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Case Report Open Access

Balloon Angioplasty of Subatretic Coarctation of the Aorta Using Progressive Larger Balloons

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Abstract

We report a case of subatretic coarctation of the aorta with dilated ascending aorta in a three-year-old boy weighing 14 Kg. Surgical treatment was indicated, but it was refused. Balloon angioplasty of the coarctation was performed using progressive increase in the diameter of the balloons. The diameters of the balloons ranged from 2 to 10 mm, and the gradient decreased from 60 down to 12 mmHg. We conclude that the balloon angioplasty with careful progressive increase in the balloon diameter is safe in the treatment of subatretic coarctation of the aorta with good results.

Keywords: Balloon dilatation; Congenital disease of the aorta; Congenital heart disease

Introduction

Balloon dilatation for the treatment of patients with native or recurrent coarctation of the aorta is widely accepted [1]. But balloon dilatation in children less than two years of age is associated with vessel recoil and recurrence of the lesion [2]. Over distention of the coarctation can cause aortic wall injury [3,4]. Recently, stents have been used in older children or young adults to solve these complications [5]. We report a patient with native subatretic coarctation of aorta and important dilatation of the ascending aorta. Because the surgical treatment was refused by the parents, the patient was treated by balloon angioplasty using progressive larger diameter balloons until reaching a good result.

Case Report

A three-year-old boy was referred to our tertiary Cardiologic Center due to poor physical development and systemic arterial hypertension. On physical examination the weight was 14 Kg, and the blood pressure was 150/100 mmHg in the upper limbs. Radial pulse was strong and the femoral pulse was absent. Blood pressure in the inferior limbs was 80/60 mmHg. The first and second cardiac sounds were loud and a systolic murmur was audible in the left sternal line.

Electrocardiogram revealed left ventricular hypertrophy and the chest radiography showed normal cardiothoracic ratio with dilatation of the ascending aorta in frontal view. Color echodopplercardiography confirmed dilatation of the ascending aorta and severe coarctation, with normal volumes and ejection fraction of the left ventricle. The gradient across the coarctation was 55 mmHg. Due to aortic dilatation that suggested possible disease of the aortic wall, surgical treatment was indicated, but refused by the parents. Diseases of the aortic wall increase the risk of percutaneous procedure for treatment of aortic coarctation. Even the surgical risk is higher in these cases.

We performed cardiac catheterization by the right femoral artery approach. The blood pressure in the aorta below the coarctation was 95/60 mmHg. It was impossible to reach the ascending aorta and the angiography performed below the coarctation showed flow absence to the aorta above the coarctation, suggesting interruption of the aorta. Right brachial approach was attempted and the blood pressure in the ascending aorta was 155/90 mmHg. Angiographic study revealed subatretic coarctation with dilatation of the ascending aorta (23.5 mm of diameter). The left and right thoracic internal arteries were very dilated. A Lehman 5F catheter was positioned near the subatretic coarctation and angiography by hand showed the coarctation diameter (Figure 1A). It was impossible to cross the coarctation using the Lehman catheter. A coronary angioplasty guide wire 0.014 inch through the Lehman catheter crossed the severe stenosis and reached the descending aorta. On the guide wire 0.014 inch a 2 mm diameter coronary angioplasty balloon catheter was placed in the coarctation area and two inflations were made (Figure 2A). Another coronary angioplasty catheter with 4 mm diameter was used and two more inflations were made (Figure 2B). Angiography showed increase of the flow across the coarctation. Balloon catheters with 6 mm, 8 mm (Figure 2C) and 10 mm of diameter (Figure 2D) were used sequentially and successful dilatation was obtained with good blood flow to the abdominal aorta (Figure 1B). The gradient across the coarctation decreased from 60 mmHg to 12 mmHg.

Echocardiographic study showed normal flow pattern in the abdominal aorta. The in-hospital evolution was uneventful and the patient was discharged two days after the procedure. In a one year

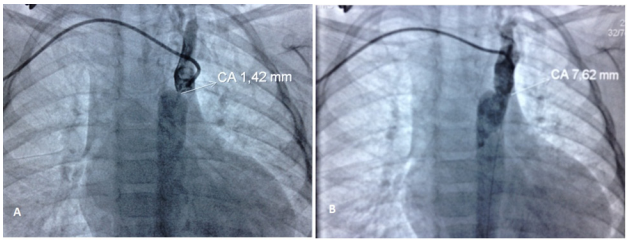

Figure 1: A) The subatretic coarctation was visible in frontal view. The diameter shown by angiography was 1.42 mm (arrow). B) After the balloon dilatation using progressive larger balloons the coarctation diameter increased to 7.62 mm (arrow).

