

# Successful Surgical Treatment of a Giant Left Coronary Artery Aneurysm with Fistula

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## ABSTRACT

Coronary artery aneurysm (CAA) is an aortic catastrophe with low prevalence. Giant CAA is even more uncommon, requiring surgical intervention. Giant CAA usually originates from the proximal segments of the right coronary and the anterior descending arteries. Here we report a rare case of giant left CAA with fistula formation treated with successful surgery.

## INTRODUCTION

The diagnostic criterion for coronary artery aneurysm (CAA) is coronary artery dilation of >1.5 times the adjacent normal segment [Swaye 1983]. The prevalence of CAA is <1%, and giant CAA with fistula formation is even less common. Most CAAs have been found in the proximal segments of the right coronary and the anterior descending arteries [Kawsara 2018; Tamene 2015], so a giant CAA originating from the left circumflex artery is extremely rare. Here we report a giant CAA in the left circumflex with fistula formation that had a favorable prognosis after surgery.

## CASE REPORT

A 62-year-old woman was admitted to our hospital with a heart space-occupying lesion existing for about 2 months and associated chest distress and dyspnea during exercise lasting for >1 month. The patient's physical examination showed no other abnormalities except a systolic grade II/VI murmur over the left fourth intercostal space. The medical and familial histories of the patient were unremarkable. A preoperative echocardiography revealed the presence of a large mixed mass in the left atrioventricular groove (pseudoventricular

aneurysm of the left ventricle or left CAA with thrombosis). A magnetic resonance imaging (MRI) examination of the heart indicated a mixed mass in the left atrioventricular sulcus groove area accompanied by left atrial compression, which was suspected to be a left CAA with thrombosis (Fig. 1A). Coronary angiography showed coronary atherosclerosis with a large circumflex branch communicating with the left atrium (Fig. 1B). Based on these findings, a diagnosis of "left giant CAA with fistula formation into the left atrium" was made, and surgical correction was advised.

After the patient gave consent, the operation was performed via a median sternotomy. Intraoperatively, a giant round aneurysm was found on the surface of the left ventricle near the atrioventricular groove. The aneurysm was  $\sim 4.2 \times 5.5 \times 6.4$  cm in size, with an intact capsule and no adhesion to the surrounding tissues (Fig. 2). Under cardiopulmonary bypass, the aneurysm wall was incised, and the internal thrombus was removed. Then a dilated circumflex branch ( $\sim 5$  mm in diameter) connecting to the atrium near the mitral annulus through an 8-mm fistula was discovered. After suturing the fistula and resecting the aneurysm, the wound was closed with part of the aneurysm's wall. Pathologic examination confirmed CAA with calcification. After the surgery, the patient recovered well under anticoagulation therapy with aspirin and was discharged after 10 days. We followed the patient for 3.5 years; she suffered no chest distress or shortness of breath. In July 2020, echocardiography examination showed cardiac function to be normal. Coronary computed tomography angiography

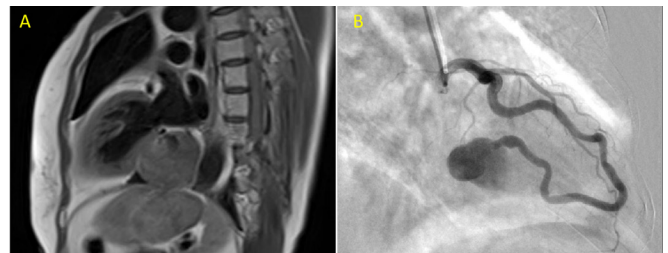


Figure 1. Preoperative MRI examination of the heart and coronary angiography. (A) The MRI shows a mixed mass in the left atrioventricular sulcus groove area, accompanied by left atrial compression. (B) Coronary angiography shows coronary atherosclerosis with a large circumflex branch communicating with the left atrium.

