Giant Coronary Artery Aneurysm
Imaging Findings Before and After Treatment With a Polytetrafluoroethylene-Covered Stent

Parham Eshtehardi, MD; Stéphane Cook, MD; Igal Moarof, MD; Hans-Jürgen Triller, MD; Stephan Windecker, MD

Coronary artery aneurysm (CAA), defined as dilatation of the coronary artery exceeding 50% of the reference vessel diameter, is uncommon and occurs in <5% of coronary angiographic series.1 CAAAs are termed giant if their diameter exceeds the reference vessel diameter by >4 times or if they are >8 mm in diameter.2 Atherosclerosis accounts for the vast majority of CAAs in adults, whereas Kawasaki disease is responsible for most cases in children.1,2 Up to one third of CAAs are associated with obstructive coronary artery disease and have been associated with myocardial infarction, arrhythmias, or sudden cardiac death.3

A 63-year-old man with typical chest pain and a positive treadmill exercise test was referred for diagnostic coronary angiography. Six years before this hospitalization, the patient had suffered from a subdural hematoma, undergone surgical ligation of a large aneurysm of the left middle cerebral artery in the presence of 2 smaller aneurysms of the right pericallosal artery and internal carotid artery. Oral anticoagulation was initiated after surgery and has been maintained since then. Cardiovascular risk factors consisted of arterial hypertension, diabetes mellitus, dyslipidemia, obesity, a family history for coronary artery disease, and smoking. Coronary angiography showed a focal stenosis of the mid segment of the left anterior descending artery (LAD), followed by a giant coronary aneurysm measuring 16×22 mm (Figure 1A). To alleviate the significant stenosis of the mid-LAD and exclude the giant CAA, percutaneous coronary intervention was planned. Intravascular ultrasound (IVUS) (Atlantis SR 40MHz, iLab, Boston Scientific Inc, Boston, Mass) images were acquired before percutaneous coronary intervention to estimate vessel size and length of the base of the aneurysm (Figure 1B). After IVUS, the proximal stenosis was treated with a 3.0/20-mm balloon (Maverick 2, Boston Scientific Inc) inflated to 10 bars for 12 seconds. Thereafter, the aneurysm was excluded from the native coronary artery by placement of a 3.5/26-mm polytetrafluoroethylene (PTFE)–covered stent (Graft...
which was inflated at 10 bars for 51 seconds. Stent placement was optimized by high-pressure postdilatation with a noncompliant balloon (inflated at 18 bars for 15 seconds). Both the final angiogram and IVUS demonstrated elimination of the stenosis and exclusion of the aneurysm (Figure 1C and 1D). The patient was discharged home on dual-antiplatelet therapy with 100 mg aspirin per day lifelong and 75 mg clopidogrel per day for 6 months.

Seven months after the intervention, the patient had no recurrence of clinical symptoms. Follow-up coronary angiography (Figure 2A) and IVUS (Figure 2B) showed mild restenosis in the proximal portion of the stent, with complete exclusion of the CAA. Cardiac computed tomography confirmed these findings and demonstrated complete sealing of the aneurysm, with evidence of an organized thrombus and involution (Figure 2C and 2D) of the aneurysm.

The optimal imaging and management of giant CAA remain controversial and are based largely on case reports and anecdotal experience. Coronary angiography has some limitations, including the inability to differentiate true aneurysms from pseudoaneurysms or complex plaques. IVUS provides detailed, high-quality images and is a valuable tool to distinguish CAA from coronary artery ectasia, as well as true aneurysms from pseudoaneurysms. Moreover, it is helpful in choosing appropriate stent dimensions for a therapeutic intervention and in ensuring full stent expansion after deployment. Cardiac computed tomography enables the further delineation of the topographical anatomy of CAA and appears particularly useful during follow-up imaging after CAA exclusion with PTFE-covered stents, as illustrated in the present case.

Exclusion of CAA has been advocated in patients with objective evidence of ischemia and in those whose aneurysms show a significant change in dimension over time. Untreated CAA may be complicated by ischemia, myocardial infarction, distal embolization due to thrombus formation within the aneurysm, calcification, fistula formation, and spontaneous rupture. PTFE-covered stents were introduced into clinical practice in the late 1990s and are characterized by their ease of use and high degree of effectiveness. They are used commonly for treatment of iatrogenic coronary perforations and less frequently for the treatment of CAA. Stent thrombosis has been reported after PTFE-covered stent implantation and has been related to delayed reendothelialization. The devices may also stimulate neointimal hyperplasia and, therefore, predispose to restenosis, for which reason follow-up imaging is advisable. Apart from surgical treatment of the aneurysm and medical management, other devices have been investigated for percutaneous exclusion of CAA, including coils and stents covered with saphenous vein graft material.

**Disclosures**

None.

**References**

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