

Case Report

Management of Stent Dislodgment in Coarctoplasty of Aorta with Three Overlapping Self-Expandable Nitinol Stents

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Key words:

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We describe a case of native coarctation of aorta managed with three self-expandable nitinol stents. After balloon predilation, the first and second stents were dislodged. The coarcted area was successfully treated with the third stent overlapped with the previous stents. During follow up (30 months), the patient was free of complications. It seems that implantation of multiple overlapping self-expandable stents in aortic coarctation patients, if needed, is safe and possible.

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The balloon-expandable stent has been well established for the treatment of coarctation of the aorta (CoA).¹⁻⁷ Nevertheless, it can be associated with significant complications, such as aortic dissection,⁸ late aneurysm formation,^{2,4} and especially stent dislodgment.⁷⁻⁸ However, only a few studies have evaluated the efficacy of self-expandable stents.⁹⁻¹⁰ The aim of this study was to report an interesting case of CoA that was successfully managed with three overlapping self-expandable stents.

Case presentation

A 17-year-old boy was referred to our clinic for headache and cold lower extremities. His blood pressure was 160/90 mmHg and 100/70 mmHg in his upper and lower extremities, respectively. Transthoracic echocardiography revealed severe CoA with 65 mmHg peak systolic gradient.

Informed consent was obtained. He underwent retrograde femoral artery catheterization under local anesthesia by the Seldinger technique. He was treated with

325 mg aspirin from two days before the procedure. The coarctation segment was crossed with a flexible-tip guide wire 0.035 inch in diameter; a pigtail catheter was then passed over the wire. Descending thoracic aortography was performed in left anterior oblique view and demonstrated severe discrete native coarctation with 60 mm Hg peak systolic gradient (Figure 1A), mild hypoplasia and aneurysmal dilation at the pre- and post-stenotic segments, respectively. According to angiographic measurements, the diameters of the coarcted segment, descending thoracic aorta at the pre-coarctation and post-coarctation areas, and at the level of the diaphragm were 2, 14, 22 and 17 mm, respectively. Initial staged predilation was performed with 6 × 30 and 12 × 30 Tyshak balloons (Figure 1B). Due to the severe coarctation and special shape of the coarctation site, the balloons moved repeatedly during inflations. The pressure gradient decreased to 30 mmHg after balloon deflation. Then, a 20 × 40 Sinus-Aorta self-expanding nitinol stent (OptiMed Medizinische Instrumente GmbH, Ettlingen, Germany) was chosen. The technique of