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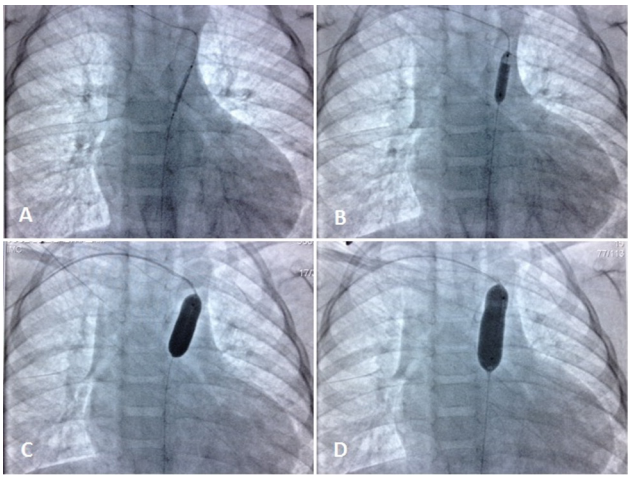

Figure 2: A) Shows the 2 mm coronary balloon angioplasty inflated in the coarctation area. B) Shows the inflated 4 mm coronary balloon angioplasty in the coarctation. C) Shows an 8 mm balloon catheter inflated in the coarctation. D) Shows a 10 mm balloon catheter completing the dilatation of the coarctation.

follow-up the blood pressure was 100/60 mmHg in the upper limbs and the gradient across the coarctation by echocardiographic study was 15 mmHg with normal flow pattern in the abdominal aorta.

Discussion

In a three-year-old boy, balloon angioplasty for the treatment of aortic coarctation is widely accepted[1]. The chance of recurrence in children older than two years decrease [3] and stent implantation is not performed in children less than 20 kg. In older children or young adults the subatretic coarctation is in general treated with covered stent implantation [6] to avoid aortic wall injury or pseudoaneurysm formation. In our case the important dilatation of the ascending aorta suggested a possible disease of the aortic wall which increased the risk of aneurysm or aortic wall injury caused by balloon angioplasty [4]. For this reason surgical treatment was indicated, but it was refused by the parents. We decided to perform the balloon angioplasty with progressive increment in the balloon diameter up to 10 mm which was the diameter of the aorta near the left subclavian artery. This technique is used in some patients with subatretic coarctation, in which a two-stage approach is advocated. In these cases the balloon dilatation is followed by stent implantation after a few months [7,8] or in the same procedure [9,10]. Our patient had a good result. Despite of the important dilatation of the ascending aorta there were not any acute complications such as pseudoaneurysm in the dilated area, aortic wall injury or peripheral vascular complications. The in-hospital evolution was uneventful. The eccentric blood flow showed immediately after dilatation and the discordance of diameters of the aorta pre and postcoarctation increase the risk of recurrent coarctation or aneurysm formation during the follow-up. It is not unusual that the eccentric blood flow disappears with the growth of the child. The patient was followed every month and after one year his blood pressure was normal. Echocardiographic study was repeated during the follow-up and it did not show progressive dilatation of the ascending aorta, aneurysm formation or recurrence of the coarctation. In this case, despite of the good results after one year, a close follow-up is necessary because complications can occur years after the procedure.

Conclusion

We conclude that subatretic coarctation of the aorta in children less than 20 Kg, in whom the covered stent implantation is not an option and the surgery is refused, the treatment by balloon angioplasty using careful increment in the diameter of the balloons until reaching a good result is possible.

References

1. Mendelsohn AM, Lloyd TR, Crowley DC, Sandhu SK, Kocis KC, et al. (1994) Late follow-up of balloon angioplasty in children with a native coarctation of the aorta. Am J Cardiol 74: 696-700.
2. Rao PS, Thapar MK, Kutayli F, Carey P (1989) Causes of recoarctation after balloon angioplasty of unoperated aortic coarctation. J Am Coll Cardiol 13: 109-115.
3. Fawzy ME, Sivanandam V, Galal O, Dunn B, Patel A, et al. (1997) One- to ten-year follow-up results of balloon angioplasty of native coarctation of the aorta in adolescents and adults. J Am Coll Cardiol 30: 1542-1546.
4. Koerselman J, de Vries H, Jaarsma W, Muyldermans L, Ernst JM, et al. (2000) Balloon angioplasty of coarctation of the aorta: a safe alternative for surgery in adults: immediate and mid-term results. Catheter Cardiovasc Interv 50: 28-33.
5. O'Laughlin MP, Perry SB, Lock JE, Mullins CE (1991) Use of endovascular stents in congenital heart disease. Circulation 83: 1923-1939.
6. Erdem A, Akdeniz C, SarÄ±taÅŸ T, Erol N, Demir F, et al. (2011) Cheatham-Platinum stent for native and recurrent aortic coarctation in children and adults: immediate and early follow-up results. Anadolu Kardiyol Derg 11: 441-449.
7. Butera G, Piazza L, Chessa M, Abella R, Bussadori C, et al. (2006) Covered stents in patients with congenital heart defects. Catheter Cardiovasc Interv 67: 466-472.
8. Kusa J, Szkutnik M, BiaÅ‚kowski J (2008) Percutaneous reconstruction of the continuity of a functionally interrupted aortic arch using a stent. Cardiol J 15: 80-84.
9. Thanopoulos BD, Hadjinikolaou L, Konstadopoulou GN, Tsaousis GS, Triposkiadis F, et al. (2000) Stent treatment for coarctation of the aorta: intermediate term follow up and technical considerations. Heart 84: 65-70.
10. Zabal C, Attie F, Rosas M, Buendía-Hernández A, García-Montes JA (2003) The adult patient with native coarctation of the aorta: balloon angioplasty or primary stenting? Heart 89: 77-83.