

Iatrogenic Localized Ascending Aortic Intimal Hematoma During Left Coronary Artery Catheterization

Edmund Kenneth Kerut, M.D.,*†‡ Chester Falterman, M.D.,*† Curtis Hanawalt,‡ Robert Frank, M.D.,‡ Charles Everson, M.D.,‡ and David Hunter, M.D.‡

*Heart Clinic of Louisiana, Marrero, Louisiana, †Departments of Physiology and Pharmacology, Louisiana State University Health Sciences Center, New Orleans, Louisiana, ‡West Jefferson Medical Center, Marrero, Louisiana

(*ECHOCARDIOGRAPHY, Volume 22, October 2005*)

iatrogenic, aortic dissection, intimal hematoma, coronary arteriography, TEE, CT, aortography

A 79-year-old male underwent diagnostic left heart catheterization and coronary arteriography for symptoms of increasing angina pectoris. The patient's cardiac history included that of coronary artery bypass surgery with three vein grafts (left anterior descending, circumflex, and right coronary arteries), and a coronary stent within the proximal portion of the left main coronary artery (so-called "protected left main"). He had a longstanding history of hypertension, hyperlipidemia, and Type II diabetes mellitus. Using 6 Fr catheters, an AL2 catheter was engaged within the left main coronary artery. After injection, "staining" of the ascending aorta and left sinus of Valsalva was noted (Fig. 1). The patient remained asymptomatic, but the procedure was then terminated.

Computed tomography (CT) revealed a subintimal hematoma from the orifice of the left main coronary artery extending cranially to about 4 cm (Fig. 2), when visualized with sequential horizontal "cuts." Transthoracic (TTE) and transesophageal echocardiography (TEE) were then performed to evaluate for a dissection flap. By TTE, there was no abnormality noted, but by TEE a subintimal hematoma was noted (Fig. 3).

The subintimal hematoma was relatively subtle to image by TEE. A dissection flap was not present.

The patient was treated nonsurgically, with aggressive blood pressure control and beta blocker therapy. Repeat CT and TEE 2 days later revealed resolution of the initial findings. The patient remained without symptoms during the hospitalization.

Iatrogenic aortic dissection with subintimal hematoma formation of the ascending aorta during cardiac catheterization is uncommon.¹⁻³ Iatrogenic dissection may also occur at the site of femoral artery catheter insertion, and progress retrogradely into the descending aorta.⁴ It may also occur secondary to coronary artery bypass grafting.^{5,6} Usually catheter-associated dissection of the sinus of Valsalva and ascending aorta occurs from retrograde coronary artery dissection at the time of coronary angioplasty or stenting.¹ Iatrogenic right coronary artery dissection is more often the culprit than left coronary artery dissection.^{1,2} Dissection of the sinus of Valsalva or ascending aorta is easily diagnosed, as persistent dye staining (Fig. 1) is typically noted in the catheterization laboratory.¹ Investigators recommend stenting of the coronary dissection entry point^{1,3} and then the ostium of the right coronary artery (all dissections involved the right coronary artery in reported cases¹).

Address for correspondence and reprint requests: Edmund Kenneth Kerut, M.D., Heart Clinic of Louisiana, 1111 Medical Center Blvd, Suite N613, Marrero, Louisiana 70072. Fax: 504-349-6621; E-mail: kenkerut@pol.net

