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Bioptome-assisted stent repositioning in the case of stent migration during balloon-expandable stenting for coarctation of the aorta

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Brief Report

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Abstract

Coarctation of aorta is commonly treated with endovascular interventions such as coarctation stenting. Migration of stent is the most dreaded complication of coarctation stenting. A 60-year-old lady with severe malaligned coarctation underwent endovascular stent placement. The expanded stent migrated to proximal aorta, which could be stabilized with a bioptome, re-positioned with a balloon and postdilated to its optimal size, resulting in a good outcome.

Coarctation of the aorta is a congenital cardiac anomaly consisting of a constricted aortic segment with a prevalence of 5–8% of all CHD. Endovascular stenting of aortic coarctation is now an accepted technique to relieve the obstruction.[1–3] Migration of the stent is the most dreaded complication of endovascular stenting. It can be a proximal migration, as in the direction of ascending aorta or it can be a distal migration into the thoracic and abdominal aorta. For a more common distal migration strategy is to essentially deploy it at a distal location. Management of proximally migrated stent is scantily described in the literature. Few bail-out techniques in such conditions include surgical retrieval,[4] stent deployment at distal sites,[5] or balloon and snare-assisted techniques for stent redeployment have been described.[6] The present case successfully describes the novel repositioning of a partially deployed and proximally migrated coarctation stent using a bioptome forceps.

Case report

A 60-year-old lady was presented with hypertension and mild chest pain on and off for the past 6 years. There was a history of giddiness. On examination, the blood pressure (in supine position) in upper limbs was 170/70 mmHg and in lower limbs was 80/60 mmHg, and in rest of the vitals were stable. There was no family history of ischaemic heart disease. Cardiovascular examination showed features of left ventricular hypertrophy. Her lipid profile was normal. Her echocardiography revealed coarctation of aorta with a gradient of 60 mmHg and pandiastolic spill. She had a bicuspid aortic valve (thickened leaflets) with gradients of 20 mmHg across the aortic valve. There was no aortic regurgitation. She had significant left ventricular hypertrophy, but her LV systolic function was normal. Her CT aortogram confirmed severe discrete coarctation of aorta with a transverse aortic diameter of 21 mm and descending aortic diameter at the level of the diaphragm of 18 mm (Figure 1).

In view of the above findings, the patient was taken for coarctation stenting of aorta. Patient was taken for the procedure under general anaesthesia. Left brachial access was taken with a 5F sheath. Femoral artery and femoral vein were accessed using 6F sheaths. Coronary angiogram was done via left brachial artery, which showed no evidence of coronary involvement. Aortogram was done in LAO 30-degree and RAO 30-degree views as per the unit's protocol. Aortogram showed similar findings as CT. Sheath size was upgraded to 12 French to accommodate the stent.

The constricted segment could be easily crossed retrograde from descending aorta using 0.035" Glidewire (Terumo Corp., Tokyo, Japan). It was exchanged with 0.035" 260 cm Amplatz Super Stiff Wire (Boston Scientific Corp., Natick, MA, USA) (Videos 1 and 2). A 12F Mullens introducer sheath was parked across the lesion. Coarctation stenting done with 45 mm long 8 zig-covered Cheatham platinum stent hand crimped on a 20 mm × 5 cm balloon-in-balloon (Numed Corporation, Hopkinton, NY, USA) (Video 3). The initial inflation showed the melon seeding of the stent with proximal migration (Figure 2). Attempt to recapture the stent with inflation led to further proximal migration of the stent. Having lost the balloon from the stent, an attempt was made to reintubate the stent with the same BIB. Since the balloon had lost its profile with prior inflation, the 20 mm (outer balloon) was unable to intubate the stent. Stent was highly mobile with distal narrowing, but luckily was over the wire. Repeated attempts at intubation of the stent only led to further proximal migration of the stent. It was at this moment a need to stabilise the stent was felt and bioptome was taken for the same. A

