case report

Giant aneurysm of the right coronary artery and magnetic resonance coronary angiography

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Coronary artery aneurysm (CAA) is generally defined as coronary dilatation that exceeds the diameter of normal adjacent segments or the diameter of the patient's largest coronary vessel by 1.5 times. The prime cause of CAAs is atherosclerosis, and the most commonly affected artery is the right coronary artery. CAAs are quite commonly detected during X-ray coronary angiography. However, Coronary artery aneurysm (CAA) is generally defined as coronary dilatation that exceeds the diameter of normal adjacent segments or the diameter of the patient's largest coronary vessel by 1.5 times. The prime cause of CAAs is atherosclerosis, and the most commonly affected artery is the right coronary artery. CAAs are quite commonly detected during X-ray coronary angiography. However, giant CAAs, especially with the diameter exceeding 100 mm, are extremely rare. The treatment method of choice of giant CAAs is the excision of aneurysm with coronary artery bypass grafting. We present a case of a 41-year-old apparently healthy woman with a giant right CAA. This was detected by noninvasive methods, including magnetic resonance coronary angiography, and its maximum diameter exceeded 100 mm. In emergency, the aneurysmal sac was excised and the aortocoronary saphenous vein graft was performed. We also present a review of the published studies of giant CAAs with the diameter exceeding 100 mm.

Coronary artery aneurysm (CAA) is not an uncommon condition, but giant CAAs are extremely rare. CAA is generally defined as coronary dilatation that exceeds the diameter of normal adjacent segments or the diameter of the patient's largest coronary vessel by 1.5 times. The most commonly affected coronary artery is the right coronary artery (RCA).[1] The prime cause of CAAs is atherosclerosis.[2] We present a case with a giant right CAA.

CASE

A 41-year-old apparently healthy white woman suffering from palpitations and New York Heart Association class III dyspnea for 12 months was referred to the Department of Cardiology. She had no history of Kawasaki disease, other connective tissue diseases, or chest trauma. Physical examination results were normal. No abnormalities were observed in blood tests and serum protein electrophoresis. The test for antinuclear antibodies was negative.

Transesophageal echocardiography (TEE) revealed a huge tumor (100×90×80 mm) on the right cardiac border, compressing the right atrium, and the superior and inferior vena cava. Blood flow into the tumor cavity and a connection with RCA were detected, which suggested the diagnosis of RCA aneurysm.

Sixty-four slice coronary computed tomography angiography (CTA) exposed a large pericardial mass (**Figures 1 and 2**) (102×85×82 mm) connected with RCA and strongly compressing the right atrium, and the superior and inferior vena cava. Other coronary arteries were normal, and there was no occlusive coronary artery disease.

To complete diagnosis, cardiovascular magnetic resonance (CMR) imaging and magnetic resonance coronary angiography (MRCA) were performed (**Figures 3 and 4**) confirming the diagnosis of RCA aneurysm. No luminal thrombus or calcification was observed. CMR also revealed the compression of the right atrium, and the superior and inferior vena cava.

The patient was admitted to Cardiac Surgery Department in emergency.

The procedure was realized via median sternotomy. Because of the size of the aneurysm, the

