Case Report

A Case Report of a Coronary Artery Aneurysm as a Rare Complication of Percutaneous Coronary Intervention

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ABSTRACT

A 60-year-old man presented with typical chest pain of the New York Heart Association function class III. The patient mentioned a history of stroke, hypertension, hyperlipidemia, and gastrointestinal bleeding. Angiography revealed a total cut in the mid-portion of the left anterior descending (LAD), a total cut in the ostial portion of the second branch of the diagonal branch of the left circumflex artery (LC_X) as well as significant segmental stenosis in the mid-portion of the LC_X, and also a significant lesion in the mid-portion of the right coronary artery (RCA). He was scheduled for a multivessel percutaneous coronary intervention (PCI).

The LAD was wired with a 0.014-PILOT 150 guidewire, and 2 drug-eluting stents were deployed in the LAD. Six weeks later, the patient experienced chest pain again, despite receiving full medical treatment. The next angiography showed an unexpected pseudoaneurysm, in the mid-portion of the LAD exactly at the site of the stenting performed in the previous PCI. We considered coronary artery bypass grafting given the high possibility of thrombosis in the LAD and the presence of lesions in the RCA and the LC_x.

Conclusions

Coronary aneurysms, albeit rare after PCI, can be life-threatening complications. Early diagnosis can be lifesaving. Chest pain after any intervention should flag up complications, especially in the absence of response to medical treatment. Regular follow-ups are the key to the diagnosis of any complications in the golden time for treatment. *(Iranian Heart Journal 2020; 21(2): 84-89)*

KEYWORDS: Coronary artery bypass grafting, Percutaneous coronary intervention, Pseudoaneurysm

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 Received: April 13, 2019
 Accepted: June 17, 2019

espite improvements the in techniques and devices of percutaneous coronary intervention (PCI), the rate of unexpected postprocedural complications is on the rise. ¹ Coronary artery aneurysms are rare complications of PCI. In fact, the prevalence of the formation of pseudoaneurysms is higher than that of true aneurysms.²⁻⁵ A coronary artery aneurysm is an expansion of greater than 50% of the diameter of the vessel. ⁶ Patients treated with drug-eluting stents are at higher risks for aneurysm formation. Definite treatment is unclear yet. Whereas coronary artery aneurysms are resolved without any interventional treatment in some patients, others may develop serious conditions such as arrhythmias, coronary artery obstruction, and even sudden cardiac death.^{7,8}

In this article, we describe a patient with a coronary artery aneurysm as a post-elective PCI complication.

Association function class III. The patient mentioned a history of stroke, hypertension, hyperlipidemia, and gastrointestinal bleeding. Angiography illustrated a total cut in the mid-portion of the left anterior descending (LAD), a total cut in the ostial portion of the second branch of the diagonal branch of the left circumflex artery (LC_X) as well as significant segmental stenosis in the mid-portion of the LC_X, and also a significant lesion in the mid-portion of the right coronary artery (RCA). (Fig. 1).

The patient was scheduled for a multivessel PCI in another center. During the procedure, the LAD was wired with a 0.014-PILOT 150 guidewire and then pre-dilatation was done. Thereafter, stenting was performed at the proximal part of the LAD with a 3×33 mm XIENCE Xpedition. Because of residual significant stenosis in the mid-part, another stent (2.5×18 mm XIENCE Xpedition) was deployed in the same area (Fig. 2). He was discharged in good condition and the resolution of the symptoms.

Case Report

A 60-year-old man presented with typical chest pain of the New York Heart



 Figure 1a: Before PCI on the LAD (lateral view)
 Figure 1b: LAD wiring during PCI (right anterior oblique cranial view)

 PCI, Percutaneous coronary intervention; LAD, Left anterior descending



Figure 2: After PCI on the LAD (lateral and right anterior oblique cranial views)

PCI, Percutaneous coronary intervention; LAD, Left anterior descending

Nonetheless, 6 weeks later, the patient experienced chest pain of the New York Heart Association function class III, despite receiving full medical treatment. At this time, he was referred to our center. The patient was completely stable at the time of the second admission. He had a blood pressure of 135/80 mm Hg, a pulse rate of 75/min, a respiratory rate of 14/min, and temperature of 37 °C. On bigeminy premature ECG. ventricular contractions were seen. Further evaluations were done via a 24-hour Holter monitoring, which showed infrequent premature ventricular contractions (1.1%, with 819 On transthoracic contractions). echocardiography, the left ventricular ejection fraction was 40%, the apex was aneurysmal, and there was anteroseptal hypokinesia.

The angiographic procedure in our center revealed an unexpected pseudoaneurysm in the mid-portion of the LAD, at the site of the previous stenting and exactly in the mid-part of the stent (Fig. 3). Due to the high possibility of thrombosis in the LAD and the presence of lesions in the RCA and the LC_x , we considered coronary artery bypass grafting. Interestingly, the patient had chest pain at rest, despite receiving full anti-ischemic agents, which may have indicated the rapid expansion of the LAD pseudoaneurysm.

Surgically, the LAD was totally occluded by suturing at the site of the pseudoaneurysm (Fig. 4). Subsequently, 4 grafts were implanted: the left internal mammary artery to the LAD and 3 saphenous vein grafts to the first obtuse marginal artery, the first diagonal branch, and the posterior interventricular artery.