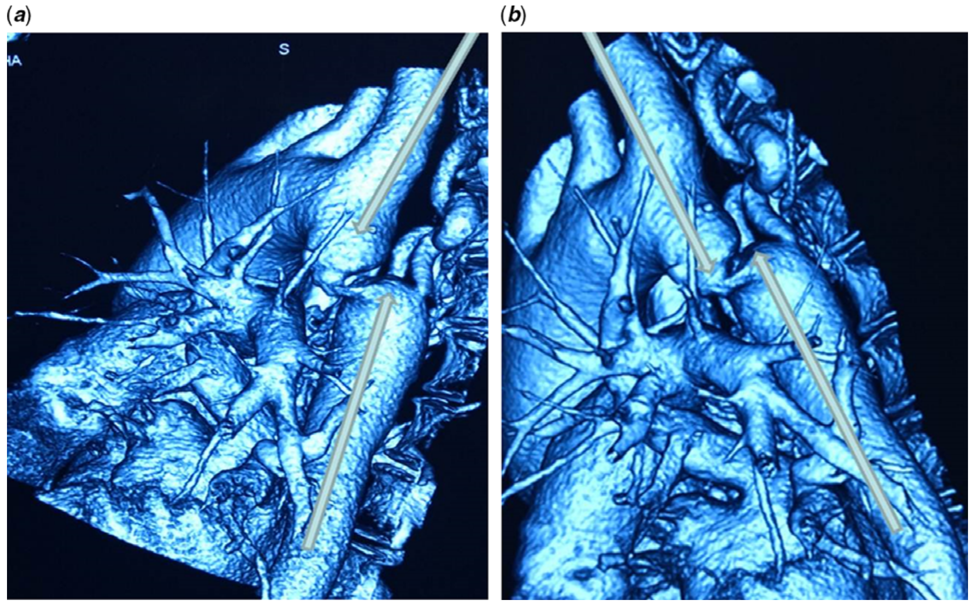

Figure 1. (a) CT aortogram with 3D reconstructions showing the severe discrete coarctation of aorta (marked by arrow). (***b***) Demonstrating the CT angiogram in a complimentary view.

5.5 F, 104 cm Cook biopsy forceps was introduced adjacent to the 0.35 wire. A Z-med 10 mm × 4 cm balloon (Numed) with a better profile than the partially inflated balloon we had used earlier was introduced adjacent to the bioptome (Figure 3). The issue with a bioptome was the risk of possible injury to the aortic valve and hence the sheath, which was now upgraded to 14F to accommodate the bioptome, was positioned very proximally to the stent. The stent migrated slightly distally towards the transverse arch of the aorta while inflating and was repositioned with the help of bioptome. Bioptome helped to stabilise the mobile stent and also to enable intubation of the stent with a balloon. Once intubated, the balloon was partially inflated and redeployed appropriately. Post-dilatation was done with the BIB 20 × 5 cm. Angiogram, which was done post-deployment showed the stent in position with no evidence of constriction (Video 4). Total gradients across the coarctation segment were 140 mmHg before stenting, and post-stenting the gradient was reduced to 10. Reanalysis of the coarctation images demonstrates significant malalignment between the proximal and distal segments of coarctation (Videos 1 and 2, Fig 1a and b). Her post-op recovery was satisfactory she was discharged in stable condition. She is asymptomatic with controlled blood pressure recording, on beta blockers in follow-up after 2 years.