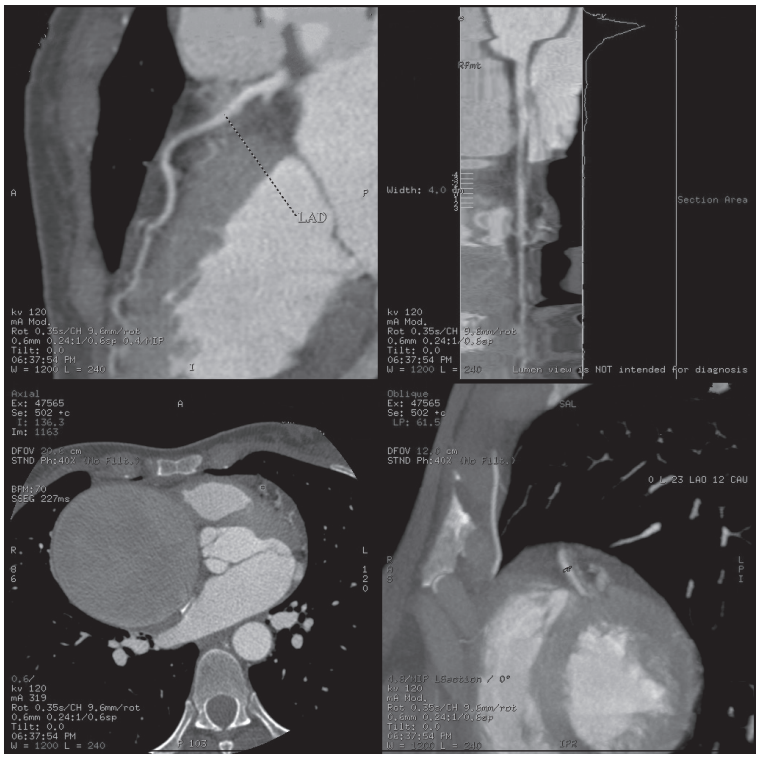

Figure 1. Computed tomographic images of the left anterior descending artery.

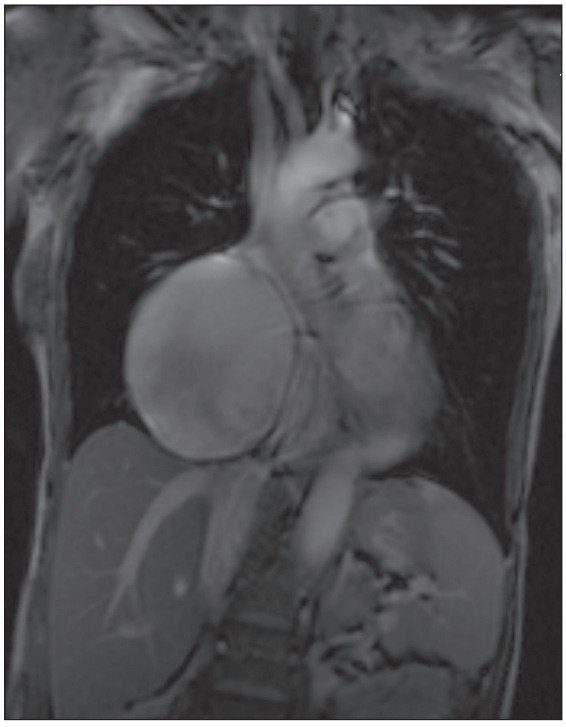

Figure 3. Coronary magnetic resonance image of giant aneurysm in coronal section compressing the inferior vena cava and right ventricle.

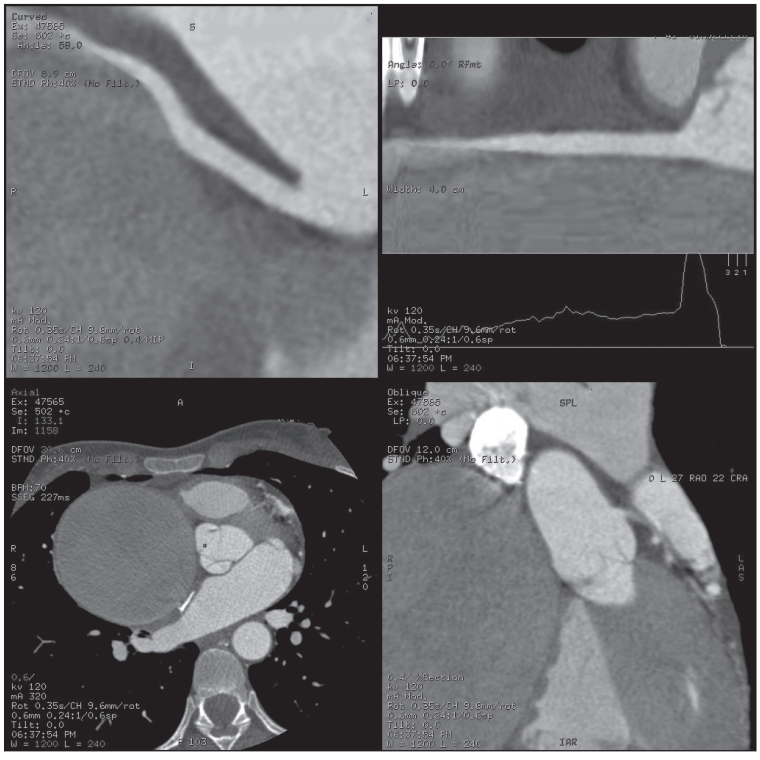

Figure 2. Computed tomographic images of the right coronary artery.

