EDITORIAL COMMENT

Aortic Intramural Hematoma: From Observation to Therapeutic Strategies*

Susanne Mohr-Kahaly, MD
Mainz, Germany

Noninvasive diagnostic imaging procedures, such as magnetic resonance imaging (MRI), computed tomography (CT) and transesophageal echocardiography (TEE) (1–5), have allowed the detection of aortic abnormalities with an extremely high morphologic image resolution and quality. The availability of one of these imaging modalities allows the use at a lower threshold of clinical likelihood, which leads to earlier detection of acute aortic abnormalities. Furthermore, the noninvasive nature of these imaging modalities allows close follow-up examinations. Because of these refined technologies, more subtle forms of the dissecting process—such as localized intramural hematoma, hemorrhage into the aortic media (AIH) or penetrating aortic ulcers (PAU) (6)—are now well-recognized abnormalities that were frequently overlooked by aortic angiography. Thus, variants of aortic dissection beyond the classic Stanford (type A and B) and DeBakey (type I, II and III types), have recently been classified by Svensson et al. (7) (type I–V) and by Erbel et al. (8) into communicating-noncommunicating, antegrade and retrograde dissection.

See page 1604

Aortic intramural hemorrhage was first described by Krukenberg (9) in 1920 as a bleeding into the outer layers of the aortic media due to rupture of the vasa vasorum without a primary intimal tear. In autopsy studies, this variety of dissection was found in 3% to 13% of cases with dissection (10,11). In recent studies (2,5,12,13), AIH is described in 13% to 23%, or in the study of Song et al. (14) published in this issue of the Journal, in 29% of consecutive cases with acute dissection of the ascending aorta, indicating that this pathophysiologic process of dissection without a primary intimal tear accounts for up to one of three to four cases of acute dissection. Studies based on CT evaluation of suspected aortic dissection reported an even higher percentage of AIH compared to classic dissection of 41% and even 53% (1,15). This high percentage is probably due in part to the inability of CT to detect low flow states in noncommunicating dissection.

Accepted diagnostic criteria of AIH are as follows: absence of a dissection membrane, a communication and Doppler flow signal but regional circular or crescentic thickening of the aortic wall >0.7 cm with central displacement of intimal calcification (5) by TEE, or high attenuation areas in CT and T2-weighted images (isodense by T1-weighted images) by MRI, without enhancement after injection of contrast media (2,3). Due to formation of methemoglobin, subacute AIH reveals a high signal intensity on both T1 and T2 images, thus allowing some temporal information of the bleeding process.

However, imaging criteria, although characteristic, will never be 100% specific. Clinical symptoms—as in acute aortic dissection—are required to differentiate AIH from subacute noncommunicating dissection with a thrombosed false channel, aortitis, tumor or soft plaques. Imaging modalities may be combined to improve sensitivity. Because clinical symptoms may be due to other diseases such as coronary artery disease (CAD), vertebral or pleuritic pain, the diagnosis of AIH may require other diagnostic procedures such as coronary angiography to exclude CAD, or short-term follow-up examinations to look for serial changes.

Wall configuration in AIH has been reported to change very rapidly (16,17). Bleeding into the aortic media may be self-limiting, but it is a dynamic process that may lead to classic communicating dissection and to aortic rupture as well as to rapid aneurysmal dilatation of the aorta or circumferential and longitudinal extension of the bleeding (13,17). In a meta-analysis of 143 cases with type A and B AIH, a mortality of 21% (30/143) occurred, which was due to aortic dissection or rupture (18) in 20 of 30 cases (67%). In earlier studies, this progression rate was even higher with 32% to 40% for type B and between 50% and 100% in type A patients (2,4,5). Due to this experience and the known risks of acute type A dissections, emergent surgical therapy was recommended in patients with type A AIH. However, this was not always possible because of old age or other diseases. In some centers, especially in Japan, patients were observed on medical therapy alone, and a more favorable outcome with a mortality of <10% (14) and complete resolution of AIH was shown. Kang, a co-author of the present article (19), reported previously a lower progression rate of only 15% and a survival of medically treated type A patients despite initial presentation with pericardial or mediastinal effusion.

The authors have addressed this issue in more detail in the present article and could show in one of the largest but still retrospectively analyzed patient collections of 24 type A cases where mortality of all type A AIH patients was 8% versus 20% for classic dissection, and mortality of medically
treated patients was only 6% versus 58% of those medically treated for classic dissection. The authors suggest that the absence of flow seems to have a beneficial effect compared to classic dissection which also has been shown earlier for classic dissection during follow-up (8).

How can these differences from earlier studies be explained? The first cause is certainly the learning curve of recognition. In earlier studies, more subtle findings of “wall-thickening” might have been overlooked. This is indicated by the percentage of intramural hemorrhage diagnosed compared to classic dissection in the study from our institution (5), and the study by Nienaber et al. (2) showing AIH in 13% of patients with dissection compared to nearly 30% in the present study. Are patients comparable? The largest recent studies reporting a high percentage of AIH compared to classic dissection and a relatively good prognosis are coming from Japan and Korea, indicating a possible “Asian factor” (14,15,17–20). Patients with AIH are older compared to those with classic dissection with a mean age of 67 versus 50 years in this study and comparable to patients’ age in our study (mean age, 70 years vs. 59 years) and to the mean age in the meta-analysis of 68 years. In this study, more female patients had AIH (79%) compared to the existing literature (25% to 39%) (5,18). However, Moriyama et al. (19) reported female gender in 44% of type A AIH from Japan. Hypertension as the most important risk factor was present in 93% of the patients in the previous study and is comparable to the literature (94%).

The high prevalence of fluid extravasates—pericardial (88%), pleural effusion (75%) and mediastinal hemorrhage (21%)—is a frequent finding in AIH patients. This indicates impending aortic rupture and is considered to be an indication for emergent surgery, due to the known risks of pericardiocectomies described by Isselbacher et al. (21). However, in recent studies (15,17), it was shown that AIH patients with tamponade who had their blood pressure closely monitored survived pericardiocectomies and their conditions improved during medical therapy.

With increasing experience, larger patient collections and frequent follow-up examinations with noninvasive imaging modalities, AIH is likely to be more frequently detected and medical blood pressure-lowering therapy can be instituted earlier. This may prevent progression to dissection or rupture and improve prognosis. One predictive factor seems to be the size of the ascending aorta at the first examination. Kaji et al. (17) have shown that patients with an aortic diameter <5 cm had regression of the hematoma during medical therapy, whereas those with a larger diameter had a tendency for progression to dissection or rupture. Another factor to consider in the decision for medical therapy of type A AIH is advanced age of the patient. Some authors (19,22) have shown that prognosis of very old patients is acceptable under medical therapy probably because of severe atherosclerosis limiting the expansion of hemorrhage under adequate blood pressure control.

Therefore, treatment strategies may be individualized (23,24) under close monitoring conditions on an intensive care unit. Symptomatic patients and those with rapid progression during follow-up and a large ascending aorta should undergo emergent surgery. However, other patients whose conditions can be stabilized with antihypertensive therapy as well as very old patients may be treated medically with good long-term results.

Reprint requests and correspondence: Dr. Susanne Mohr-Kahaly, Second Medical Clinic, University Hospital Mainz, Langenbeekstr. 1, 55101 Mainz, Germany. E-mail: mohr-kahaly@2-med.klinik.uni-mainz.de.

REFERENCES


