

Successful treatment of re-coarctation of the aorta with percutaneous stent placement via axillary artery access in a young patient

Brief Report

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Abstract

In patients with critical coarctation of the aorta, percutaneous balloon angioplasty and/or stent placement is usually performed via the femoral route. When femoral access is not suitable for intervention, the trans-axillary approach can be chosen as an alternative access. We hereby present the first case of a patient who had a successful percutaneous stent placement via trans-axillary access in our institution.

Coarctation of the aorta is described as a congenital narrowing of the upper descending aorta, which can be sufficiently severe to cause a pressure gradient across the area.¹ It is a frequently observed congenital malformation, with an estimated incidence of approximately 5–8% among children with congenital heart disease.¹ Nowadays, percutaneous balloon angioplasty and/or stent placement is the preferred treatment modality for re-coarctation of the aorta.² In most cases, the procedure is performed via femoral access because it is less invasive than the other access methods. However, when femoral access is not suitable for intervention, either the trans-axillary or the trans-carotid approach can be chosen as an alternative access.³ In the current literature, percutaneous stent placement via the axillary artery was performed in limited cases of coarctation of the aorta, particularly in those with re-coarctation of the aorta.^{4–6} Thus, we hereby present the first case of a patient who had a successful percutaneous stent placement via trans-axillary access in our center.

Case report

A 15-year-old male patient was referred to our cardiology department for the evaluation of an increased pressure gradient in the arcus aorta. The patient's medical history revealed that he was operated for coarctation of the aorta, ventricular septal defect, and patent ductus arteriosus at the age of 1 year. He also had a redo cardiac surgery for restenosis of coarctation of the aorta in another centre at the age of 4 years. From that time on, the patient underwent multiple percutaneous balloon angioplasty procedures via femoral access for the treatment of restenosis of coarctation of the aorta in different centres. Physical examination revealed a bilateral pulse deficit in the lower extremity arteries. Transthoracic echocardiography was performed, revealing residual restenosis of the arcus aorta and a pressure difference with a peak of 75 mmHg between the ascending aorta and the descending aorta. A thoracoabdominal CT with contrast revealed restenosis that started in the distal part of the aortic arch and extended beyond the left subclavian artery origin. Also, both femoral arteries were occluded. The cardiovascular team evaluated the case, and percutaneous catheter intervention via a trans-axillary approach was decided as the most appropriate treatment option. A 5-F sheath was inserted into the axillary artery with manual palpation and the right arm abducted at 90°. After cannulation of the axillary artery, IV nitrate and heparin treatments were administered. The diameter of the axillary artery was measured as 7.4 mm (Fig 1a, Supplementary Video S1). A 5-F JR4 catheter was advanced through the hydrophilic guidewire into the descending aorta. Then, the 5-F JR4 catheter was replaced with a pigtail catheter. Following contrast administration through the pigtail catheter, the diameters of the proximal transverse aorta, distal transverse aorta, and descending aorta were measured as 13.9 mm, 8.2 mm, and 12.7 mm, respectively. The re-coarctation length was measured as 42 mm. A pressure difference with a mean of 30 mmHg was detected between the ascending aorta and the descending aorta (Fig 1b). Next, the hydrophilic guidewire was replaced with a 0.035" extra stiff wire, and a 9-F long sheath was inserted into the axillary artery. A 43-mm Andra XL stent was implanted into the re-coarctation area through the 9-F long sheath (Fig 2a). Afterward, the 9-F long sheath was replaced with a 10-F short sheath, and a JR4 catheter was advanced into the left subclavian artery. The MPA1 catheter was replaced with a JR4 catheter, which was advanced into the left internal mammary artery. The ostial region of the left subclavian artery was dilated with a 9 mm × 4 cm Mustang peripheral balloon. Then, the

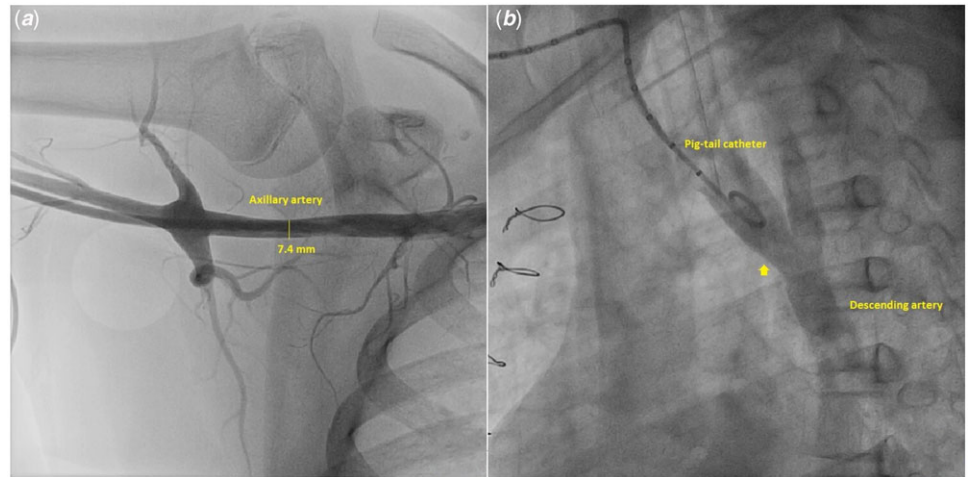


Figure 1. (a) Coronary image showing the diameter of the axillary artery. (b) Coronary image showing re-coarctation segment in the distal transverse aorta.