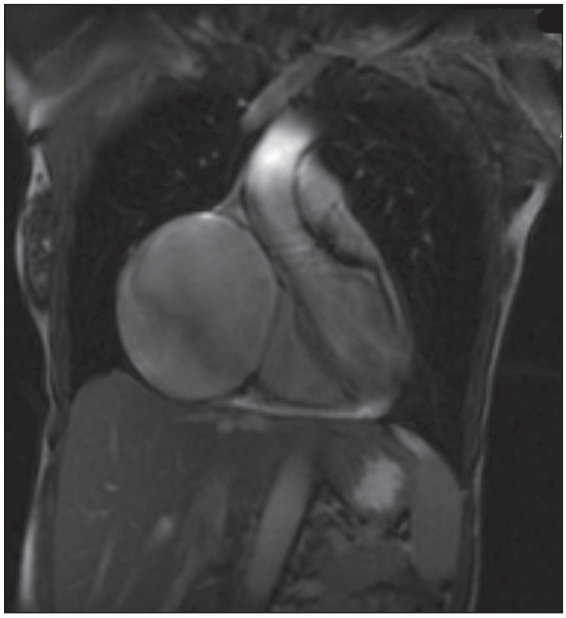

Figure 4. Giant right coronary artery aneurysm in the coronal section of CMR compressing the right ventricle (showing relationship with aortic arch).

femoral cardiopulmonary bypass cannulation - arterial (MEDTRONIC EOPA 77422) and atriocaval (Edwards Life sciences VEFM020) - were used. Following aortic cross-clamping, cold cardioplegic arrest was obtained and the giant aneurysm was possible to open (**Figure 5**). The aneurysmal sac was excluded by the closure of the proximal orifice with the 4-0 prolene and ligation of the artery distal to the aneurysm. There was no thrombus inside the aneurysm. Subsequently the aortocoronary saphenous vein graft was performed.

Histologically, the aneurysmal wall revealed atherosclerotic plaques.

Postoperative transthoracic echocardiography showed the preserved ejection fraction of the left ventricle (EF=63%) and no segmental abnormalities of myocardial contractility. The postoperative course was uneventful, and the patient was discharged on the sixth postoperative day.

Eighteen months after the procedure, the patient was asymptomatic and worked full time.

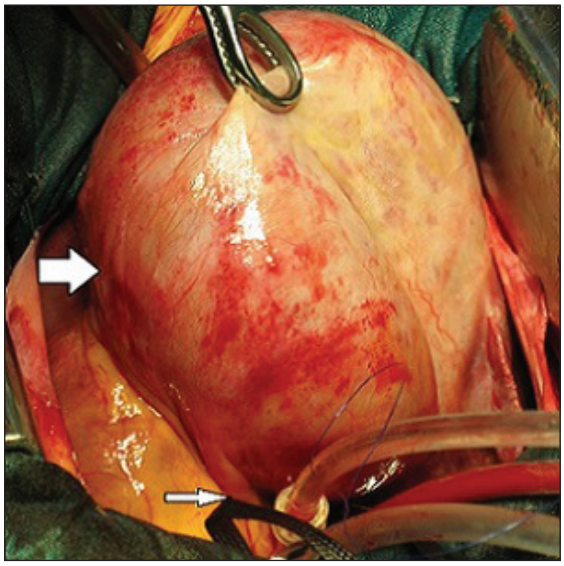

Figure 5. Giant aneurysm (big arrow) with direct contact with the proximal part of the right coronary artery (small arrow).

Table 1. Reported cases of giant coronary artery aneurysms with a maximum diameter >100 mm.

