Introduction

Aortic coarctation (AoCo) accounts for about 5 to 8% of congenital heart diseases, affecting 6 to 8% of liveborns. It is defined as a narrowing, usually at the aortic isthmus, between the left subclavian artery and the ductus arteriosus. If not treated, it may lead to complications, such as heart failure in the neonatal period, or late complications, such as aneurysms, dissections, coronary artery disease and intracranial hemorrhage, resulting from arterial hypertension secondary to the coarctation. Surgical treatment is the traditional therapeutic option, with good early and late results.

Endovascular procedures for treatment of aortic coarctation have been reported in the literature. Balloon angioplasty, combined with stents and endografts, has been improved in the last years, with the aim of minimizing the complications of treatment that may result from dilation of the narrowed area, such as rupture and restenosis. Currently, in series of cases published in the world literature, endovascular treatment of aortic coarctation has shown to be a safe and effective procedure in the medium and long...
term, with promising results and reduced surgical morbidity and mortality, as it is less invasive\textsuperscript{6-8}. This article reports the case of a 24-year-old patient with symptomatic aortic coarctation, who was submitted to angioplasty followed by aortic endograft implantation, describing the results of treatment.

**Case report**

A 24-year-old white male was admitted to the Vascular and Endovascular Surgery Service of Hospital Geral Roberto Santos, with history of 1,000-meter intermittent claudication of lower extremities (thighs), associated with seven-year history of arterial hypertension requiring the regular use of an antihypertensive scheme with four drugs: clonidine 0.400 mg/day; enal-april 20 mg/day; slow-release nifedipine 40 mg/day and hydrochlorothiazide 50 mg/day. At physical examination, the patient had an arterial blood pressure (AP) of 180/120 mmHg, with no abdominal bruits. The upper limbs pulses were strong and symmetric and the lower limbs pulses were not palpable. There was marked difference between arterial blood pressure of the upper limbs (180/120 mmHg) and the lower limbs (60/30 mmHg). The ankle/brachial index was not measured. No bruits were heard at the carotid arteries. Auscultation of the heart showed regular rhythm, without bruits. Complete physical examination was otherwise normal.

Pre-operative work-up consisted of the following exams:
1. Echocardiogram: normal (ejection fraction: 73%).
2. Laboratory exams: values within normal ranges.
3. Imaging exams: CT angiography showed critical stenosis of the proximal descending thoracic aorta, right after the origin of the left subclavian artery, compatible with aortic coarctation, (Figures 1 and 2). Digital subtraction angiography, confirmed the CT angiography findings.

The patient was taken to Angiography Suite in the Operating Room, where he was submitted under general anesthesia to the endovascular treatment of aortic coarctation. Under sterile conditions, a oblique right lower quadrant abdominal incision and extraperitonial dissection of the ipsilateral common iliac artery were performed. Through the common iliac artery, diagnostic angiography was performed with 5Fr Pigtail\textsuperscript{8} catheter, confirming the subocclusive stenosis in the thoracic aorta. Systemic heparin (5,000 units) was administered. After that, an hydrophilic Road Runner\textsuperscript{8} (Cook) guidewire was advanced across the stenosis, that was carefully dilated using balloons of progressive sizes (6x30, 8x40 and 10x40 mm) (Figure 3). The post-angioplasty...
control angiography showed a 50% residual stenosis of the thoracic aorta, associated with elastic recoil. A stiff guidewire in a Pig Tail® catheter was advanced across the lesion into the ascending aorta. This way, it was possible to deploy, through the right common iliac artery access, a Valen® (Medtronic) endograft across the coarctation, with proximal fixation to the aorta right after the left subclavian artery origin (Figure 4). The endograft was accommodated with a Coda® (Cook) balloon (Figure 5). The procedure lasted around 90 minutes. No hemotransfusion was necessary and the patient was sent to the intensive care unit.

In the immediate post-operative period, strong symmetric pulses were already palpable in the lower limbs, without pressure gradient between the lower and upper limbs. The patient also presented improvement of his intermittent claudication and better control of blood pressure levels. Currently, the patient is taking enalapril 10 mg/day only. He was discharged from the hospital on the 4th post-operative day and has been followed in the outpatient clinic.

Discussion

AoCo is an excentric narrowing of the descending aorta in the region between the left subclavian artery and the ductus arteriosus. It is characterized by discrepancy between the upper and lower limbs pulses and systolic arterial pressure, with reduced or absent femoral pulses. The diagnosis can be suspected at a routine physical examination.

AoCo can be associated with other congenital malformations, such as persistent arterial duct (patent ductus arteriosus) in 48.1%, aortic valve alterations in 12.8% and interventricular communication in 11.4% of the pediatric patients. It may have a broad symptomatic spectrum, resulting from the associated heart failure and respiratory tract infections. At physical examination, it is common to find severe systemic arterial hypertension, a heart murmur and hyperphonosis of the second sound. Transthoracic echocardiogram can show left ventricular hypertrophy and bicuspid aortic valve. In the case reported herein, no associated congenital anomalies were diagnosed.

Surgical repair has been the treatment of choice for AoCo, which may control arterial hypertension. However, the literature shows that arterial hypertension may persist in patients who have been submitted to successful surgical treatment of coarctation. Numerous factors have been involved in the persistence of elevated tensional levels in operated patients, such as the patient’s age and weight at time of surgical treatment, the technique employed, the anatomical characteristics and
this case report. The results are better than those obtained with balloon angioplasty alone. Similar results to those obtained in this case have been achieved by other authors, showing the clear benefits for the arterial hypertension control after the angioplasty with stenting in the treatment of AoCo.

The endovascular treatment of aortic coarctation described in this case adds to other reports in the literature, reinforcing the impression of an effective and safe therapeutic option, with low rate of complications and less invasive for adult patients. Long-term follow-up should be performed carefully in these cases. However, controlled studies are required to establish the real role of endovascular procedures in this affection.

References


Figure 5. Endovascular treatment of aortic coarctation: endograft accommodation in the thoracic aorta with a proper balloon.


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