

Case Report

Fate of an Aneurysmal Left Main Chronic Total Occlusion

Arash Hashemi¹, MD; Ashkan Hashemi², MD; Arsis Ahmadye¹, MD;
Lida Ghafari³, MD; Ehsan Khalilpur^{4*}, MD

ABSTRACT

A 45-year-old woman presented to our cardiology clinic because of recent exertional chest discomfort. The patient had a history of the surgical repair of a secundum-type atrial septal defect in adolescence and the surgical repair of aortic regurgitation, followed by an emergent coronary artery bypass grafting operation due to electrocardiographic changes after aortic valve repair. Primarily, we evaluated the patient's coronary tree with computed tomography angiography, which showed occluded grafts. Subsequently, coronary angiography revealed a chronic total occlusion in the left main with an aneurysmal formation and occluded grafts. Unfortunately, the surgical team refused to perform surgery. Accordingly, given her multiple prior surgeries, a percutaneous intervention was our last resort. We performed successful revascularization on the left main via the retrograde approach. Nonetheless, a year later, the patient needed another percutaneous intervention due to the progression of the left main aneurysm. The last follow-up demonstrated the patient's acceptable clinical condition and physical activity without remarkable limitations. (*Iranian Heart Journal 2023; 24(1): 86-90*)

KEYWORDS: Chronic total occlusion, Saphenous vein graft, Aneurysm

¹ Interventional Cardiologist, Erfan General Hospital, Tehran, IR Iran.

² Rutgers University, Rutgers NJMS, United States.

³ Nikan General Hospital, Tehran, IR Iran.

⁴ Cardiovascular Intervention Department, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, IR Iran.

* **Corresponding Author:** Ehsan Khalilpur, MD; Cardiovascular Intervention Department, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, IR Iran.

Email: ehsankhalilpur@gmail.com

Tel: +980125055884

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Case Presentation

A 45-year-old woman visited our cardiology clinic due to recent exertional chest discomfort. The patient had undergone a secundum-type atrial septal defect surgical repair at 15 because the defect was not amenable to percutaneous repair. She went on to develop primary aortic valve regurgitation at 30, necessitating surgical repair. When she was transferred to the recovery room, the nursing staff noticed

a diffuse ST-segment elevation, and the surgical team's reevaluation proved left main damage. Consequently, the patient underwent another surgical operation, whereby a saphenous vein graft (SVG) was placed on the left anterior descending artery (LAD) and the obtuse marginal (OM) artery. That was not the end of this surgical story, however. Two days later, she suffered intrathoracic bleeding, for which she was retransferred to the operating room. Ten years later, she gradually developed

exertional chest pain, and angiography showed an occluded SVG on the OM. Stenting was performed successfully with a drug-eluting stent (DES).

Two years prior to the writing of this case report, the patient, despite 2 antianginal therapies, visited our cardiology clinic due to chest pain at a low exertion. Computed tomography (CT) angiography revealed total occlusion in the left main stem, an occluded SVG on the LAD, and an aneurysmal formation in the proximal part of the left main (5 mm). Additionally, the stented SVG on the OM also had significant in-stent restenosis, while the right coronary artery was free of any severe stenosis. Transthoracic echocardiography showed preserved left ventricular systolic function (left ventricular ejection fraction =50%), a bicuspid aortic valve with calcified commissures, moderate aortic stenosis (the mean gradient =15 mm Hg), highly eccentric aortic regurgitation, and mild mitral regurgitation. Further evaluation via coronary angiography proved the CT angiography findings, depicting the retrograde filling of the left main system by the right coronary artery (Fig. 1). To consult with the surgical team and inform the patient, we decided to consider all the obstacles. The heart-team approach declined the sixth surgery, leaving us with the percutaneous pathway as the last resort. We were faced with a left main chronic total occlusion, retrogradely filled by the right

coronary artery and the SVG on the OM, which was the only feasible approach. We primarily performed balloon angioplasty on the SVG on the OM and wired this route. Using multiple wires and microcatheters, we finally passed the wire through the distal part of the left main into the ascending aorta and with great difficulty succeeded in snaring it (Fig. 2). Afterward, we utilized balloon escalation to open the occluded left main. A very high-pressure non-compliant balloon accomplished the seemingly impossible mission. We then stented the left main with a DES and used a high-pressure postdilation balloon.

The 1-year follow-up delineated patency of the left main stent, total occlusion of the SVG on the OM, and progression of the left main pseudoaneurysm (15 mm). The rapid progression of the pseudoaneurysm forced us to opt for percutaneous management. With the patient on the angiography table again, we managed to engage the guiding catheter into the left main and wire it. Because the wire passed through the left main struts, the balloons went through the struts. Additionally, there was a stent fracture, so our only choice was to use a covered stent in the left main in order to cover the entry site of the pseudoaneurysm (Fig. 3). The last follow-up the patient in our clinic showed acceptable functional capacity without any complaints.

