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

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

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

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 atrio caval (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.

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

| Author             | Year | Size | Sex | Coronary | Presentation      | Cause                  |
|--------------------|------|------|-----|----------|-------------------|------------------------|
| Gupta et al¹⁷      | 2010 | 180  | M   | LAD      | N/A               | Congenital             |
| Kumar et al⁸       | 2006 | 160  | F   | RCA      | SVC syndrome      | Fibromuscular dysplasia|
| Kim et al¹⁷        | 1997 | 150  | F   | RCA      | Dyspnea           | Atherosclerotic         |
| Zhang et al¹⁰      | 1988 | 150  | F   | RCA      | Dyspnea           | Congenital             |
| Lim et al¹¹        | 1977 | 150  | M   | RCA      | Dyspnea           | Congenital             |
| Wei et al¹⁴        | 1986 | 150  | F   | RCA      | Dyspnea           | Congenital             |
| Burnside et al¹²    | 2012 | 150  | F   | RCA      | Mediastinal mass  | Myxoid degeneration    |
| Li et al¹⁴         | 2012 | 144  | F   | LCx      | Chest distress    | CAF                    |
| Li et al¹⁵         | 2005 | 138  | M   | RCA      | CHF               | CAF                    |
|                   |      | 130  | F   | LM+LAD   | CHF               | CAF                    |
| Llera et al¹⁶      | 2010 | 130  | F   | RCA      | STEMI             | Post-traumatic         |
| Chazov et al¹⁷     | 1991 | 120  | M   | RCA      | Chest heaviness   | Unknown                |
| Westaby et al¹⁸    | 1999 | 120  | M   | RCA      | Angina, collapse  | Atherosclerotic         |
| Hirooka et al¹⁹    | 2009 | 120  | F   | LM       | CHF               | Unknown                |
| Maria et al²⁰      | 2009 | 120  | M   | LCx      | Angina            | Atherosclerotic         |
| Sareyyupoglu et al²¹ | 2009 | 114  | F   | RCA      | CHF               | Atherosclerotic         |
| Mignosa et al²²    | 2004 | 110  | M   | RCA      | Dysphagia         | Williams syndrome       |
| Topalian et al²²   | 2005 | 110  | M   | RCA      | Angina            | Cystic medial necrosis  |
| Vlachou et al²⁴    | 2008 | 110  | M   | RCA      | Nausea            | Unknown                |
| Keyser et al²⁵     | 2012 | 106  | M   | RCA      | Angina            | Atherosclerotic         |
| Konen et al²⁶      | 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.1 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.
case report

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