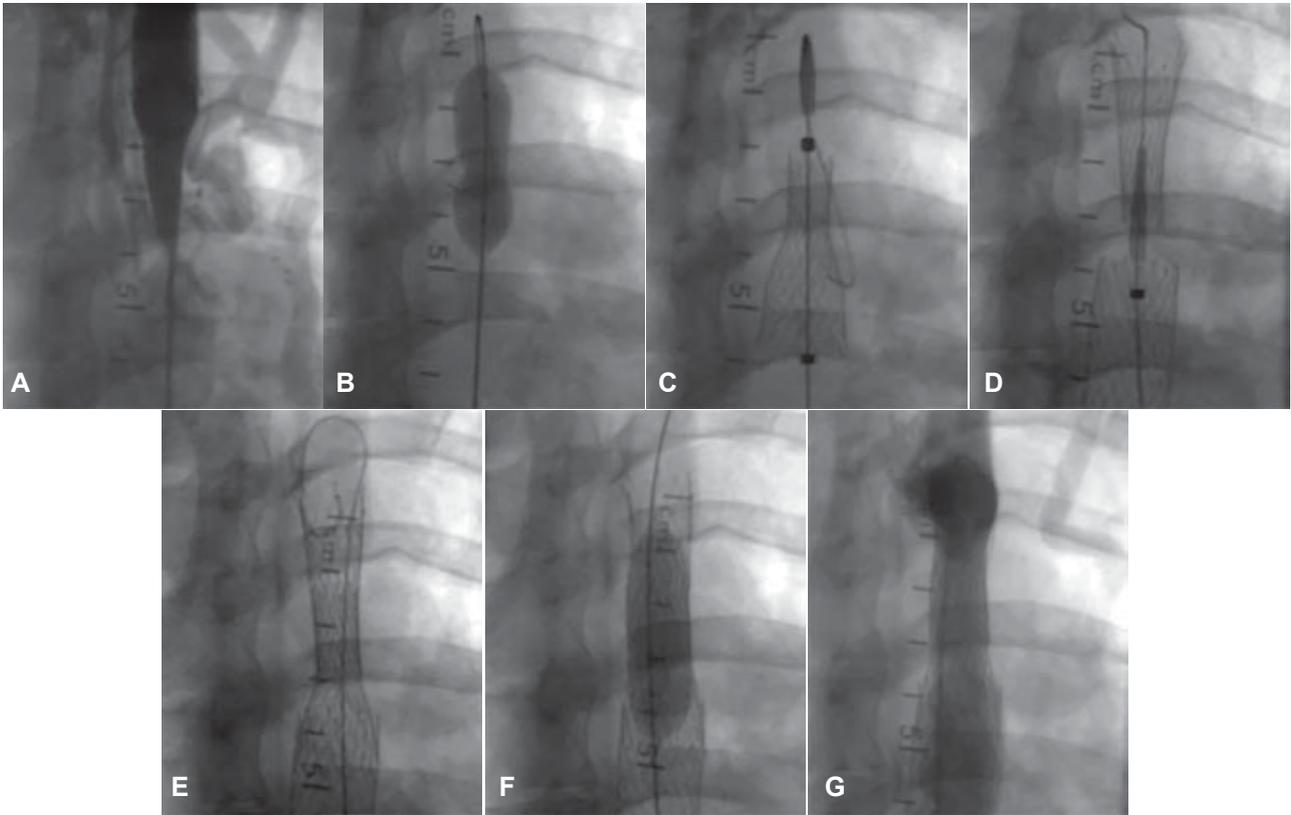


Figure 1. Serial aortogram in left anterior oblique projection depicting: A) severe native coarctation of aorta; B) predilation angioplasty with a 6×30 Tyshak balloon; C) downward migration of the stent following implantation of one 20×40 nitinol self-expandable stent (OptiMed); D) upward jumping of the stent following implantation of a second 22×40 nitinol self-expandable stent; E) deployment of the third 18×40 nitinol self-expandable stent overlapped with the previous stents; F) post-dilation angioplasty using a 15×30 pulmonary balloon; G) significant improvement in narrowing after implantation of the third stent.

stent implantation has been well described.¹⁰ After the stent had been properly positioned across the target site, the stent migrated from the coarctation area distally and stopped 2 mm beneath the coarctation site (Figure 1C). The second stent (22×40 mm) jumped up as soon as the outer sheath was withdrawn. The first and second stents were placed just above and below the stenotic segment without any complications for the aorta and left subclavian artery (Figure 1D). Next, we chose an 18×40 stent. It was overlapped with the previous stents and deployed accurately through the coarcted segment (Figure 1E). Balloon post-dilation was performed with a 15×30 pulmonary balloon (Figure 1F). The final gradient decreased to 2 mmHg and the diameter of the isthmus increased from 2 mm to 14 mm. A repeated aortogram then confirmed the correct device position without any complications (Figure 1G). No heparin or anticoagulation was given after completion of the procedure. Aspirin, 80 mg/day, was administered for 6 more months.

Follow up was performed at 1, 3 and 6 months after the procedure and was then continued at 6-month intervals. During follow up, the patient was free of complications and his symptoms ameliorated dramatically. Chest radiography showed the stents in their original position without any evidence of stent fracture. Transthoracic echocardiography showed no evidence of re-coarctation at 6, 18 and 30 months after the procedure. According to computerized tomographic angiography 30 months after stent implantation, the patient had no aneurysm formation or dissection (Figure 2).

Discussion

Stent implantation for the treatment of CoA remains a technically demanding procedure with a high incidence of complications. Stent dislodgment has been considered as one of the main complications during implantation of balloon-expandable stents.⁷⁻⁹



Figure 2. Computerized tomographic angiography 30 months after the procedure shows three overlapping stents in their original position, wide aortic lumen, and no aneurysm.

However, self-expandable stents have firm apposition with the aortic wall, even in cases with a dilated thoracic aorta either proximal or distal to the coarctation site. This results in a decrease in the chance of stent migration,⁹ whereas these stents may lead to stent jumping, particularly on their release through the coarcted segment.¹⁰ Although a self-expanding stent cannot be recaptured when it has been deployed and misplaced, we can use overlapped stents in the dislodgment situations.

After balloon predilation, some degree of elastic recoil of the coarcted segment is common. In our patient, the elasticity of the aortic wall was great and in addition the deployed self-expandable stent did not have anti-jumping markers. It seems that if we encounter great elastic recoil of the coarcted segment after balloon deflation, balloon-expandable stents are a more appropriate choice. In this situation, based on our experience, if we want to use self-expandable stents, the risk of dislodgment can be reduced by se-

lecting a significantly longer stent that has anti-jumping markers.¹⁰

Even though we were able to treat CoA using three overlapping stents, concerns existed about the increased risks of aortic wall stiffness leading to residual hypertension, acute dissection, late aneurysm formation and stent thrombosis (acute, subacute or chronic) due to the great amount of metal used. None of these complications occurred during long-term follow up. Nevertheless, we continue to follow the patient closely.

In conclusion, it seems that it would be better to use balloon-expandable or longer self-expandable stents, including anti-jumping markers, when we encounter great elastic recoil of the coarcted segment after balloon predilation. If necessary, implantation of multiple overlapping self-expandable stents in patients with native CoA is safe and possible.

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