INTRODUCTION

Stenosis of the inferior cava vein (ICV) is a severe complication of surgical correction of anomalous pulmonary vein drainage in the scimitar syndrome in adult patients.1-2 This paper reports the case of a 39-year-old woman who underwent surgical correction of this anomaly and presented severe ICV stenosis, which was treated effectively by balloon angioplasty.

CLINICAL CASE

A 39-year-old woman with a 5-year history of palpitations, dyspnea with moderate effort, and morning ankle edema. In the physical examination a grade II/IV systolic ejection murmur with wide splitting of the second sound was auscultated in the pulmonary focus. The electrocardiogram revealed sinus rhythm, PR interval 0.14 s, QRS axis +90° with a morphology of incomplete right bundle-branch block, and a thoracic radiograph showing moderate cardiomegaly due to dilation of the right ventricle (RV), pulmonary plethora, and a vascular image parallel to the right cardiac margin. The 2D echocardiogram showed RV volume overload with intact interatrial septum and anomalous drainage of the lower right pulmonary vein into the ICV. In cardiac catheterization, a left-to-right shunt was detected with Qp/Qs of 1.7 and pulmonic artery pressure of...
35/15 mm Hg (ascending aorta pressure 105/65 mm Hg). Angiography demonstrated drainage of the right, middle, and inferior pulmonary veins into the ICV and excluded pulmonary sequestration. She underwent surgical correction. By medial sternotomy and right longitudinal atriotomy extended to the ICV, infradiaphragmatic drainage of the middle and lower right pulmonary vein was confirmed. The venous collector was tunneled from its opening on the cava to the left atrium through a septal window using a Dacron™ hemiconduct. The right atrium and ICV were then enlarged with a patch of bovine pericardium. The immediate postoperative period ensued without complications, except for an episode of arterial hypotension and bradycardia that resolved spontaneously. After discharge from the hospital, the patient reported intolerance to minor effort that interfered with household tasks, causing one syncope and two presyncope episodes. In the physical examination, painless hepatomegaly was palpated 2 cm below the rib cage without other significant disturbances. The stress test was interrupted at minute 1.6 by excessive tachycardization and a feeling of dizziness. In the echocardiogram, the RV was smaller, pulmonary vein blood flow was conducted back to the left atrium, and ICV blood flow was accelerated at its entrance into the right atrium, with a maximum gradient of 11 mm Hg and mean gradient of 13 mm Hg, without residual shunting. Catheterization was performed via the left femoral artery and vein and the right brachial vein, registering a peak gradient of 9 mm Hg and a mean gradient of 7mm Hg between the ICV and atrium (Figure 1). An angiographic image of stenosis was obtained, with an estimated diameter of 12 mm and ICV dilation (diameter 28-30 mm) (Figure 2a). An Inoue catheter was inserted and the balloon was inflated in the stenotic zone to consecutive diameters of 28 mm and 30 mm (Figure 2b). After dilation, the gradient disappeared (Figure 1) but the angiographic image hardly changed (Figure 2c), resulting in improved functional capacity with prolongation of effort up to 7 min. At 10 months of follow-up, the patient had a practically normal life and persistent Doppler gradient, with a peak value of 5 mm Hg and mean gradient of 3 mm Hg.

**DISCUSSION**

Venous obstruction is relatively frequent when prosthetic material is used in the surgical intervention, due to the proliferation of fibrous tissue on the prosthesis, together with progressive retraction. The surgical treatment of this complication is technically difficult and demands new surgery with extracorporeal circulation, which is why percutaneous dilation is chosen at present. While the effectiveness of balloon dilation is usually transitory, due to vessel compliance, good immediate and intermediate-term results have been communicated with stent implantation. In the patient in this study, another factor is partial occupation of the ICV lumen by tunneling the anomalous drainage, which may be involved in the stenosis. The Inoue catheter has been used successfully in membranous stenosis of the ICV due to Budd-Chiari syndrome. In this case it was chosen because of: (a) easy placement in the stenosis zone; (b) low pressure (1-2 atm) and short inflation time (<3 s); (c) a more resistant balloon that polyurethane balloons, and (d) the use of a

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**ABBREVIATIONS**

ICV: inferior cava vein
RV: right ventricle

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**Fig. 1.** Simultaneous registration of the inferior cava vein (ICV) and right atrial (RA) pressures before (above) and after balloon dilation (below).
single balloon with a diameter adjustable in relation to volume. Dilation caused the gradient to disappear and was accompanied by marked improvement in immediate and intermediate-term functional capacity. The minimal or null modification of the image after angioplasty is explained by the probable diaphragmatic mechanism of the stenosis secondary to growth of a fine fibrous scar tissue that is not visible on angiography. Although stent dilation may be indicated in restenosis, its use is not free of several potential problems: a) difficulties in implantation due to distal location of the stenosis, near the opening of the ICV on the right atrium; b) compression of the hemiconduct, and c) its interference in the case of surgical reintervention.

It is concluded that dilation with an Inoue catheter in this adult patient was an effective intermediate-term treatment method in ICV stenosis after surgery for the scimitar syndrome.

REFERENCES