

CASE REPORT

Congenital Coronary Aneurysm Resulting in Myocardial Infarction: MR Imaging Findings

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ABSTRACT

We report a case of a 33-year-old Caucasian male who presented with myocardial infarction and a right atrial mass. Coronary catheterization demonstrated a right coronary aneurysm. In this report, we describe magnetic resonance (MR) imaging findings of a right coronary artery aneurysm with thromboembolism formation, resulting in inferior myocardial infarction.

Key Words: Cardiac MR imaging; Coronary aneurysm; Cardiac mass; Myocardial infarction.

INTRODUCTION

Aneurysmal coronary artery disease is defined as saccular or fusiform distension of a part of a coronary vessel of up to one and a half times the diameter of an adjacent normal segment (Swaye et al., 1983). The incidence of coronary aneurysms varies from 0.3–5% (Hartnell et al., 1985; Swaye et al., 1983) and aneurysms be either congenital or acquired. Clinical symptoms of angina and myocardial infarction are not specific but may be associated with coronary artery aneurysm (Syed and Lesch, 1997).

In this report, we describe a case of a young man who presented with thromboembolism of a congenital right coronary aneurysm resulting in myocardial infarction. Magnetic resonance (MR) imaging findings and depiction of both the aneurysm and infarct extent are described.

CASE REPORT

A 33-year-old Caucasian male presented to an outside hospital eight months previously with sudden

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onset of chest pain radiating to the neck, nausea, and diaphoresis. The symptoms occurred while he was playing volleyball. An electrocardiogram (ECG) showed evidence of acute inferior myocardial infarction. He was successfully treated with thrombolytics with rapidly resolving symptoms.

A subsequent coronary catheterization revealed a congenital, windsock-shaped aneurysm of the right coronary artery with intraluminal thrombus as well as a thrombus in the distal coronary artery. Other coronary vessels were reported to be normal. An outside MRI was performed and suggested a mass in the right atrium.

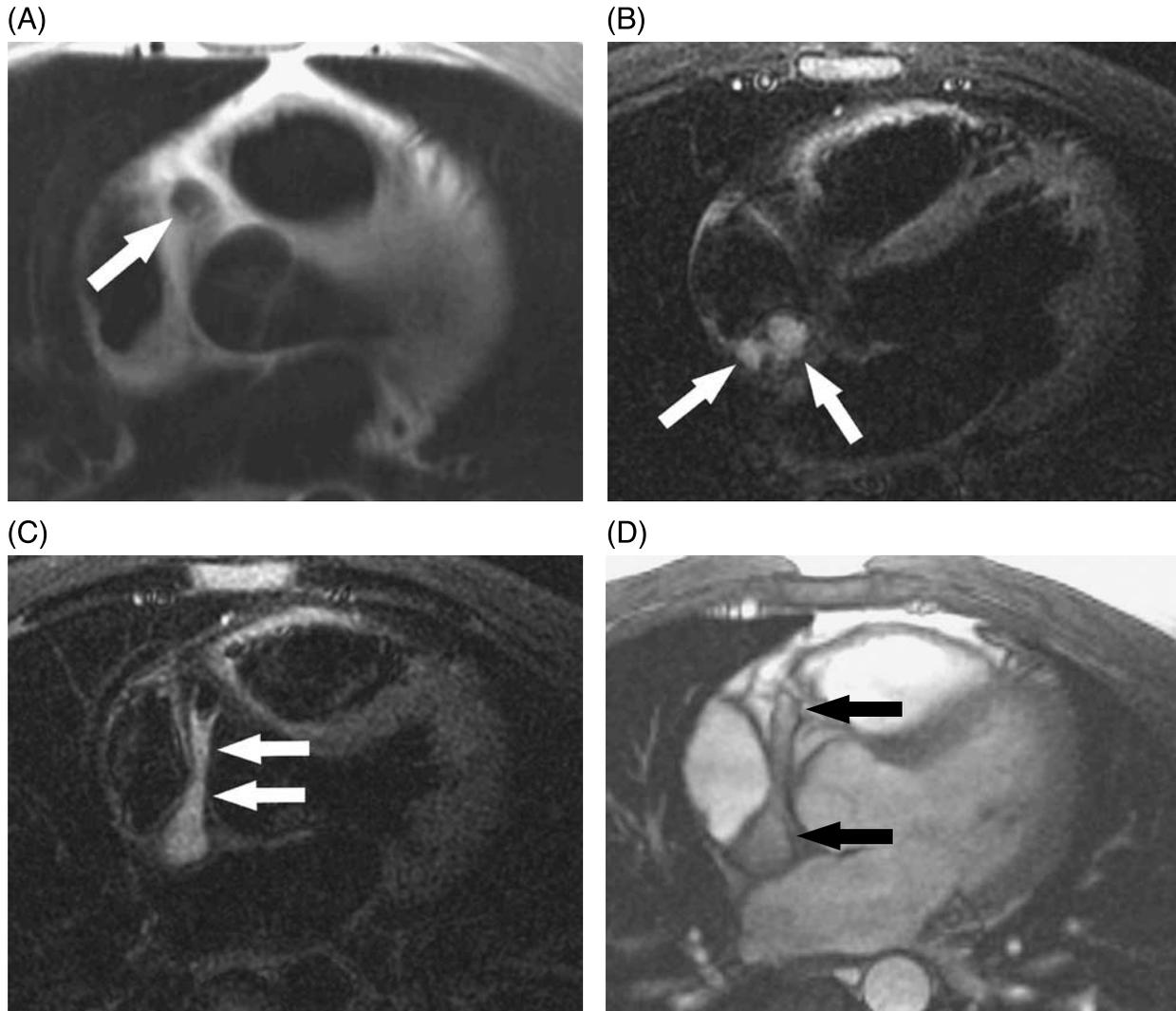
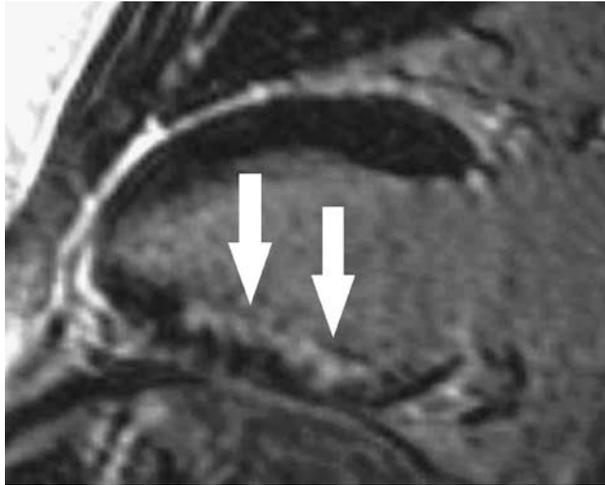