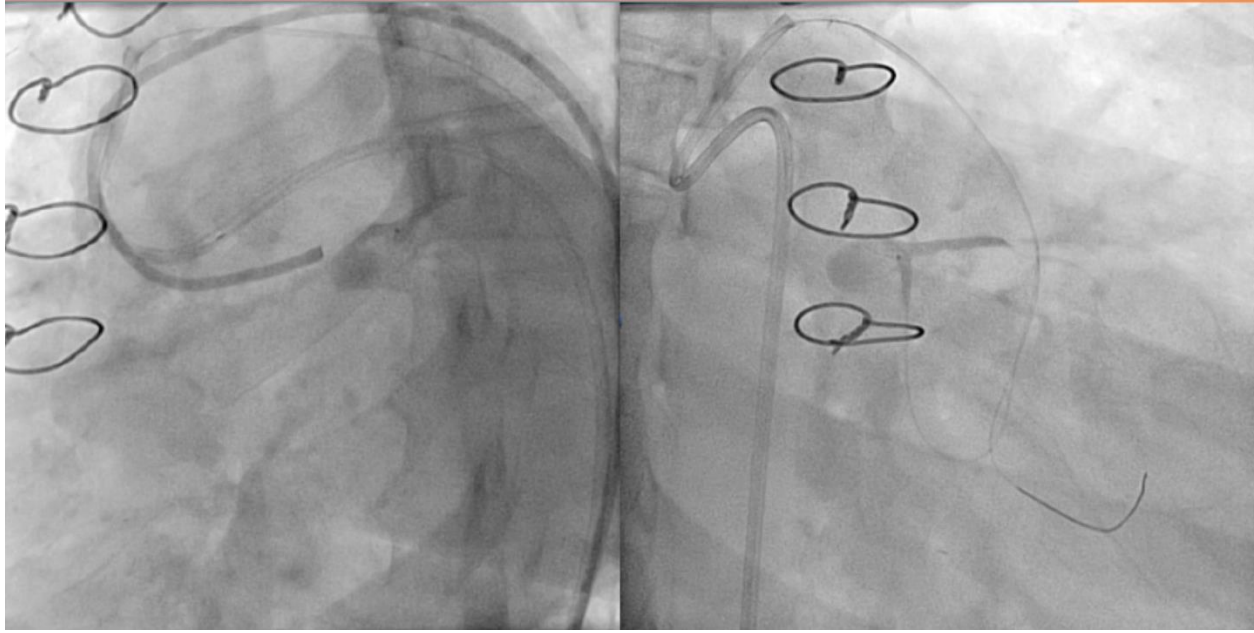


Figure 1: The image shows the left main chronic total occlusion and its retrograde filling.

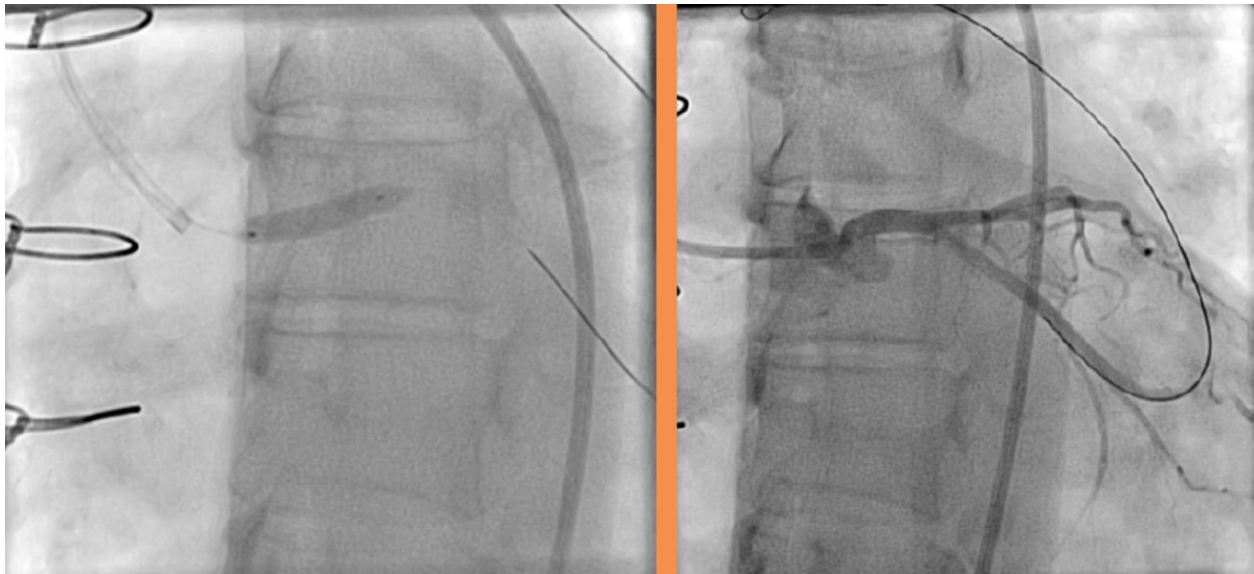


Figure 2: The image shows the left main aneurysm and stent deployment.



