Aortic Valve Commissural Tear Mimicking Type A Aortic Dissection

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A 52-year-old man came to the local emergency department with symptoms of heart failure and transient chest pain. Transthoracic echocardiography showed severe aortic regurgitation and a dilated ascending aorta. Aortic dissection was suspected, and he was transferred to our institution. Transesophageal echocardiography appeared to confirm the presence of a type A dissection. A mobile, linear structure was present in the proximal ascending aorta, suggesting the presence of dissection flap. Aortic cusp prolapse and severe aortic regurgitation were seen. At surgery, no aortic dissection was present. Rather, the commissure between right and left aortic valve cusps was separated from the wall of the aorta. Motion of the torn commissure with the cardiac cycle apparently led to the transesophageal echocardiographic appearance described. The ascending aorta was dilated. Histopathologic examination of the aorta confirmed the visual appearance of cystic medial necrosis. Aortic valve commissural tear is a rare event, which may lead to severe aortic regurgitation. This entity may lead to the false-positive transesophageal echocardiographic diagnosis of type A dissection. (J Am Soc Echocardiogr 2002;15:658-60.)

CASE REPORT

A 52-year-old man was evaluated in his local emergency department after 5 weeks of progressive dyspnea, exertional fatigue, and transient nonradiating, nonexertional chest pain. He had initially been treated with antibiotics and bronchodilators. He had no history of trauma. In the emergency department he was found to be in severe heart failure. Transthoracic echocardiography showed severe aortic regurgitation and a dilated aortic root. Aortic dissection was suspected, and he was transferred to our institution. On presentation here, he was dyspneic and uncomfortable. His blood pressure was 136/60. Rales were ausculted to the apices bilaterally. Loud aortic insufficiency and systolic outflow murmurs were heard.

Transesophageal echocardiography (TEE) appeared to confirm a type A aortic dissection (Figures 1 and 2). An apparent dissection flap was present a small distance above the aortic valve. It did not extend beyond the sinuses of Valsalva. Prolapse of aortic valve cusps was seen, with severe aortic regurgitation. The aorta was dilated, measuring 5.8 cm at the sinus of Valsalva level and 4.1 cm beyond the sinotubular junction. Left ventricular systolic function was normal. No other abnormalities were present.

The patient was taken to the operating room. Inspection confirmed an aneurysmal ascending aorta, measuring approximately 6 cm in diameter. It tapered off to a normal dimension before the aortic arch. The aneurysm was opened after cardioplegic arrest. No aortic dissection was present. The fibrous tissue of the commissure between right and left coronary cusps of the aortic valve had separated and detached from the aortic wall over a sector of approximately 1 cm (Figure 3). The tissues of the commissure and the cusps themselves were intact. This commissural separation appeared to produce prolapse of both right and left cusps. The aortic annulus was only minimally dilated. Because the tissues had the appearance of cystic medial necrosis and because of the uncertainty regarding the mechanism of the commissural tear, the decision was made to replace rather than repair the valve. A number 25 St. Jude Medical valve conduit was placed with reimplantation of both coronary arteries by the button technique. Subsequent pathology reports confirmed the presence of cystic medial necrosis in the ascending aorta.

The patient had an uneventful postoperative course and was discharged on oral warfarin.

DISCUSSION

In recent years, TEE has become one of the principal means by which aortic dissection is diagnosed. Very high sensitivities for the diagnosis of aortic dissection have been nearly uniformly reported.1,3 Reported

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Specificities for the diagnosis of aortic dissection were more variable in earlier studies employing single plane TEE.\textsuperscript{1,2} False-positive diagnoses of dissection have become less common with multiplane imaging.\textsuperscript{3} Generally excellent specificity for the diagnosis of aortic dissection can be expected using this newer technology.\textsuperscript{3} When false-positive diagnoses of dissection have occurred, they have nearly always been in the diagnosis of dissections involving the ascending aorta. The false-positive diagnosis of a dissection flap in the ascending aorta has been attributed to linear reverberation artifact in this region\textsuperscript{1,2} and to the presence of extensive atherosclerotic plaque.\textsuperscript{4} It is likely that multiplane imaging decreases the rate of false-positive diagnoses by allowing more complete visualization of the ascending aorta in the longitudinal plane. In any case, a false-positive diagnosis of ascending aortic dissection caused by aortic valve commissural tear, as described in our patient, has not been previously reported.

We describe here a patient with an aneurysmal ascending aorta caused by cystic medial necrosis, who showed symptoms of severe aortic regurgitation and heart failure. Aortic regurgitation occurred as a consequence of detachment from the aortic wall of the commissure (fibrous tissue at the site of union) between the right and left coronary cusps. Motion of this commissure (Figure 3) with the cardiac cycle gave the appearance of a mobile linear structure within the proximal aortic root. This appearance, and its association with a dilated aorta and severe aortic regurgitation, led to the TEE diagnosis of type A dissection.

Mechanisms of aortic regurgitation in type A aortic dissection have recently been described.\textsuperscript{5} One such mechanism is disruption of the normal anatomy of cusp attachment to aortic wall by the aortic dissection, leading to aortic cusp prolapse. This was clearly different from the mechanism of aortic regurgitation displayed by anatomic findings in our patient. Again, no intimal tear or dissection flap was present in our patient, and the site of cusp attachment was clearly separated from the aortic wall rather than merely distorted.

Aortic valve commissural tears have been rarely described in the past, though not as a cause for the false-positive diagnosis of aortic dissection. Mok et al\textsuperscript{6} reported operative findings in a patient with acute, severe aortic regurgitation. Separation of the commissure between left and right coronary cusps of a grossly normal aortic valve from the aortic wall was identified. Histopathologic examination showed an atherosclerotic plaque at the site of separation. Aoyagi et al\textsuperscript{7} reported commissural tears at surgery in 2 patients with severe aortic regurgitation and aortic cusp prolapse on transthoracic echocardiography. Commissural tear was attributed to hypertension in 1 patient. No cause was identified in the second. Sakakibara et al\textsuperscript{8} similarly reported commissural tear in a patient with severe aortic regurgitation and a history of hypertension.

Aortic valve commissural tear is a rarely reported entity that has been attributed to localized atheroma, hypertension, unknown causes and, in the current report, cystic medial necrosis. We are unaware of reports relating this entity to trauma. Aortic valve commissural tear leads to aortic cusp prolapse and severe aortic regurgitation. We have shown that the detached aortic valve commissure can appear on multiplane TEE as a mobile, linear structure in the aortic root, which can mimic the appearance of a dissection.
flap. This entity should be considered as a potential cause for the false-positive diagnosis of ascending aortic dissection. Surgical intervention may of course be warranted for both disorders.

REFERENCES


Figure 3 Schematic illustration of aortic valve commissural tear. Detachment of commissure between left and right coronary cusps is displayed in transverse (left upper panel) and longitudinal (left lower panel) planes. Normal aortic anatomy is displayed on right (upper and lower panels). iLMCA, Left main coronary artery; RCA, right coronary artery.

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