DISCUSSION

Coronary artery aneurysms are uncommon complications of PCI. Indeed, according to previous studies, such aneurysms occur in 0.3% to 6% of post-PCI patients.^{2-4, 9} Pseudoaneurysms are more common than true aneurysms.²⁻⁵

An aneurysm is considered a giant one if it is more than 8 mm in size or if it is more than 4 times the caliber of the normal vessel. ¹⁰ In the present case, there were 2 pseudoaneurysms, 6.05 mm and 5.3 mm in diameter, and they were not classified as giant ones.



Figure 3: Two pseudoaneurysms (5.45 and 4.81 mm in size in the angiographic view) at the site of the previous stenting in the LAD

The real diameter of the catheter was 2 mm. Mathematical calculations revealed that the real size of the aneurysms was 6.05 mm and 5.3mm.

LAD, Left anterior descending



Figure 4: LAD pseudoaneurysm from the surgeon's view LAD, Left anterior descending

A consensus has yet to emerge on what constitutes the definite treatment of aneurysms after PCI. What is clear, however, is that the resolution depends on the patient's condition and the specifications of the aneurysm. Infected, large, expanding, or chronic aneurysms that are symptomatic must be treated. ¹¹ In the absence of a definite

treatment, one of the 3 options of medical treatment, PCI, and surgery is usually considered. ¹² Surgery has several indications including severe coronary artery disease, the presence of fistulae, and a sudden increase in the diameter of the aneurysm. Surgery is still deemed the best option for treating any post-PCI aneurysm on the strength of its safety and reliability. ^{13,14} Our patient had triplevessel disease and a post-PCI aneurysm, which explains the reason behind our decision to perform surgery. The aneurysm was located in the mid-portion of the LAD. but this artery was patent. Consequently, during the surgical operation, the LAD was totally occluded so that the site of the pseudoaneurysm could be sutured. Next, 4 grafts were considered: the left internal mammary artery to the LAD and 3 saphenous vein grafts to the first obtuse marginal artery, the first diagonal branch, and the posterior interventricular artery. The final result was not only the resolution of the pseudoaneurysm but also the treatment of the underlying coronary artery disease. Postoperatively, all the patient's signs and symptoms were resolved; and on the follow-up, he was in good condition and completely asymptomatic.

CONCLUSIONS

Post-PCI coronary artery aneurysms, although infrequent, can be life-threatening. Early diagnosis is necessary and can be lifesaving. Chest pain may be a common symptom after any coronary intervention, but it can be indicative of a serious complication. As a result, in patients with following chest pain PCI, serious complications must be ruled out.

REFERENCES

 Anabtawi IN, de Leon JA: Arteriosclerotic aneurysms of the coronary arteries. J Thorac Cardiovasc Surg1974; 68:226 – 228.

- 2. Baumbach A, Bittl JA, Fleck E, et al. Acute complications of excimer laser coronary angioplasty: a detailed analysis of multicenter results. Coinvestigators of the U.S. and European Percutaneous Excimer Laser Coronary Angioplasty (PELCA) Registries. J Am Coll Cardiol 1994; 23:1305–13.
- Slota PA, Fischman DL, Savage MP, Rake R, Goldberg S. Frequency and outcome of development of coronary artery aneurysm after intracoronary stent placement and angioplasty. STRESS Trial Investigators. Am J Cardiol 1997;79:1104 – 6.
- 4. Condado JA, Waksman R, Gurdiel O, et al. Long-term angiographic and clinical outcome after percutaneous transluminal coronary angioplasty and intracoronary radiation therapy in humans. Circulation 1997;96:727–32.
- **5.** Popma JJ, Leon MB, Moses JW, et al. Quantitative assessment of angiographic restenosis after sirolimus-eluting stent implantation in native coronary arteries. Circulation 2004;110:3773–80.
- 6. Syed M, Lesch M. Coronary artery aneurysm: a review. Prog Cardiovasc Dis 1997;40:77–84.
- 7. Aoki J, Kirtane A, Leon MB, Dangas G. Coronary artery aneurysms after drugeluting stent implantation. J Am Coll Cardiol Intv 2008; 1:14–21.
- 8. IndolfiC, Achille F, Tagliamonte G, Spaccarotella C, Mongiardo A, Ferraro A. Polytetrafluoroethylene stent deployment for a left anterior descending coronary aneurysm complicated by late acute anterior myocardial infarction. Circulation 2005;112:e70–1.
- Bell MR, Garratt KN, Bresnahan JF, Edwards ED, Holmes DR Jr. Relation of deep arterial resection and coronary artery aneurysms after directional coronary atherectomy. J Am Coll Cardiol 1992;20:1474-81.
- **10.** Sugimura T, Kato H, Inoue O, Takagi J, Fukuda T, Sato N. Long-term consequences

of Kawasaki disease: a 10-to 21-year followup study of 594 patients. Circulation 1996;94:1379-85.

- **11.** Aoki J, Kirtane A, Leon M, Dangas G. Coronary artery aneurysms after Drug-Eluting stent implantation. JACC cardiovascular intervention 2008; 1: 14-21.
- 12. Singh S.K. Goyal T, Sethi R, Chandra Sh, Devenraj V, Rajput N.K, Kaushal D, Tewarson V, Gupta S, Kumar S. Surgical

treatment for coronary artery aneurysm: A single-centre experience 2013; 17: 632-637.

- **13.** Bradbury AW, Milne A, Murie JA. Surgical aspects of Behcet's disease. Br J Surg 1994;81:1712-21.
- 14. Yamaguchi H, Yamauchi H, Yamada T, Ariyoshi T, Surgical repair of coronary artery aneurysm after percutaneous coronary intervention. Jpn Circ J 2001;65:52-5.