CLINICAL VIGNETTE

Coronary Artery Aneurysm: Discussion and Management Strategies

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Coronary artery aneurysms (CAA) are rare and usually silent disorders that are incidentally detected during coronary angiography or computed tomography (CT) angiography.[1] We present an anomalous left circumflex aneurysm.

Case

A 79-year-old male was initially admitted to hospital with worsening dyspnea on exertion and severe lower extremity edema five years ago. Evaluations showed atrial fibrillation with rapid ventricular response on electrocardiography and severely reduced left ventricular systolic function with ejection fraction of 20% on echocardiography. Patient was started on guidelines directed medical therapy and underwent coronary angiography to rule out obstructive coronary artery disease. Angiogram showed common origin of the left circumflex (LCx) and right coronary arteries originating from right coronary sinus with a saccular aneurysm measuring 9.5 mm in diameter in the proximal portion of the LCx (Figure 1). His LV systolic function normalized on appropriate medical therapy.

He had follow-up Coronary CT angiography in two of five years with stable size and appearance of the aneurysm (Figure 2) and has remained without any symptoms that can be attributed to the aneurysm and he continued conservative management with watchful waiting and aggressive risk factor modification.

Discussion

Coronary artery aneurysms are noted in about 5% of the patients undergoing coronary angiography. They are defined as a focal dilation of coronary segments of at least 1.5 times the adjacent normal segment.[2] CAAs are divided into saccular aneurysms if the transverse diameter exceeds the longitudinal diameter, and fusiform aneurysms in the opposite case. The right coronary artery is most commonly affected artery (40%) followed by the left anterior descending (32%), and the left main the least affected (3.5%). Atherosclerotic and vasculitic CAAs usually affect more than one artery, whereas congenital and iatrogenic CAAs are typically confined to a single vessel.[2,3]

Most CAAs are asymptomatic, detected incidentally during coronary angiography or CT angiography. However, clinical symptoms can develop for the following reasons:

1) Presence of concomitant obstructive atherosclerotic disease can result in both exertional angina or acute coronary syndrome which can be due to thrombosis in the aneurysmal segment leading to distal embolization and MI.

2) Compression of nearby structures due to massive enlargement of some CAAs.

3) Aneurysm rupture and subsequent acute cardiac tamponade is the least common presentation.[4,5]

Coronary angiography is most commonly used, but to better assess vessels and differentiate true aneurysms from pseudoaneurysms intravascular ultrasound (IVUS) has been modality of choice in cardiovascular laboratories. IVUS can accurately size the CAA and allow for appropriate interventional strategies such as proper stent sizing. Recently, Coronary CT angiography use has increased in assessing CAAs especially in giant CAA and those involving vein grafts, because it allows more accurate evaluation of the aneurysm size, degree of thrombus and calcification than invasive angiography.[6]

Management of patients with CAA remains controversial and challenging because of the absence of randomized trials or large-scale data. Most patients remain asymptomatic but for symptomatic patients presenting with angina or acute MI with aneurysmal culprit, both percutaneous and surgical revascularization are challenging.

Medical therapy has remained the cornerstone strategy with aggressive risk factor modification for atherosclerosis, implicated in the pathogenesis of CAA. High-intensity statin therapy or other lipid-lowering agents, aggressive blood pressure control and smoking cessation should be implemented in all patients with CAA.

Controversies are ongoing regarding the use of antiplatelet therapy or oral anticoagulation but recent small case-series have shown a significantly higher rate of adverse outcomes including death and myocardial infarction in patients with coronary aneurysms or ectasia. Use of oral anticoagulation has substantially decreased risk during intermediate-term follow-up.[7]

Newer immunomodulator therapies using intravenous immunoglobulins have shown promising results specifically in patients with vasculitic CAA such as Kawasaki disease.

Percutaneous coronary intervention (PCI) in patients with CAA has been challenging with higher rate of procedural complications. Also, patients who underwent PCI in the setting of an acute coronary syndrome had higher subsequent adverse cardiovascular outcomes.[2,8]

Several interventional strategies have been used in managing these patients: balloon angioplasty with or without stenting, placement of covered stents, coil embolization or surgical excision. Clinical presentation, anatomical location, shape of the aneurysm and technical considerations impact decision making with these challenging cases.

