

Native Coronary Artery Pseudoaneurysm after Coronary Artery Bypass Grafting

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ABSTRACT

Coronary artery pseudoaneurysms are extremely rare and most often occur after trauma or endovascular procedures [Aoki 2008; Kar 2017]. Delay in diagnosis or treatment may lead to coronary thrombosis with resultant ischemia or hemorrhage subsequent tamponade. Here, we present the case of a 66-year-old female who developed a coronary artery pseudoaneurysm of a non-grafted vessel three weeks after coronary artery bypass grafting. To avoid re-sternotomy, the pseudoaneurysm was successfully managed with a covered coronary stent and mini-left anterior thoracotomy to evacuate the hemopericardium and relieve tamponade.

INTRODUCTION

Coronary pseudoaneurysms are exceedingly rare and most often caused by either trauma to the mediastinum or catheterization procedures leading to injury of the vessel wall [Aoki 2008; Kar 2017]. Expedient diagnosis of these aneurysms is critical as they are prone to thrombus formation and/or rupture, which can lead to myocardial ischemia or hemorrhage. Due to the rare nature of this condition, there are currently no accepted guidelines for their management. Reports in the literature have described strategies, including serial imaging, percutaneous coil embolization or stent grafting, as well as surgical repair [Aoki 2008; Kar 2017; Xiang 2020; Nakagawa 2021]. To our knowledge, there are no reports of non-anastomotic coronary pseudoaneurysm after coronary artery bypass grafting (CABG). We present a patient with a 4.8 cm ascending aortic aneurysm who underwent three-vessel coronary artery bypass grafting and hemiarch replacement that was complicated by a coronary pseudoaneurysm of a non-grafted vessel.

CASE REPORT

Our patient was a 66-year-old female, who initially presented after developing chest pain doing yard work. She was found to have had an NSTEMI and severe, multivessel coronary artery disease. Her past medical history was significant for hypertension, hyperlipidemia, obesity, and obstructive sleep apnea. She underwent a complete cardiovascular workup, which revealed an ejection fraction of 50%, no significant valvular abnormalities, and an ascending aortic aneurysm of 4.8cm. She underwent CABG of the right coronary artery, obtuse marginal, and left anterior descending (LAD) as well as a hemiarch replacement under moderate hypothermic circulatory arrest. Her LAD was identified as intramyocardial at the time of surgery. Her postoperative recovery was unremarkable, and she was discharged home.

She presented to the emergency department three weeks postoperatively, complaining of shortness of breath and chest pain. She was hypertensive on presentation with systolic blood pressures of 150mmHg. A CT scan revealed a coronary pseudoaneurysm with possible active extravasation and associated pericardial hematoma. She was hemodynamically stable and transferred to our facility for further management. She was taken to the cath lab for a coronary angiogram, which confirmed a pseudoaneurysm originating from a small, non-grafted diagonal branch. (Figure 1) All three of her bypass grafts were widely patent. Given the relatively small size and location of the pseudoaneurysm and the time since her recent surgery, a less invasive approach was favored to avoid re-sternotomy. We, therefore, planned for a hybrid approach with the exclusion of the pseudoaneurysm with a covered coronary stent followed by pericardial drainage via a left anterior mini-thoracotomy. In the cath lab, the diagonal coronary branch was engaged, and a Run-through wire (Terumo Interventional Systems, Terumo, Europe) was used to cross the area of the pseudoaneurysm. A 2.5 mm Papyrus covered stent (Biotronik AG, Bülach, Switzerland) was placed across the pseudoaneurysm. Subsequent angiography confirmed the successful exclusion of the lesion. (Figure 2) She was then taken from the cath lab to the operating room for a mini left anterior thoracotomy and pericardial window with the excellent evacuation of her hemopericardium confirmed by intraoperative transesophageal echocardiography. She was discharged from this hospitalization on a postoperative day four on dual antiplatelet therapy. She has since been seen in

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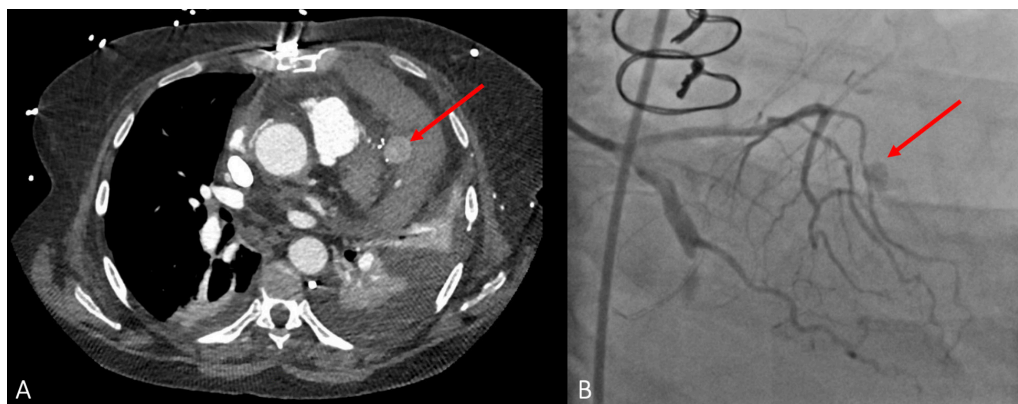


Figure 1. (A) Computed tomography arteriogram (CTA) image. The red arrow indicates pseudoaneurysm originating on the left lateral aspect of the heart with possible active extravasation. (B) Coronary angiogram with the red arrow demonstrating a pseudoaneurysm originating from a diagonal branch of the LAD.