Figure 1. A 33-year-old Caucasian man with medical history of myocardial infarction. (A) ECG-gated proton-density-weighted axial image (double inversion recovery fast spin echo sequence with blood suppression technique, TR/TE 1714.3/4.7) showing an ectatic proximal right coronary artery (arrow). (B) T2-weighted axial MR image (double-inversion recovery sequence with blood suppression technique; TR/TE 1818.2/61.6) showing a hyperintense lesion in the right atrial septum (arrows). (C) T2-weighted axial MR image (double-inversion recovery proton-density sequence with blood suppression technique; TR/TE 1818.2/61.6) showing an ectatic branch vessel of the right coronary artery (upper arrow) communicating with a mass in the interatrial septum (lower arrow). (D) Axial bright blood MR image (steady-state free precession sequence; TR/TE 3.9/1.4) showing an ectatic branch vessel of the right coronary artery (upper arrow) communicating with a mass in the interatrial septum (lower arrow). (E) Myocardial viability MR image (TR/TE/flip angle 5/1.2/25 degrees) obtained 15 min after intravenous injection of 0.2 mmol/kg gadodiamide contrast agent. The vertical long-axis view shows a nontransmural area of enhancement in the inferior wall of the left ventricle (arrows). Findings are consistent with right coronary artery myocardial infarction. (F) ECG-gated proton-density-weighted axial image (double-inversion recovery fast-spin echo sequence with blood suppression technique, TR/TE 1714.3/4.7) after gadolinium administration showing irregular enhancement of the mass (arrow).

(E)



(F)

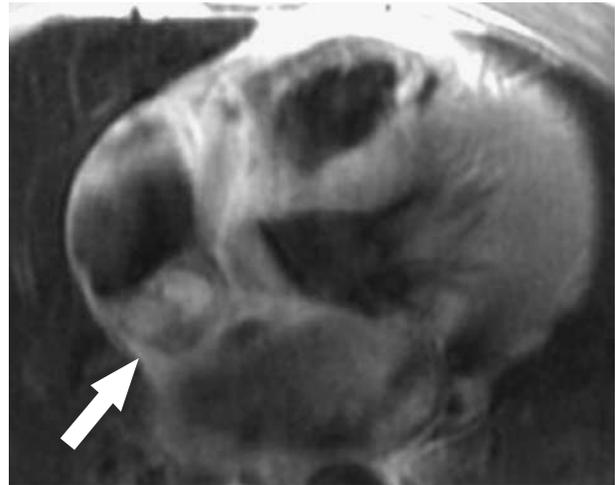


Figure 1. Continued.

The patient was advised to undergo excision of the mass and the coronary aneurysm to reduce the risk of recurrent embolism and infarction. He was referred to our department for preoperative imaging for potential resection of the mass.

