A 37-year-old Asian American man presented with severe stable angina of recent onset over a period of 3 weeks. He was an active policeman, whose only significant past medical history was a prolonged febrile illness with a rash at age 5. Exercise myocardial perfusion stress test was strongly positive with ST depression in inferolateral leads and large reversible perfusion defects in the inferior, inferolateral, and lateral walls of the left ventricle. Cardiac catheterization revealed a large fusiform aneurysm of the proximal left anterior descending (LAD) artery, ectasia of the proximal circumflex artery with 95% narrowing, and an occluded right coronary artery with an occluded proximal aneurysm. (Figure 1).

Coronary CT angiogram showed 3-dimensional extent of the aneurysms, stenoses, and, in particular, the LAD aneurysm’s relation to the main pulmonary artery. The LAD aneurysm measured 11.7×17.7×24.2 mm, with a 2.5-mm diagonal artery arising from the side wall. (Figure 2).

Percutaneous intervention of the circumflex artery was performed with a 3.0×23-mm MultiLink Vision stent (Abbot Vascular), which was post-dilated progressively with non-compliant balloons. The patient was treated with aspirin and clopidogrel.

Subsequently, stent-assisted coil embolization of the aneurysm was performed.

Informed consent was obtained after careful discussion with the patient, regarding indications, potential benefits, and alternatives.

Intravenous heparin was used to keep the activated clotting time >300 seconds during the entire procedure. Initially, the LAD was wired with a 0.014-inch Cougar wire (Medtronic). A Progreat microcatheter (Terumo Corp) was placed inside the aneurysm. A 3×33-mm Zeta Multilink (Abbot Vascular) was then placed in the LAD at low pressure, entrapping the microcatheter. An Azuro coil (Terumo Corp), measuring 2×50 cm was subsequently deployed, wrapping around the stent. (Figure 3) The microcatheter was then removed, and post-dilation of the stent, especially inside the mother vessel, both proximally and distally, were performed. Intraprocedural intravascular ultrasound and Chromaflow® (Volcano Corp) was used to systematically evaluate the extent of the aneurysm, stent apposition, coil deployment, and blood flow dynamics inside the aneurysm, within and without the stent struts.

An immediate post-coil embolization angiogram showed preservation of flow, not only in the LAD but also in the diagonal branch. Intravascular ultrasound and the Chromaflow imaging of the aneurysm showed reduced flow and
reduction in the size of the aneurysm; however, there was residual significant flow outside the struts. (Figure 4).

Therefore, coronary angiogram and intravascular ultrasound were performed the next day, with a view to performing further coil embolization through the stent struts if needed. The stent was widely patent and well-apposed at the proximal and distal landing zones in the parent LAD. The diagonal branch had become smaller in size. In addition, the flow in the aneurysm had been nearly obliterated, and blood flow was seen predominantly inside the stent. (Figure 5).

No further attempt at coil embolization was performed. The patient became angina-free following the procedure and successfully completed stage 4 of the Bruce protocol exercise stress test 6 weeks after the procedure.

We describe a case of a large fusiform aneurysm of the LAD and ectasia of the proximal circumflex with severe
stenosis. Aneurysm of the LAD was treated with a novel technique of stent-assisted coil embolization.

The risks of coronary artery aneurysm include spontaneous rupture, thrombosis, fistula formation, and myocardial ischemia. Multiple surgical techniques have been described to treat these aneurysms. These techniques include proximal and distal ligation of the aneurysm, with coronary artery bypass grafting, aneurysm resection with direct end-to-end anastomosis, and reverse saphenous interposition grafting.1

Stent-assisted coil embolization has been reported in fusiform cerebral artery aneurysms with a wide neck.2,3 A recent report extended this treatment to an eccentric saccular coronary aneurysm with a small neck4; however, percutaneous treatment for a large fusiform coronary aneurysm (24 mm) with a very wide neck (fundus to neck ratio of <0.5) has not been reported. As the aneurysm was located directly behind the main pulmonary artery trunk, open surgical treatment for the aneurysm would have been more extensive, involving division of the pulmonary artery. Therefore, we attempted stent-assisted coil embolization in this particular case.

To the best of our knowledge, this is the first case in which a large fusiform aneurysm of a proximal coronary artery was successfully treated with stent-assisted coil embolization and the flow dynamics assessed systematically.

Although the etiology and pathophysiology in this particular case remain undetermined, we assume that the aneurysms were sequelae of Kawasaki disease in the patient. Even though the long-term outcome of stent-assisted coil embolization of a large proximal coronary aneurysm is unknown, immediate post-procedural success of obliterating the aneurysm, while keeping the large parent LAD is evident. Whether this novel strategy becomes the niche first-line treatment for coronary aneurysms remains to be seen.

Disclosures

None.

References

Stent-Assisted Coil Embolization of a Large Fusiform Aneurysm of Proximal Anterior Descending Artery: Novel Treatment for Coronary Aneurysms
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