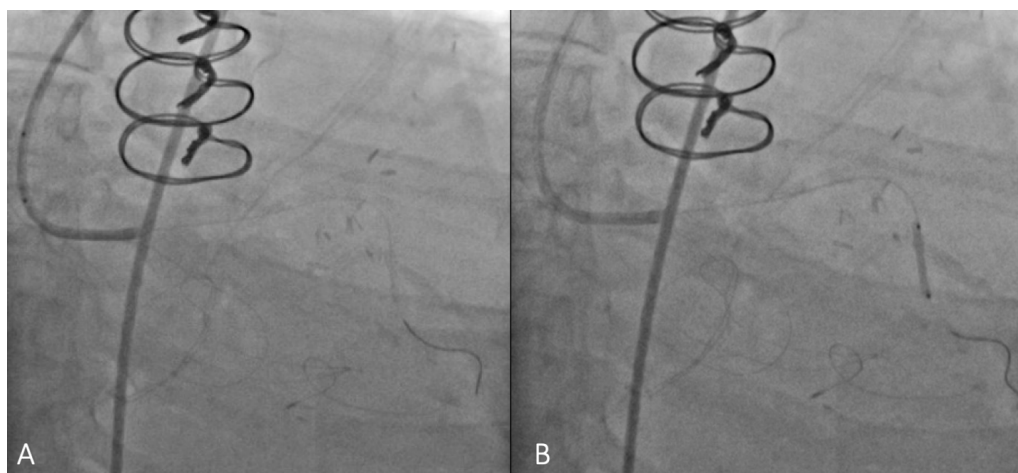


Figure 2. (A) The diagonal branch engaged with a catheter distal to the pseudoaneurysm. (B) Covered stent deployment across the pseudoaneurysm.

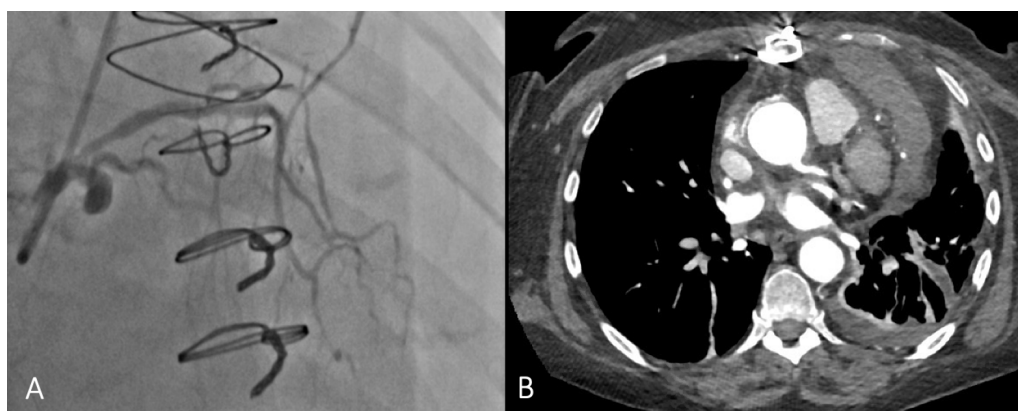


Figure 3. (A) Completion coronary angiogram demonstrating exclusion of the pseudoaneurysm with a covered stent. (B) CTA image obtained four weeks after stent placement demonstrating postsurgical changes and no filling of the pseudoaneurysm.

the clinic and is recovering well. Repeat axial imaging of her chest demonstrated no contrast filling of the coronary pseudoaneurysm (Figure 3).

DISCUSSION

Based on the timing and location of the pseudoaneurysm, we believe the most likely etiology of her pseudoaneurysm was trauma to the diagonal branch during dissection to identify an intramyocardial LAD. Intramyocardial LAD has been reported in as high as 21% of CABG procedures [Vanker 2014]. Identifying distal coronary targets that are suitable for grafting can occasionally be challenging and requires meticulous dissection of the coronaries to expose the vessel. There are many different techniques and instruments used for coronary dissection that are well described and routinely practiced [De Salvatore 2015]. Previous descriptions of coronary pseudoaneurysms related to CABG have been described at the anastomosis and are exceedingly rare [Nakagawa 2021]. To our knowledge, there have been no previous reports of coronary pseudoaneurysms of non-grafted coronary vessels after CABG.

The diagnosis of coronary pseudoaneurysm in our case was made by a CT chest with intravenous contrast and confirmed with coronary angiography, consistent with other literature [Aoki 2008; Nakagawa 2021]. Management strategies for coronary artery pseudoaneurysms range from watchful waiting with serial imaging, endovascular procedures, as well as open surgical repair [Aoki 2008]. When developing a management strategy, Aoki et al. recommended an individualized approach based on the patient's history, physical exam, symptoms, and the anatomy of the aneurysm. In our case, the patient was approximately three weeks postoperative making re-sternotomy and exploration near a patent LIMA graft challenging.

Additionally, the diagonal branch with the pseudoaneurysm was less than 2mm in diameter making it difficult to repair or bypass, and may have required ligation of the vessel. While chronic stenosis or occlusion of a diagonal branch is generally well tolerated, acute ischemia from either ligation or thrombosis of the vessel after repair may have caused hemodynamic instability or ventricular arrhythmias. A hybrid approach was able to offer prompt and definitive treatment while preserving myocardial perfusion and avoiding re-sternotomy at an inopportune time.

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