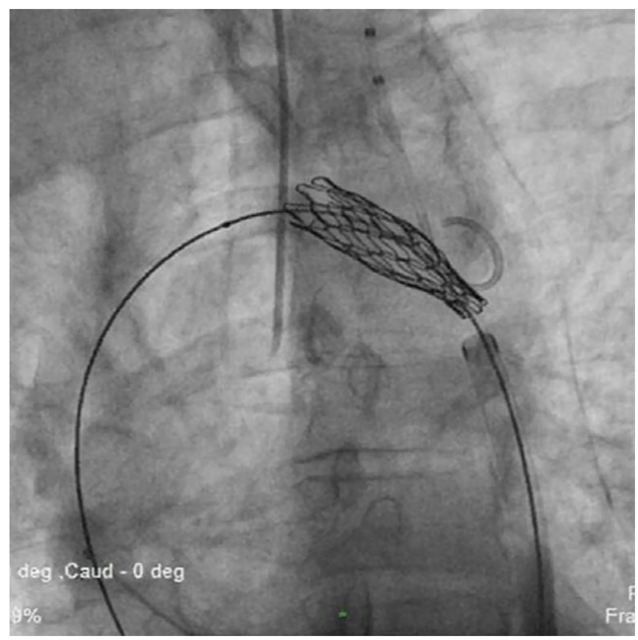

Figure 2. Aortogram showing proximal migration of the stent.

Discussion

Coarctation stenting is widely accepted to be the treatment of choice particularly in grown-up patients as was with our cases 1–3. Stent therapy also appears to be an attractive method for the treatment of native or recurrent coarctation, aneurysm formation following prior surgical or balloon intervention, and for long-segment hypoplasia.[7] Covered stents are particularly useful when the assessed risk for the development of aneurysm or dissection is high. In our case, there was a significant malalignment between the proximal and distal segments of the coarctation. We here propose the concept of malalignment. In the event of significant malalignment in the proximal and distal segments of the coarctation, it is imperative to select a longer stent. We were using 45 mm stent that is a significantly long stent. The option remained to use a 60 mm customised stent or ensure that the stent is optimally placed and mounted on the balloon to prevent the melon seeding as it happened in our case. Because of the age of the patient and also most likely a tear caused by stretching of a maligned segment is likely to be eccentric, and thus a covered stent would be more beneficial as was done in our case.

Stent migration is always a dreaded complication.[4] In most instances, it requires stent deployment at distal sites or surgical intervention.[5] This may require additional stent deployment.[4] The present case demonstrated the use of biotope to re-cannulate the stent with the balloon to facilitate redeployment.

In conclusion in elderly patients with coarctation of the aorta, stent implantation may be a feasible and improved option to relieve the stenosis. Malalignment between the proximal and distal segments of the coarctation should also be analysed while choosing the stent characteristics. Bioptome can be an important

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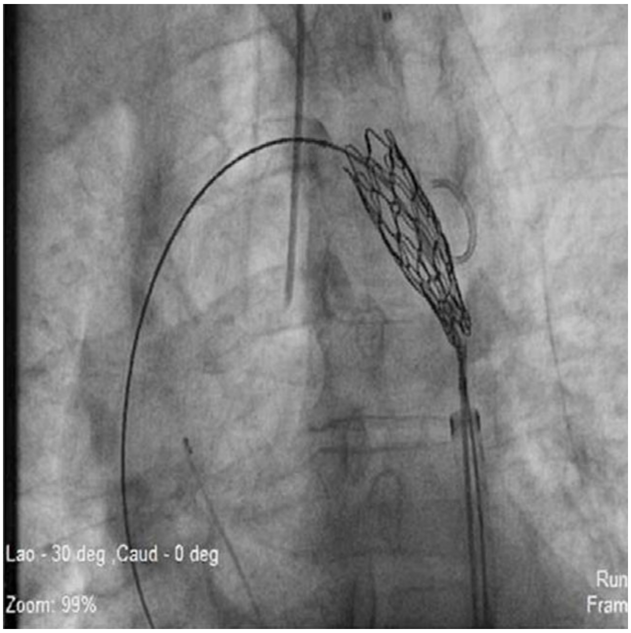

Figure 3. Aortogram showing the stent stabilisation by the bioptome, which is able to enable reintubation with a Z-Med balloon.

rescue in the event of stent migration, as has been demonstrated in our case.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S1047951121002262.

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Conflicts of interest. None.

Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008, and has been approved by the institutional committees.

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