Vol. 15(4), pp. 38-41, August 2023
DOI: 10.5897/AATCVS2022.0047
Article Number: BFE596271119
ISSN 1994-7461

http://www.academicjournals.org/AATCVS

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African Annals of Thoracic and Cardiovascular Surgery

Case report

Surgical repair of a giant right coronary artery aneurysm with intra-cardiac fistulas: A case report

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Received 10 August, 2022; Accepted 14 August, 2023

Coronary artery aneurysms (CAA) are rare and life-threatening cardiovascular abnormalities. Multiple aneurysms and giant aneurysms are even rarer. The authors report a case of a giant CAA (7 cm) in a 62-year-old male patient with multiple cardiovascular risks. In fact, there were three adjacent aneurysms of the right coronary artery (RCA) that were connected to the cardiac chambers through two fistulas. Additionally, there was significant stenosis of the left anterior descending (LAD) at segment II. The patient underwent double coronary artery bypass grafting (RCA and LAD) and aneurysm repair under cardiopulmonary bypass. Despite a few early postoperative complications, the results in terms of myocardial revascularization were good, and the patient was discharged from the hospital on the 18th day postoperatively.

Key words: Coronary artery aneurysm, cardiac fistula, ischemic heart, coronary artery bypass

INTRODUCTION

A coronary artery aneurysm (CAA) is defined as a dilation of the normal coronary diameter to 1.5 times the size of a normal adjacent coronary artery segment. CAAs are rare and life-threatening cardiovascular abnormalities. Multiple aneurysms and giant aneurysms (greater than 5 cm) are even rarer (Abu-Saleh et al., 2015). The most common etiology in adults is atherosclerosis, with a relatively low risk of spontaneous rupture (Verma, 2015). The authors report a case of a symptomatic patient with a giant right coronary artery aneurysm.

CASE REPORT

GB was a 62-year-old male patient who had recently started experiencing chest pain at rest, in addition to exertional dyspnea. His cardiovascular risk factors included hypertension, a history of smoking, hypercholesterolemia, diabetes, and obesity (BMI = 36 kg/m²). He was admitted to the hospital for further investigations. The physical examination was normal, blood pressure was measured at 150/108 mmHg, and blood tests showed a high troponin level of 21 µg/L. Both the electrocardiogram (ECG) and ultrasound of the supra-aortic trunks and peripheral arteries were normal. CT angiography (Figures 1 and 2) revealed a giant aneurysm of the right coronary artery (RCA) with a size exceeding 75 mm. The trans-thoracic echocardiogram showed that the left ventricle was not dilated, the ejection fraction was 60%, and there was no valvular disease

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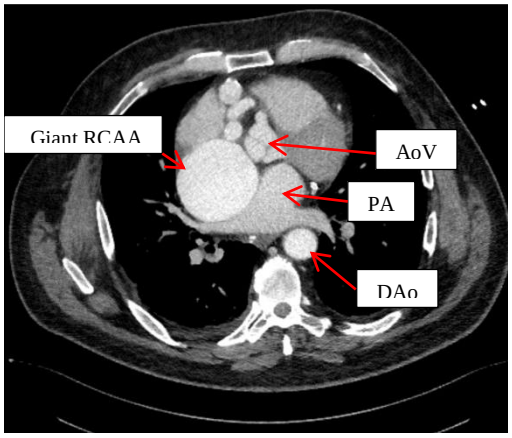

Figure 1. CT angiography of the heart (cross sectional view). RCAA: Right coronary artery aneurysm; AoV: Aortic valve; PA: Pulmonary artery; DAo: Descending aorta.

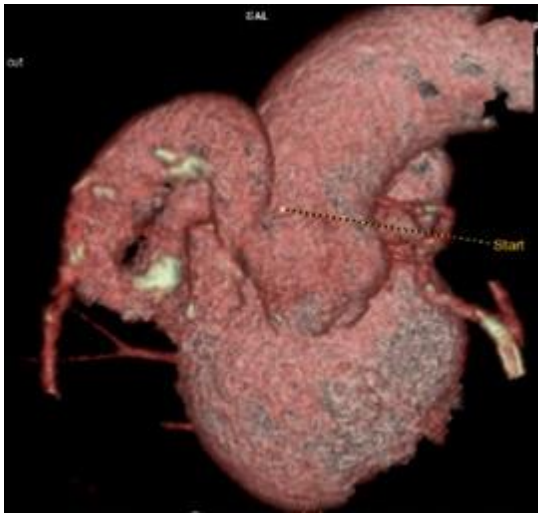

Figure 2. 3D Volume Rendering reconstruction of the thoracic angio-CT.