Patients with acute coronary syndrome due to a thrombosed CAA, with high thrombus burden poses additional risk and results in lower procedural success. The main goal is restoring flow to coronary bed. In these cases, thrombectomy devices have been used with variable success favoring the use of mechanical devices including rheolytic thrombectomy.

As a general rule, large CAAs (>20 mm) or CAAs involving left main artery surgical excision is considered first-line therapy. Large CAA involving SVGs or causing external compression can be treated with coil embolization. For CAAs of major side branches involve concomitant use of stents and coils.[2,8,9]

In asymptomatic patients with CAA, require caution when deciding whether or not to intervene.

The optimal treatment approach for patients with CAA is still unclear and future studies to understand the underlying etiology and identify the ideal medical regimen and interventional methods should be undertaken.

Figures

Figure 1. Coronary angiography illustrating anomalous LCx with saccular aneurysm involving the proximal the portion.

Figure 2. Subsequent CT coronary angiography illustrating stable size and appearance of Lcx aneurysm.

REFERENCES

1. **Swaye PS, Fisher LD, Litwin P, Vignola PA, Judkins MP, Kemp HG, Mudd JG, Gosselin AJ**. Aneurysmal coronary artery disease. *Circulation*. 1983 Jan;67(1):134-8. doi: 10.1161/01.cir.67.1.134. PMID: 6847792.
2. **Kawsara A, Núñez Gil IJ, Alqahtani F, Moreland J, Rihal CS, Alkhouli M**. Management of Coronary Artery Aneurysms. *JACC Cardiovasc Interv*. 2018 Jul 9;11(13):1211-1223. doi: 10.1016/j.jcin.2018.02.041. PMID: 29976357.
3. **Packard M, Wechsler H**. Aneurysms of coronary arteries. *Arch Intern Med.* 1929;43:1
4. **Ramirez FD, Hibbert B, Simard T, Pourdjabbar A, Wilson KR, Hibbert R, Kazmi M, Hawken S, Ruel M, Labinaz M, O'Brien ER**. Natural history and management of aortocoronary saphenous vein graft aneurysms: a systematic review of published cases. *Circulation*. 2012 Oct 30;126(18):2248-56. doi: 10.1161/CIRCULATIONAHA.112.101592. PMID: 23109515.
5. **Chrissoheris MP, Donohue TJ, Young RS, Ghantous A**. Coronary artery aneurysms. *Cardiol Rev*. 2008 May-Jun;16(3):116-23. doi: 10.1097/CRD.0b013e31815d0573. PMID: 18414182.
6. **Manginas A, Cokkinos DV**. Coronary artery ectasias: imaging, functional assessment and clinical implications. *Eur Heart J*. 2006 May;27(9):1026-31. doi: 10.1093/eurheartj/ehi725. Epub 2006 Jan 16. PMID: 16415301.
7. **Doi T, Kataoka Y, Noguchi T, Shibata T, Nakashima T, Kawakami S, Nakao K, Fujino M, Nagai T, Kanaya T, Tahara Y, Asaumi Y, Tsuda E, Nakai M, Nishimura K, Anzai T, Kusano K, Shimokawa H, Goto Y, Yasuda S**. Coronary Artery Ectasia Predicts Future Cardiac Events in Patients With Acute Myocardial Infarction. *Arterioscler Thromb Vasc Biol*. 2017 Dec;37(12):2350-2355. doi: 10.1161/ATVBAHA.117.309683. Epub 2017 Oct 19. PMID: 29051141.
8. **Bogana Shanmugam V, Psaltis PJ, T L Wong D, T Meredith I, Malaiapan Y, Ahmar W**. Outcomes After

Primary Percutaneous Coronary Intervention for ST-Elevation Myocardial Infarction Caused by Ectatic Infarct Related Arteries. *Heart Lung Circ*. 2017 Oct;26(10):1059-1068. doi: 10.1016/j.hlc.2016.12.006. Epub 2017 Feb 7. PMID: 28216061.

9. **Yip HK, Chen MC, Wu CJ, Hang CL, Hsieh KY, Fang CY, Yeh KH, Fu M**. Clinical features and outcome of coronary artery aneurysm in patients with acute myocardial infarction undergoing a primary percutaneous coronary intervention. *Cardiology*. 2002;98(3):132-40. doi: 10.1159/000066322. PMID: 12417812.