



Percutaneous Treatment for Aneurysmal Coarctation of the Aorta with Covered Stenting: A Case Report

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Abstract

The coarctation of the aorta (CoA) is rare in adulthood. Diagnosis is made by clinical suspicion and physical findings such as blood pressure difference between the upper and lower extremities, pulse delay in the femoral artery, and systolic murmur over the thoracic spine. The CoA in adulthood and in patients with associated aneurysm is challenging and different complications even with proper treatment can occur. Covered stents are indicated in concomitant aneurysm, older age, and tight coarctation.

A 26-year-old male with resistant hypertension due to a CoA diagnosed by computed tomography angiography referred to our center for an attempted stent implantation. Cardiac catheterization and aortography revealed a long CoA after the origin of the left subclavian artery with a 60 mmHg gradient. Moreover, there was a large aneurysm in the site of the coarctation. Under general anesthesia and fluoroscopic guidance, two balloon-expandable covered Cheatham-Platinum stents (size 18 in 44 millimeters and size 18 in 50 millimeters) were successfully implanted across the CoA with no residual gradient. On 2 years' follow-up, the patient had no symptoms except for mild hypertension. In this patient, the use of a covered stent within the aneurysm was safe and effective.

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Introduction

The incidence of the coarctation of the aorta (CoA) in children with congenital heart disease is 5 to 8%. Most frequently, it is associated with a bicuspid aortic valve, different levels of aortic stenosis, and congenital mitral valve stenosis. The significant after-load increase affects the left ventricle (LV) in the CoA, resulting in increased wall stress, compensatory LV hypertrophy, and finally LV dysfunction. Moreover, arterial collaterals develop mostly in intercostals

arteries. Patients may occasionally complain of exertional headaches, leg fatigue, or claudication. Symptoms are mostly related to systemic hypertension and LV hypertrophy. Life expectancy will be reduced in patients without correction due to accelerated coronary artery disease, stroke, and congestive heart failure.¹

In adult life, some cases of the CoA have been treated during childhood, some others are re-coarctations following previous transcatheter or surgical therapy, and others are missed cases of native coarctations. Diagnosis is made

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by clinical suspicion and physical findings such as blood pressure difference between the upper and lower extremities, pulse delay in the femoral artery, and systolic murmur over the thoracic spine. Different methods are employed for the treatment of the CoA in adults, including surgical or percutaneous balloon angioplasty with or without stent placement. Today, transcatheter approaches have been increasingly utilized, because of improved balloon and stent technology, which confers improved safety and success of these procedures.

Case Report

A 26-year-old male with a severe CoA diagnosed by computed tomography angiography referred to our center for an attempted stent implantation. He had a history of resistant hypertension. Cardiac catheterization and aortography revealed a long CoA after the origin of the left subclavian artery with a 60 mmHg gradient. Moreover, there was a large aneurysm in the site of the coarctation (Figure 1). Under general anesthesia and fluoroscopic guidance, two balloon-expandable covered Cheatham-Platinum (CP) stents (size 18 in 44 millimeters and size 18 in 50 millimeters) were successfully implanted across the CoA. A post-procedural aortography showed an excellent result, and the gradient had decreased to 8 mmHg. On follow-up multi-slice computed tomography, performed before discharge and 4 weeks after the procedure, there were no complications (Figure 2). The patient has no symptom on 2 years' follow-up.

