Spontaneous Nontraumatic Rupture of the Ascending Aorta
Case Report and Review

Hidetoshi Akashi, MD; Keiichiro Tayama, MD; Hiroyuki Otsuka, MD;
Satoru Tobinaga, MD; Shigeaki Aoyagi, MD

Spontaneous nontraumatic rupture of the ascending aorta occurred in a hypertensive patient. The clinical findings suggested acute aortic dissection, and echocardiography showed a large pericardial effusion. Computed tomography scanning did not indicate aortic dissection, but aortography in 3 projections revealed an area of intimal disruption similar to the niche of an ulcer. The patient underwent replacement of the ascending aorta and proximal aortic arch, and the postoperative course was uneventful. (Circ J 2003; 67: 461–463)

Key Words: Aortic dissection; Aortography; Ascending aorta; Spontaneous rupture

Spontaneous nontraumatic rupture of the ascending aorta is very uncommon, with only 11 cases, not including court-ordered autopsies and incomplete ruptures, reported. Of those, 5 patients were diagnosed at autopsy and the other 6 patients were confirmed at surgery. Until the present case, the diagnosis has not been confirmed preoperatively.

Case Report

A 66-year-old Japanese female with a history of hypertension was admitted to a hospital near her home on 29 April 1999, having collapsed with severe substernal and back pain. ECG showed no evidence of myocardial ischemia, but a chest X-ray indicated an enlarged cardiac silhouette. Acute type A aortic dissection was suspected, but she was followed up with medication in that hospital because the computed tomography (CT) scan did not show a false lumen. She was admitted to our hospital because of a second episode of severe anterior chest pain on 2 May 1999. Her blood pressure had not decreased. The echocardiogram revealed a large pericardial effusion and repeat CT scanning did not show a false channel, aortic dissection or intramural hematoma, but a small protrusion was seen in the posterolateral aspect of the ascending aorta (Fig 1) and there was a pericardial hematoma (Fig 2). Although thoracic aortography did not show aortic dissection or a false channel, an irregular posterior protrusion of the contrast media was seen in the left anterior oblique projection only. No contrast extravasation was identified (Fig 3) nor were there signs of false lumen or aneurysm. Therefore, we were convinced that the patient’s diagnosis was spontaneous rupture of the ascending aorta. Her blood pressure fell to 82 mmHg and so an emergency operation was performed.

Surgery revealed a hematoma between the main pulmonary artery and the ascending aorta. Upon entering the pericardium, we encountered clots overlaying the heart surface. The patient was placed on cardiopulmonary bypass and rapid cooling was begun. After a rectal temperature of 32°C was achieved, the ascending aorta was clamped below the innominate artery and opened longitudinally. A longitudinal tear in the intima, 5 cm in length, was found in the posterolateral aspect of the ascending aorta approximately 2 cm from the aortic valve. There was neither aneurysmal dilata-

Fig 1. CT scan shows a subepicardial hematoma (black arrow) and protrusion of the adventitia because of intimal disruption (white arrow). False channel, aortic dissection or intramural hematoma cannot be seen.

Fig 2. Pericardial hematoma and cardiac tamponade (white arrow).
tion nor dissection. The ascending aorta and proximal aortic arch were replaced because the tear extended to the arch. Cardiopulmonary bypass was discontinued and the hemodynamic status remained stable. Postoperative recovery was uneventful and the patient was discharged on antihypertensive therapy 26 days after surgery.

Histologic examination of the aortic wall showed cystic medial necrosis and atherosclerosis. Medial dissection, other than the intimal tear and a very small dissection of the adventitia, was not apparent (Fig 4).

**Discussion**

A spontaneous rupture eludes definition, but can be described as a sudden event not associated with aortic aneurysm, dissection or trauma, inflammation of the aortic wall or erosion from a neoplastic mass. None of the previous cases1–9 had the diagnosis of spontaneous rupture of the ascending aorta confirmed preoperatively or before an autopsy. The present case was correctly diagnosed by a combination of aortography in 3 projections (anteroposterior, right anterior oblique and left anterior oblique) and CT scanning. It is rare to prove intimal laceration of the ascending aorta on an aortogram taken in only one projection, and particularly difficult to show a longitudinal laceration. Therefore, the preoperative diagnosis of a spontaneous rupture of the ascending aorta depended on identifying the pericardial hematoma by CT scanning and an intimal laceration on any one of the 3 projections during aortography.

Of the 11 previously reported cases, 6 underwent surgery3–6,9 and 5 were diagnosed at autopsy. There were 5 men, 4 women; 2 cases did not have data recorded2. The 9 patients ranged in age from 47 to 76 years, with a mean of 62.4 (Table 1). All had hypertension or a history of hypertension at the onset of the rupture. The preoperative diagnosis in the 6 surgical cases was acute aortic dissection and cardiac tamponade, so establishing the correct diagnosis before surgery is an important factor affecting prognosis. We were able to diagnose the spontaneous rupture in the present case because of a previous experience7 and in both cases, an irregular posterior protrusion of contrast media without contrast extravasation was seen on the aortogram taken in the left anterior oblique projection.

CT scanning did not show aortic dissection in either the previous or the present case, so we consider it difficult to diagnose this condition by CT scanning only without aortography. However, aortography should be carried out in the 3 projections. Aortography through the femoral or brachial artery was carried out in 5 of the previous 11 reported cases3–5,7,9 and revealed focal intimal disruptions only in 4 cases4,5,7,9 and an ulcer-like projection in 1 case3.

Of the 6 previous surgical cases, only 4 cases were successful; 2 had the ascending aorta replaced, 2 had the aortic root replaced and 2 underwent direct suture of the tear. However, if the correct diagnosis can be made preoperatively, the correct choice of procedure can also be made and postoperative mortality reduced.

Murray et al have reported 56 cases of spontaneous laceration of the ascending aorta of which cystic medial necrosis of some degree was present in every case but one11. Of the 11 cases found in our literature survey1–9 cystic medial necrosis was present in 5, atherosclerosis in 3, and...
the histology was not reported in the others; the present case also showed cystic medial necrosis localized around the intimal tear.

In conclusion, spontaneous rupture of the ascending aorta should be considered in patients with clinical signs of aortic dissection. Aortography should be performed and any irregularity in the surface of the intima should not be overlooked. The presence of the pericardial hematoma on CT scan plus intimal disruption in the ascending aorta on the aortogram, in conjunction with the absence of a dissected ascending aorta by CT scanning confirms the correct diagnosis of spontaneous rupture of the ascending aorta.

References