Figure 3: The image shows the covered stent in the left main.

DISCUSSION

Left main trunk pseudoaneurysms constitute a rare complication of inflammatory processes such as Behçet disease, Takayasu arteritis, and spontaneous coronary artery dissection.^{1,2} Moreover, iatrogenic left main pseudoaneurysms have been reported. Pseudoaneurysms due to coronary artery bypass grafting or previous surgical repair of the aortic valve are extremely rare, with most iatrogenic pseudoaneurysms occurring after percutaneous interventions.³⁻⁵ We believe that our patient's pseudoaneurysm was the result of her previous surgeries, leading to the left main occlusion and pseudoaneurysm due to intima damage. Previous case reports have shown that diagnostic modalities, such as coronary artery CT angiography, cardiac magnetic resonance imaging, and intravascular ultrasonography, are of great value in that they assist in the clinical follow-up of

patients.⁶ With the development of newer generations of technical interventional devices, we might encounter similar reports.⁷

Our literature review yielded no consensus concerning the management of coronary artery pseudoaneurysms, with both surgical and interventional approaches having been applied.^{8,4} What is the mainstay of these patients' therapeutic approach is the original trigger of the pseudoaneurysm.⁹ In our case, because of the patient's prior multiple surgeries, the heart-team approach chose percutaneous management. We used a covered stent to seal the entry site of this large pseudoaneurysm in spite of 1 DES layer in the left main trunk, which is the best option in these large pseudoaneurysms. The 1-year follow-up of the patient showed no clinical complaints, and we presume that there is no hemodynamic issue in her coronary artery vasculature.

REFERENCES

1. Wu EB, Chan WW, Yu CM. Left main stem rupture caused by methicillin resistant *Staphylococcus aureus* infection of left main stent treated by covered stenting. *Int J Cardiol* 2009.
2. Aqel RA, Zoghbi GJ, Iskandrian A. Spontaneous coronary artery dissection, aneurysms, and pseudoaneurysms: A review. *Echocardiography* 2004; 21:175–182.
3. Atik FA, Navia JL, Vega PR, Gonzalez-Stawinski GV, Alster JM, Gillinov AM, Svensson LG, Pettersson BG, Lytle BW, Blackstone EH. Surgical treatment of postinfarction left ventricular pseudoaneurysm. *The Annals of thoracic surgery*. 2007 Feb 1; 83(2):526-31.
4. Dhakam S, Ahmeed H, Jafarani A. Percutaneous coronary intervention of left main pseudoaneurysm with customized covered stents. *Catheterization and Cardiovascular Interventions*. 2011 Jun 1; 77(7):1033-5.
5. Mishra A, Sirasena T, Slaughter R, Pohlner P, Walters DL. Percutaneous treatment of an occlusive left main pseudoaneurysm: a role for multimodality imaging. *Cardiovascular Revascularization Medicine*. 2011 Mar 1; 12(2):133-e7.
6. Rahman S, Abdul-Waheed M, Helmy T, Huffman LC, Koshal V, Guitron J, Merrill WH, Lewis DF, Dunlap S, Shizukuda Y, Weintraub NL, Meyer C, Cilingiroglu M. Spontaneous left main coronary artery dissection complicated by pseudoaneurysm formation in pregnancy: role of CT coronary angiography. *J Cardiothorac Surg* 2009;4:15.
7. Tapias LF, Campbell J, Rosenfield K, D'Alessandro DA. Pseudoaneurysm of the left main coronary artery: A complication of orbital atherectomy. *Catheterization and Cardiovascular Interventions*. 2018 Sep 1; 92(3):507-10.
8. Spiliotopoulos K, Yanagawa B, Crean A, Overgaard C, Brister SJ. Surgical management of a left anterior descending pseudoaneurysm related to Behcet's disease. *The Annals of thoracic surgery*. 2011 Mar 1; 91(3):912-4.
9. Pande AK, Kasliwal RR, Trehan N. Spontaneous primary coronary artery dissection leading to pseudoaneurysm. *Int J Cardiol* 1993; 42:97–99.
10. von Birgelen C, Haude M, Liu F, Ge J, Gorge G, Welge D, Wieneke H, Baumgart D, Opherck D, Erbel R. [Treatment of coronary pseudoaneurysm by stent-graft implantation]. *Dtsch Med Wochenschr* 1998; 123:418–422.