Discussion

The CoA in adulthood is challenging and different

complications even with proper treatment can occur. In these patients, associated aneurysm, near-atretic aortic isthmus, and recurrent pathology need special attention. In complex cases, surgical procedures may not be as effective as those for simple childhood coarctations. Furthermore, controlling the hemostasis of large intercostal arteries is important, especially when an aneurysm is present.² Percutaneous techniques are promising, and their limitations are vessel dissection or aneurysm formation at the time of stent deployment and risk of restenosis. These limitations were relatively overcome with the use of covered CP stents. With the introduction of CP stents, balloon angioplasty has been mostly replaced by stenting. Also, bare metal stents are less popular due to the risk of stent fracture and aneurysm formation.³ CP stents have rounded edges with safer placement and less injury to the native vessels, reducing risk of dissection. Covered stents are indicated in concomitant aneurysm, older age, and tight coarctation and their use even in simple cases is increasing.⁴ However, a potential concern in using covered stents is related to distal embolization of the stent. With a bare stent, the problem is easier to address because the stent can be dilated without occluding any side branch in the abdominal or thoracic aorta, whereas with covered stents, important arteries may be closed by the polytetrafluoroethylene (ePTFE) coverage. Thus, implantation needs to be performed very carefully with enough expertise. Another issue is the need for a larger diameter sheath compared to a similar-sized bare stent. Nonetheless, there are no reports of access-related complications in the previous studies. In the case presented herein, the use of a covered stent within the aneurysm was safe and effective. Recent reports of patients treated with stents have demonstrated significantly lower acute complications compared to surgery and balloon angioplasty methods and better hemodynamic and imaging outcome

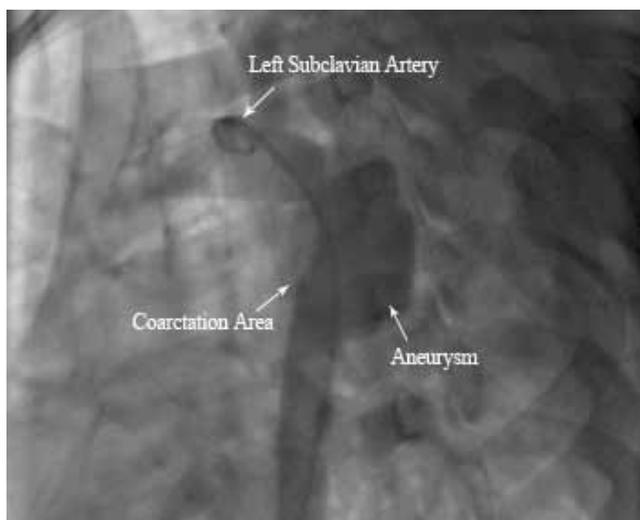


Figure 1. Aortography, showing a long coarctation after the left subclavian artery origin with a large aneurysm

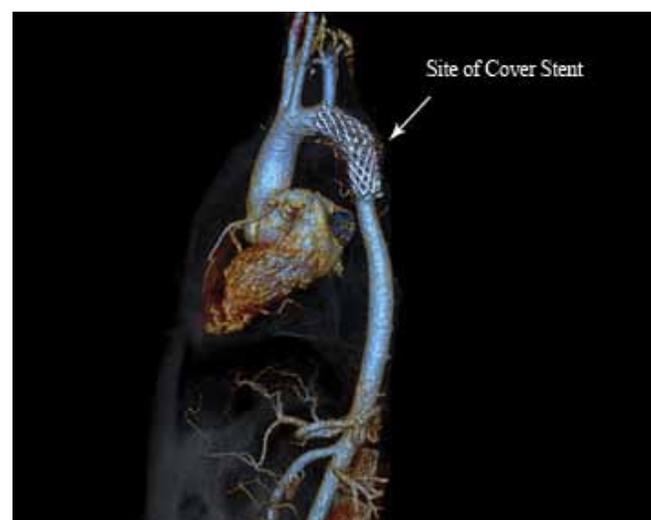


Figure 2. Multi-slice computed tomography after the procedure, illustrating the successful deployment of the stents and no residual aneurysm or coarctation

on intermediate follow-up, although there has been more planned reintervention required.³

Conclusion

The CoA in adulthood and in patients with associated aneurysm is challenging, and different complications even with proper treatment can occur. Covered stents are indicated in concomitant aneurysm, older age, and tight coarctation. In this case, the use of a covered stent within the aneurysm proved safe and effective.

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