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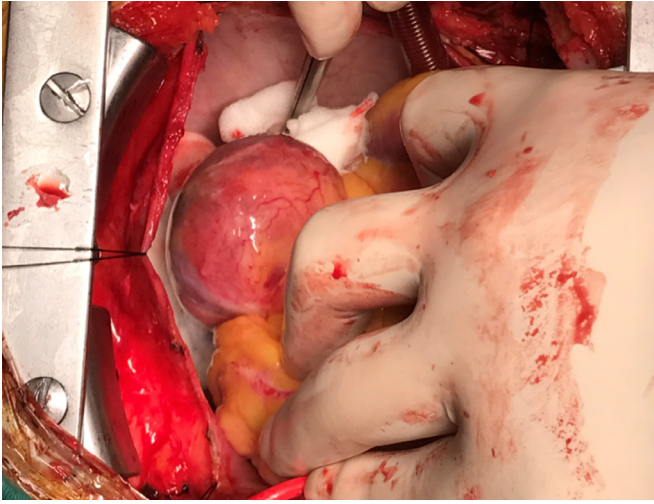


Figure 2. The giant aneurysm during surgery. A giant round aneurysm ( $\sim 4.2 \times 5.5 \times 6.4$  cm) with an intact capsule and no adhesion to surrounding tissues was found on the surface of the left ventricle near the atrioventricular groove.

(CTA) showed coronary atherosclerosis but no evidence of coronary aneurysm or left atrial fistula of the coronary artery (Fig. 3).

## DISCUSSION

CAA is uncommon, and its treatment includes percutaneous and surgical revascularization, both of which are associated with technical challenges. Furthermore, surgical intervention is a preferred treatment for giant CAA [Kawsara 2018; Li 2005; Citro 2019; Arboine 2019]. Li et al [2005] reported 6 cases of giant CAA with a diameter of  $>20$  mm, 5 cases with coronary artery fistula to the left ventricle located in the right coronary anterior descending branch and the diagonal branch, and 5 cases that underwent coronary bypass grafting or reconstruction. Mawatari summarized 17 cases of giant CAA with inclusion criteria of diameter  $>5$  cm, among which 5 cases were associated with the coronary artery fistula formation [Mawatari 2000]. In those cases, the CAAs originated from the end of the circumflex branch, which had a fistula connecting to the vicinity of the left atrium mitral valve. CAA lesions of this origin have been rarely reported. Most of the previously reported cases of the giant CAA with fistula formation are congenital. The present case was probably congenital or atherosclerosis-induced, given the patient's medical history, the form of the lesion, and the pathologic findings.

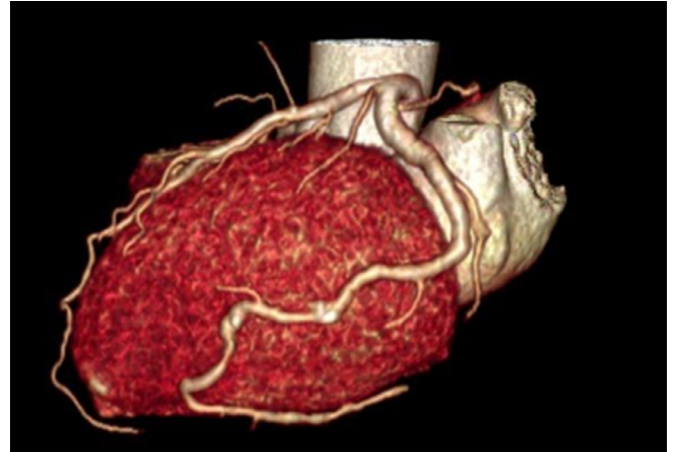


Figure 3. CTA examination at follow-up. A coronary CTA examination 3.5 years after the surgery showed coronary atherosclerosis but no evidence of coronary aneurysm or left atrial fistula of the coronary artery.

Most coronary arteries have fistulas at the connection to the left ventricle of the heart and are closely related to the formation of giant CAAs. In our case, the fistula might be the cause or the consequence of the aneurysm. A preoperative echocardiography, cardiac CTA or MRI, and coronary angiography can be used for diagnosis and surgical planning. Giant CAAs often require surgical treatment, including aneurysm resection, bypassing when necessary, and closure of the coronary artery fistulas.

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