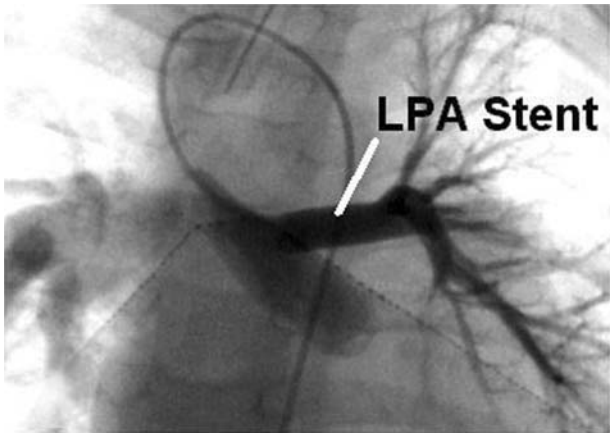

Figure 2.
Pulmonary angiography immediately after implantation of the left pulmonary artery stent.

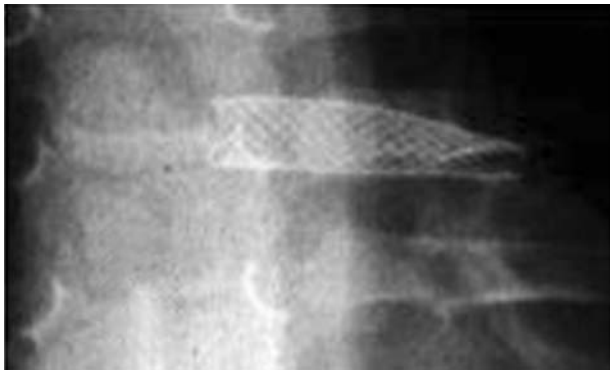

Figure 3.
Close up of stent showing incomplete expansion at the distal end the day after implantation.

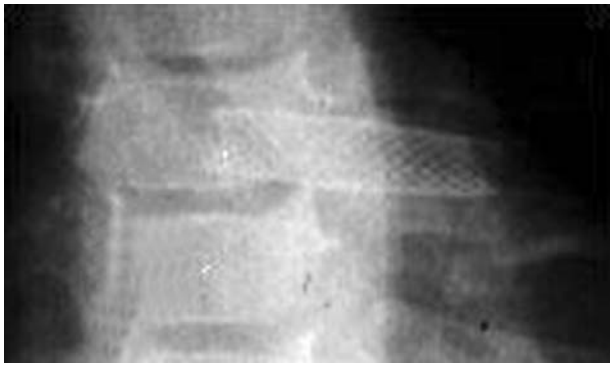

Figure 4.
Spontaneous expansion of the distal end of the stent 5 months after implantation.

Five months later, the distal part of the stent had further expanded spontaneously (Fig. 4), and bilateral bidirectional cavopulmonary anastomoses were performed without difficulty. The stent was removed by making a short incision in the proximal left pulmonary artery at the site of the anastomosis, followed by teasing out each of the individual filament wires making up the stent, without extensive dissection. Angiography the following day confirmed widely patent shunts and pulmonary arteries (Fig. 5). There was no recurrence of the stenosis in the left pulmonary artery, and the patient subsequently had completion of the Fontan circulation by creating a lateral tunnel from the inferior caval vein to the junction of the right pulmonary artery with the pulmonary trunk at 6 years of age.

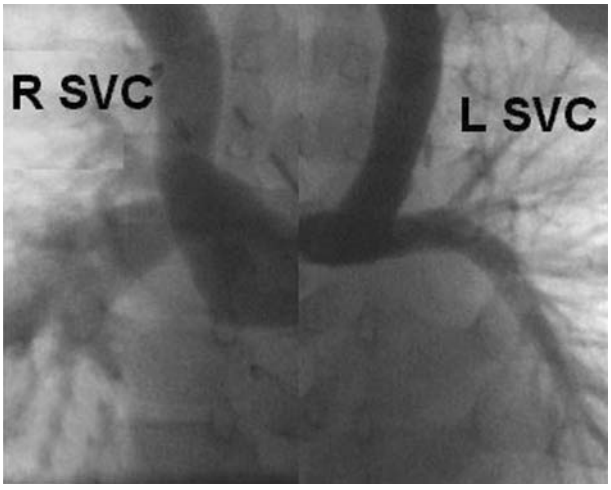

Figure 5.
Angiography the day following stent removal and bilateral bidirectional superior cavopulmonary anastomoses.

Key: RBTS – right Blalock-Taussig shunt; LPA – left pulmonary artery; RSCV – right superior caval vein; LSCV – left superior caval vein.

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