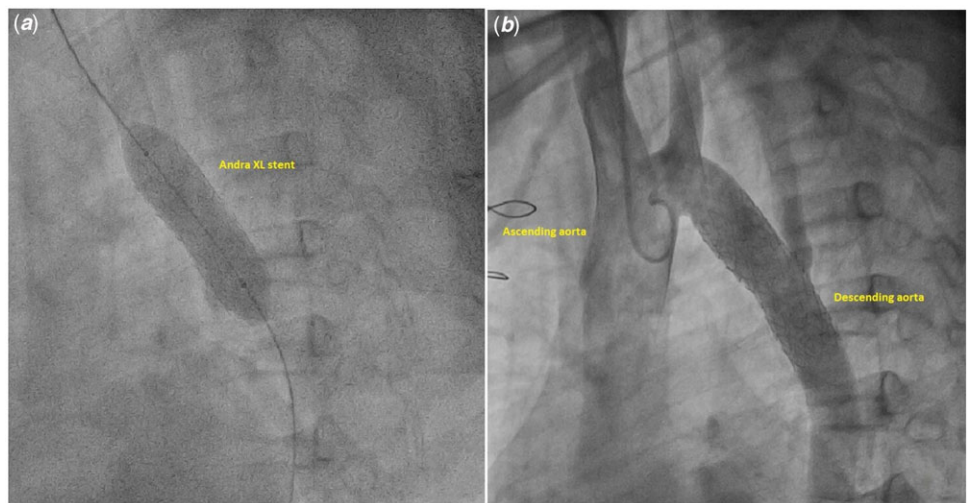


Figure 2. (a) Coronary image showing the implantation of the Andra XL stent. (b) Coronary image showing no extravasation from an aneurysmal segment.

stent was post-dilatated with a 14 mm × 4 cm Z-Med peripheral balloon. Control angiograms showed no extravasation from an aneurysmal segment (Fig 2b, Supplementary Video S2). The haemostasis was achieved by manual compression, and the procedure was completed uneventfully. The patient was discharged from the hospital with anti-hypertensive treatments.

Discussion

Cardiac surgical repair is accepted as the traditional treatment modality in most patients with coarctation of the aorta, especially neonates.¹ Percutaneous balloon angioplasty and/or stent placement has been selected for a limited group of cases, and the procedure is mainly achieved via retrograde femoral access.^{1,2} However, in the present case, an alternative access route had to be chosen because both femoral arteries were occluded. The axillary artery is promoted as a safe vascular pathway for cardiac interventions in patients with patent ductus arteriosus if the traditional femoral route is not possible.^{7,8} Prior reports have also revealed that axillary access had several significant advantages, especially when compared to carotid access.⁴ For example, thromboembolism and occlusion are not as frequent when using the axillary artery compared to the carotid artery. Additionally, the

development of severe haematoma is significantly higher after the puncture and cannulation of the carotid artery under heparinization. Moreover, the axillary artery is easier to palpate and is not an end artery, which means that arm perfusion remains guaranteed during the procedure.

In the current medical database, using the axillary artery for balloon angioplasty and/or stent placement in coarctation of the aorta patients is a safe but underrepresented access. Previously, Coimbra et al. reported the data of coarctation of the aorta patients who weighed less than 24 kg and were treated with a percutaneous axillary artery approach.⁵ According to this report, eight patients were treated with stent placement, and all procedures were successfully completed via the axillary artery without technical difficulty. Also, after sheath removal, no pulse loss was observed, and only one small haematoma developed, which did not require transfusion. Similarly, the procedure in our case was completed uneventfully, and we did not observe any complications after the intervention.

To our knowledge, our report gives an account of the first coarctation of the aorta patient to be treated with percutaneous stent placement in our center. We believe that the presently described case clearly demonstrates that the axillary artery access method is a suitable alternative for coarctation of the aorta patients when the traditional retrograde femoral pathway is not possible.

Conclusion

In conclusion, the present case showed that percutaneous axillary artery access represented an attractive alternative when the conventional retrograde pathway via the femoral artery was not possible.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/S1047951122001639>

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Conflicts of interest. None.

Ethical standards. Informed consent was obtained from the patient's legal guardians.

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