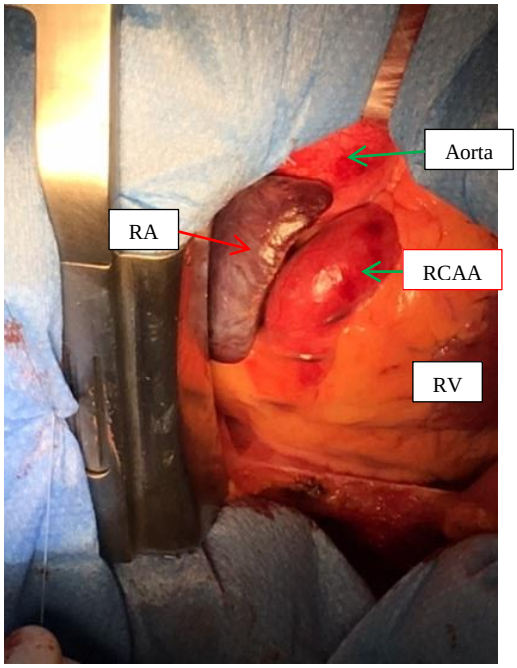

Figure 3. Surgical view of the RCA aneurysm.

or pulmonary hypertension. Subsequently, a coronary angiography was performed, confirming the enormous aneurysm of the RCA and significant stenosis of the left anterior descending (segment II).

The multidisciplinary therapy team decided to proceed with the surgical repair of the aneurysm. GB underwent double myocardial revascularization and aneurysm repair under cardiopulmonary bypass, with cannulation of the ascending aorta and double vein cannulation (superior vena cava [SVC] and the right femoral vein). The first step involved double coronary artery bypass grafting (CABG): Firstly, the left anterior descending (segment II) was bypassed using the left internal thoracic artery; secondly, a saphenous vein graft connected to the ascending aorta was employed to bypass the aneurysmal segment of the RCA (segment III). The second step involved the treatment of the aneurysms. In total, there were three aneurysms of the RCA (Figure 3). The first aneurysm was located just after the ostium of the RCA, and it had a collateral branch to the left atrium. The incoming and outgoing segments along with the collateral branch were ligated, and the aneurysm was successfully flattened (Figure 4). The second aneurysm was the largest (6 - 7 cm) and was situated between the right and left atria, concealing the origin of the SVC. The right atrium was opened, revealing a large fistula leading to the aneurysm from the inside. Subsequently, both the fistula and the aneurysm were treated, and the collateral branches were ligated. The third and final aneurysm was precisely located on the SVC. However, it was actually being supplied by a distinct artery originating from the roof of the left atrium and looping around the base of the ascending aorta. Similar to the procedure performed on the second aneurysm, the same approach was undertaken.

At the conclusion of the procedures, atrial pacing and a noradrenaline infusion at a rate of 0.1 µg/kg/min were employed to provide hemodynamic support. Subsequently, the patient spent 8 days in the intensive care unit (ICU), during which the postoperative course was marked by certain clinical issues. These complications included systemic inflammatory response syndrome, atrial fibrillation, and acquired pneumonia caused by Serratia marcescens. Effective treatment involved the administration of antibiotics (ceftriaxone),

