

Stenting of narrow pulmonary artery banding in a patient with univentricular heart

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Double inlet left ventricle (DILV) is a form of single ventricle anatomy with high risk of developing pulmonary vascular obstructive disease and congestive heart failure in case of pulmonary overcirculation [1]. This rare congenital heart defect is associated with a mortality rate of over 50% in untreated neonates [2]. Pulmonary artery banding (PAB) seems to be a solution to protect the pulmonary vascular bed and to make the patient a better candidate for Fontan palliation; however, it can worsen the subaortic stenosis [3]. While PAB reduces the Qp/Qs ratio, SaO₂ decreases [1].

We present a case of a patient with DILV, l-transposition of the great arteries (l-TGA) and mild pulmonary stenosis (PS). In infancy PAB was performed, achieving a maximum gradient of 60 mm Hg. The parents, and later the patient himself, refused any further surgical treatment, closing the way to Fontan type palliation. During follow-up an increase in PAB gradient was recorded. He was first admitted to our institution at the age of 28 years with cyanosis, dyspnea and easy fatigue. Physical examination revealed clubbed fingers and loud systolic murmur with average oxygen saturation of ≈ 65%. His 6-minute walk test (6MWT) result was 300 m with only 55% SaO₂. Angiography showed narrow PAB (5 mm diameter, 110 mm Hg maximum gradient) and well-developed pulmonary arteries. Mean pulmonary artery pressure (mPAP) was 10 mm Hg (Figure 1 A). No patient's agreement for surgery was obtained, although the Fontan pathway was precarious at his age [4]. In order to increase SaO₂, an uncommon decision of PAB angioplasty was made. PowerFlex 10 mm × 4 cm and Maxi LD 14 mm × 4 cm balloons were used

with an 11 mm PAB waist (Figure 1 B). Increase of mPAP to 17 mm Hg and SaO₂ to 80% were observed immediately after the procedure. Clinical improvement was noted: 6MWT distance increased to 460 m with average SaO₂ of ≈ 75%.

During 1-year observation the clinical state and SaO₂ level deteriorated because of a probable PAB constriction (6 mm diameter in control angiography) (Figure 1 C). Knowing the satisfactory, but short-term effects of PAB plasty, the unusual decision of PAB stenting was made. This procedure, to our best knowledge never done before, brought dangers: stent interference with the pulmonary valve, which was 25 mm from the PAB, and too extensive PAB dilatation, which could have resulted in hemodynamic collapse and pulmonary overcirculation.

During the procedure a considerably long AndraStent XL 35 mm was used through a Mullins 12 Fr sheath. Our plan was to precisely implant the stent in the PAB and subsequently flare the stent edges in an hourglass shape in order to prevent embolization. That led us to the idea of using BIB 8 × 16 mm with an inner balloon to achieve accurate stent position and diameter, then an outer balloon to flare the edges (Figure 1 D). SaO₂ reached a stable level of ≈ 85% at rest with a 6MWT distance of almost 500 m at 1-month follow-up. No pulmonary overcirculation symptoms have been noted since then.

In selected high-surgical-risk patients with a single ventricle and severe PAB, stenting seems to be a feasible way of improving quality of life.

Conflict of interest

The authors declare no conflict of interest.

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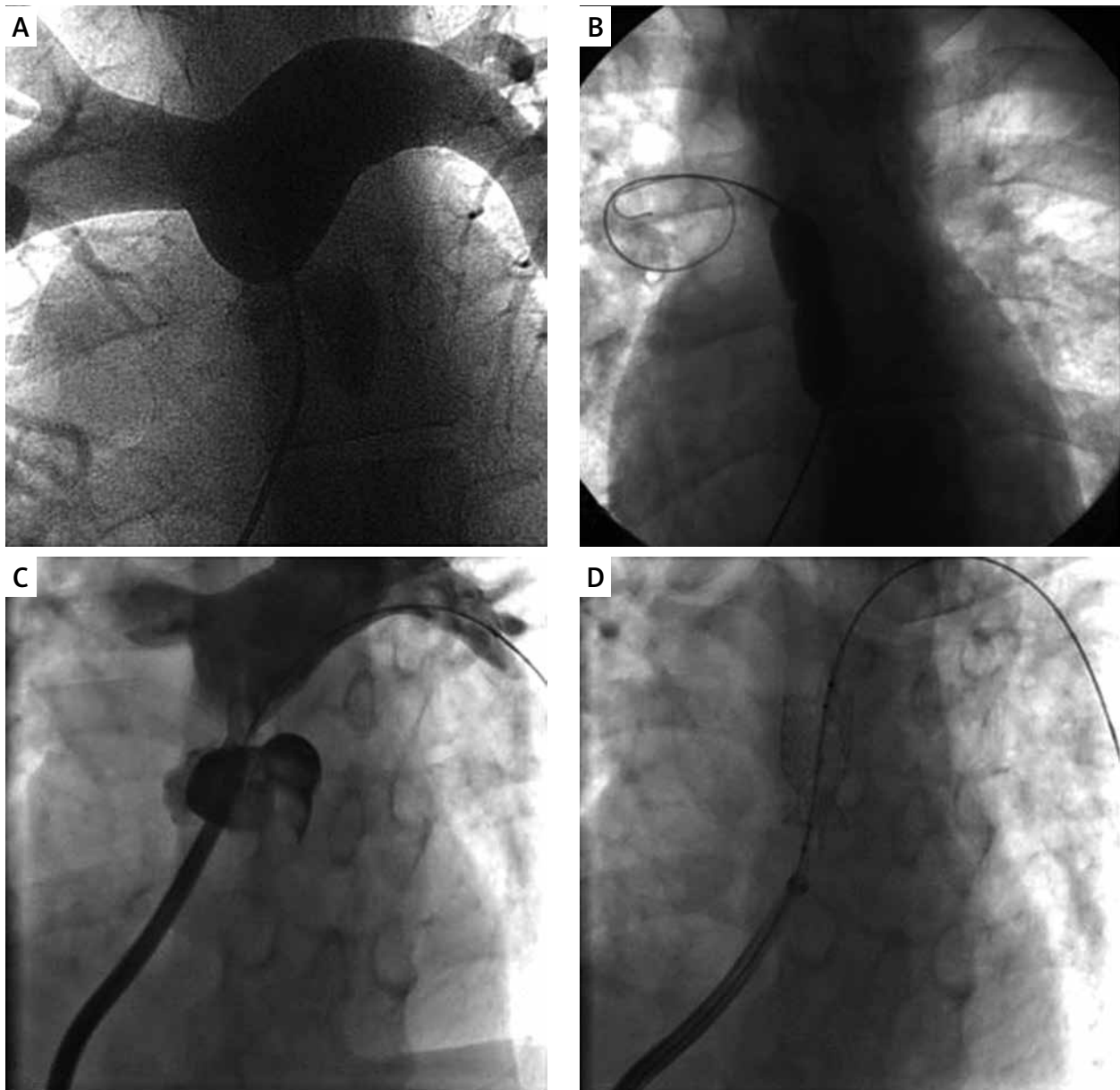


Figure 1. Pulmonary artery banding (PAB, AP projection). **A** – Baseline angiogram. **B** – PAB dilatation with balloon – 11 mm waist. **C** – Angiogram after 1 year – 6 mm PAB diameter. **D** – Control angiogram after stent implantation – PAB dilatation to 8 mm

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