Author	Year	Size	Sex	Coronary	Presentation	Cause
Gupta et al[7]	2010	180	M	LAD	N/A	Congenital
Kumar et al[8]	2006	160	F	RCA	SVC syndrome	Fibromuscular dysplasia
Kim et al[9]	1997	150	F	RCA	Dyspnoea	Atherosclerotic
Zhang et al[10]	1988	150	F	RCA	Dyspnoea	Congenital
Lim et al[11]	1977	150	M	RCA	Dyspnoea	Congenital
Wei et al[12]	1986	150	F	RCA	Dyspnoea	Congenital
Burnside et al[13]	2012	150	F	RCA	Mediastinal mass	Myxoid degeneration
Li et al[14]	2012	144	F	LCx	Chest distress	CAF
Li et al[15]	2005	138	M	RCA	CHF	CAF
		130	F	LM+LAD	CHF	CAF
Llera et al[16]	2010	130	F	RCA	STEMI	Post-traumatic
Chazov et al[17]	1991	120	M	RCA	Chest heaviness	Unknown
Westaby et al[18]	1999	120 110	M M	RCA RCA	Angina Angina, collapse	Atherosclerotic Atherosclerotic
Hirooka et al[19]	2009	120	F	LM	CHF	Unknown
Marla et al[20]	2009	120	M	LCx	Angina	Atherosclerotic
Sareyyupoglu et al[21]	2009	114	F	RCA	CHF	Atherosclerotic
Mignosa et al[22]	2004	110	M	RCA	Dysphagia	Williams syndrome
Topalian et al[23]	2005	110	M	RCA	Angina	Cystic medial necrosis
Vlachou et al[24]	2008	110	M	RCA	Nausea	Unknown
Keyser et al[25]	2012	106	M	RCA	Angina	Atherosclerotic
Konen et al [26]	2001	101	M	RCA	Fatigue	Unknown

CAF: Coronary artery fistula, LAD: left anterior descending artery, LCx: left circumflex artery, CHF: congestive heart failure, LM: left main coronary artery, N/A: not available, RCA : right coronary artery, STEMI: ST-elevation myocardial infarction, SVC: superior vena cava, F: female, M: male

DISCUSSION

CAAs are noted in approximately 0.9% to 4.9% of patients undergoing coronary angiography and are more common in men. RCA is also the most common site for CAAs.[1]

The prime cause of CAAs is atherosclerosis, followed by Kawasaki disease, polyarteritis nodosa, systemic lupus erythematosus, infection, trauma, angioplasty, and congenital malformations. CAAs are also the complication of coronary artery stenting and have been increasingly reported as a complication of drug-eluting stenting.[2]

Our patient had no history of Kawasaki disease, other connective tissue diseases, or chest trauma, and there was no coronary artery disease in coronary CTA and MRCA. The histopathologic examination of the excised aneurysm showed atherosclerotic plaques suggesting that her aneurysm had the most frequent background, atheromatosis.

CAAs, especially giant CAAs, may be detected noninvasively with the use of echocardiography, computed tomography, and magnetic resonance imaging.[3] We made a presumptive diagnosis using TEE, which was confirmed by performing coronary CTA, CMR, and MRCA. Coronary CTA showed no coronary artery disease, and MRCA revealed the precise anatomy, size, and position of aneurysm, which were helpful for defining the range of surgical procedure.

According to ACCF/ACR/AHA/NASCI/SCMR 2010 Expert Consensus Document on CMR, MRCA may be used for identifying coronary artery anomalies and aneurysms. It may be particularly useful in younger individuals with signs or symptoms of myocardial ischemia for the purpose of identifying anomalous origins of coronary arteries.[4] However, the gold standard for diagnosis of coronary aneurysms still remains x-ray coronary angiography.[3] In the light of obtaining precise details from coronary CTA and MRCA, there was no need to perform x-ray coronary angiography in the described case.

Treatment options in CAAs consist of medical, surgical, and percutaneous approaches. To prevent thromboembolic complications, antiplatelet and/or antithrombotic drugs should be considered.[5] Excision of CAA with CABG is the most frequently performed procedure as the treatment of giant CAAs, especially with a diameter exceeding 50 mm.[6]

To the best of our knowledge, the biggest CAA with a maximum diameter of 180 mm was described by Gupta et al.[7] We present a case of 102 mm aneurysm, which is one of the biggest described in the literature (**Table 1**). We believe that only 23 cases (including the described one) have been reported to date in the English literature, with a maximum diameter exceeding 100 mm. We assume that our case is the first case of an atheromatous giant CAA in quadragenarian female described so far.

In conclusion, giant CAAs exceeding 100 mm are extremely rare, and MRCA is a useful noninvasive method in confirming diagnosis. This is also helpful in planning of surgical treatment without exposure to ionizing radiation or iodinated contrast medium particularly in young patients. It provides the precise anatomy, size, and position of aneurysm at least equivalent to x-ray coronary angiography.

Conflict of Interest

The authors do not report any conflict of interest regarding this work.

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