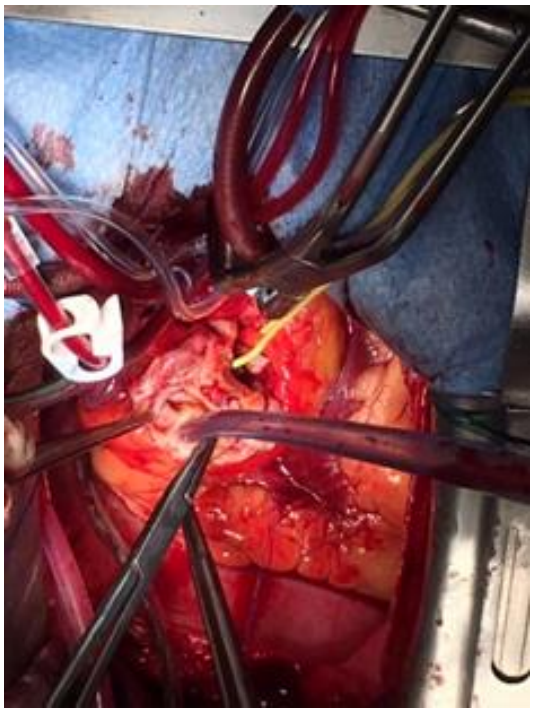

Figure 4. Aneurysm flattened and opened showing a calcified wall.

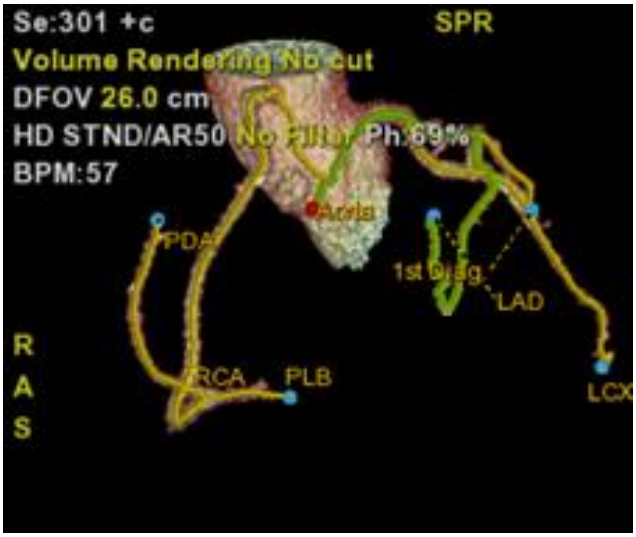

Figure 5. Postoperative Day 17 angio CT. LAD: left anterior descending; Diag: diagonal; LCX: left circumflex; PDA: posterior descending artery; RCA: right coronary artery; PLB: posterior left ventricular branch.

paracetamol, furosemide, amiodarone, and bisoprolol. As the patient returned to the ward, the recovery process was uneventful. A follow-up chest CT angiogram was performed (Figure 5), revealing well-functioning grafts with good flow. On postoperative day 18, Mr. GB was discharged from the hospital.

DISCUSSION

CAAs are observed in approximately 0.9 to 4.9% of patients undergoing coronary angiography, and similar to our patient, they are more prevalent in men. The RCA is also the most common site for CAAs (Sobczak et al., 2014; Swaye et al., 1983). The causes of coronary aneurysms encompass Kawasaki's disease, diagnostic or interventional coronary angiography, inflammatory and infectious arteritis, connective tissue disease, aortic dissection, tumor metastases, trauma, and congenital malformation (Naraen et al., 2017). Considering our patient's medical history and the appearance of the aneurysm, we presumed that the etiology was not congenital but rather acquired due to arteriosclerosis. The presence of calcified stenosis in the LAD further reinforced this argument. Interestingly, what distinguished this giant aneurysm was the presence of fistulas connecting to the cardiac chambers and the presence of three distinct aneurysmal dilations.

Since these aneurysms are relatively uncommon, the management of such patients has largely relied on anecdotal reports and accumulated experience. Some authors have reported successful treatment of giant CAAs using new-generation drug-eluting stents (Engstrom et al., 2017). The decision to undergo surgical intervention in cases of coronary artery aneurysms hinges on factors such as their size, the risk of rupture, the coexistence of obstructive coronary artery disease, and the presence and size of fistulas connecting to cardiac chambers. In our patient's case, all the criteria for surgery were met, as he presented with angina and there was a potential risk of spontaneous aneurysm rupture. The coronary grafting procedure alleviated the symptoms of obstructive coronary artery disease.

Although the patient experienced some complications while in the ICU, the surgical approach was undoubtedly the appropriate choice. Subsequent postoperative imaging confirmed complete resolution of the aneurysm, and there were no ischemic symptoms evident.

CONCLUSION

The case highlights one of the various presentations and the subsequent management of a disease for which treatment protocols are not well-established. The surgical procedure that was successfully performed resulted in the complete cure of the aneurysm. This emphasizes once again the role of CABG in the management of CAAs.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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