Magnetic resonance images were obtained on a 1.5 T scanner (CV/i, General Electric Medical Systems, Waukesha, WI). Double-inversion recovery proton-density axial images (TR [repetition time]/TE [echo time] 1818.2/4.7 msec) showed the right coronary artery to be dilated to 12.5 mm at its origin (Fig. 1A). The distal right coronary artery followed its normal course into the atrioventricular groove without evidence of ectasia. Double inversion recovery T2-weighted axial images (TR/TE 1818.2/61.6 msec) with chemical shift fat suppression showed a $2.3 \times 1.6 \times 2.4$ cm mass related to the interatrial septum with heterogeneous signal compared to the myocardium (Fig. 1B). In addition, axial steady-state free precession images (TR/TE 3.9/1.4) demonstrated a dilated branch vessel of the proximal right coronary artery measuring approximately 7.0 mm. The branch vessel extended along the right lateral aspect of the aortic root and communicated with the mass in the right atrial septum (Figs. 1C and 1D). Postgadolinium images (Fig. 1F) showed irregular enhancement of the mass. Magnetic resonance signal intensity and appearance suggested the mass contained blood.

Myocardial viability images (TR/TE/theta 5/1.2/25 degrees) were obtained approximately 15 min after a 0.2 mmol/kg intravenous dose of gadodiamide (Amersham Health, Princeton, NJ). A nontransmural infarction of the inferior wall of the left ventricle was revealed at

the base of the heart (Fig. 1E). No enhancement of the interatrial mass was identified (not shown).

The patient underwent open-heart surgery for excision of the atrial mass for diagnosis and ligation of coronary artery tract. Surgical examination revealed an aneurysmal right coronary artery. The tract communicating with the interseptal mass was identified as the sinus node artery. The artery was ligated at its origin at the right coronary artery. The mass in the right atrial septum was identified as a partially thrombosed coronary aneurysm that was opened and shelled out. Pathological examination of the mass confirmed a thrombosed right coronary artery with intravascular papillary endothelial hyperplasia.

DISCUSSION

In coronary aneurysm disease, involvement of the right coronary artery is most commonly seen, whereas involvement of the left coronary artery is only rarely seen (Syed and Lesch, 1997). Coronary aneurysm disease has not previously been described presenting as a mass in the right atrial septum.

Kawasaki disease and atherosclerosis are the most common causes of coronary artery aneurysm (Syed and Lesch, 1997). Coronary artery aneurysm can also be seen in connective tissue disorders, vasculitis, and mycotic infection. Dissection and trauma or iatrogenic injury are other causes of coronary aneurysm (Seabra-Gomes et al., 1974). Complications of coronary artery aneurysm include thrombosis developing in the aneurysm, causing distal embolization with myocardial

infarction (Van den and Segal, 1973) as in this case, as well as rupture of the coronary aneurysm, which can lead to sudden death (Anabtawi and de Leon, 1974).

The diagnosis of coronary artery aneurysm is typically made using catheter-based coronary angiography (Tunick et al., 1989). Advanced imaging modalities are represented by computer tomography and magnetic resonance imaging (Laurent et al., 1987; Pucillo et al., 1990).

Differential diagnosis of the cardiac mass in this case included thrombus, infectious vegetation, structural abnormalities, and neoplasm (Errichetti and Weyman, 1994). The patient had no history of fever and physical examination did not show signs of endocarditis. Cardiac tumors are most commonly caused by metastatic disease, whereas primary cardiac tumors are rare findings (Hanson, 1992). Although primary malignant cardiac tumors are only rarely seen, angiosarcoma is the most common, followed by undifferentiated sarcoma (Burke and Virmani, 1996). Due to a tendency to hemorrhage and necrosis, angiosarcoma typically presents with heterogeneous signal intensity on MR imaging (Mader et al., 1997). Myxoma is the most common benign cardiac tumor and occurs in the left atrium in approximately 86% of case (Reynen, 1996). Myxoma tends to present with increased signal intensity on T2-weighted images with areas of decreased signal intensity caused by calcification and hemosiderin (Masui et al., 1995).

In the present case, previous cardiac imaging demonstrated abnormal coronary arteries and suggested a cardiac mass. Magnetic resonance imaging strategy for characterization of masses typically consists of T1- and T2-weighted sequences. Since cardiac MR images are gated to the cardiac cycle, short TR sequences are usually proton-density weighted. For characterization of the relationship of the mass to the coronary arteries, bright blood images were acquired. Delayed myocardial enhancement images provided documentation of the extent of infarction in the right coronary artery distribution.

There was no definite enhancement of the mass that would otherwise suggest a tumor. Also bridging signal intensity between the aneurysmal right coronary artery and the right atrial mass were suggestive for thrombosed aneurysm.

Magnetic resonance imaging contributed precise information about the location of the mass, the right coronary aneurysm, and its dilated side branch. In addition, MR imaging provided information about myocardial viability with extension of the myocardial infarction and functional information about the myocardial motion. These findings contributed comprehensive presurgical information that enabled advanced planning of the open heart surgery.

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