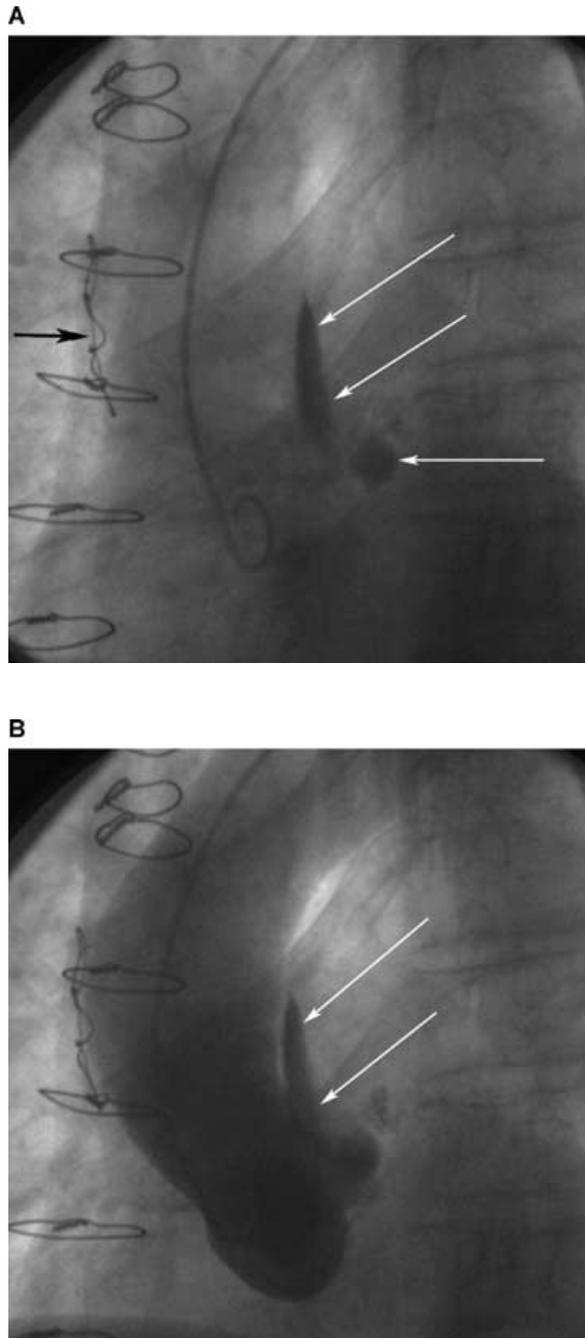


Figure 1. After noting the staining in the ascending aorta by fluoroscopy, the AL2 catheter was exchanged for a pigtail catheter. **A.** Prior to aortography, an image was obtained with the pigtail catheter in the aortic root, from a right anterior oblique (RAO) projection. Staining of the left aortic cusp and ascending aorta is noted (white arrows). The horizontal black arrow reveals surgical markers used to identify the aortic ostia of vein grafts. **B.** Aortography demonstrates a “contrast-free” space between the aortic lumen and “stained” aortic wall (arrows).

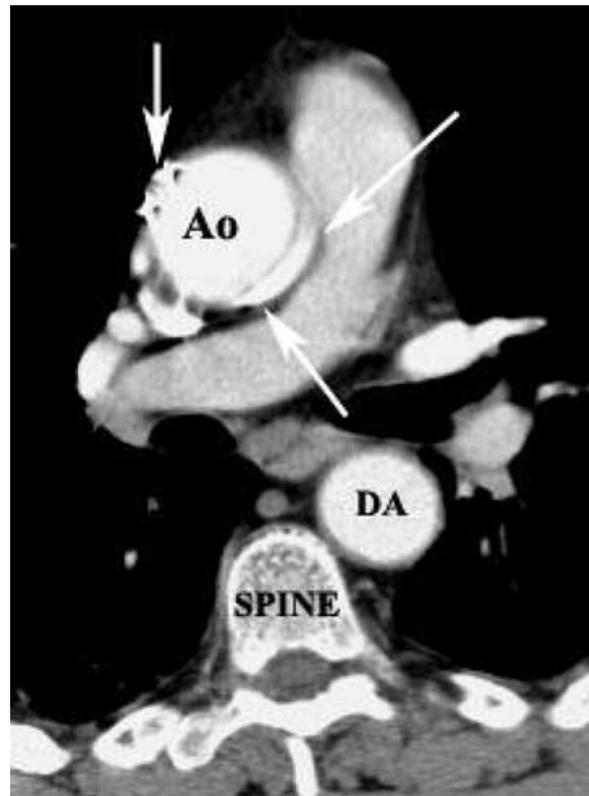


Figure 2. Transverse plane CT image with contrast demonstrates a crescent-shaped intimal hematoma (oblique arrows) within the wall of the ascending aorta (Ao). A surgical marker (vertical arrow) at the site of insertion of a vein graft is noted. DA, Descending aorta.

However, if the dissection extends >40 mm up the aorta from the coronary ostium, surgery is recommended by some.³

In the presented case, diagnosis was readily apparent during the catheterization procedure, with aortic wall “staining” noted immediately. As a left main coronary stent was already in place, it was elected to watch the patient conservatively. CT imaging was rather apparent in imaging the subintimal hematoma, but TEE findings were somewhat subtle.

Spontaneous aortic intimal hematoma (AIH) is a relatively uncommon form of classic aortic dissection, in which the aortic wall is filled with a blood clot without a detectable intimal wall tear. AIH is defined as a crescentic aortic wall thickening >7 mm when visualized in a transverse plane by TEE, along with an absence of a dissection flap, intimal tear, or penetrating atherosclerotic ulcer.^{7,8} By CT, AIH is defined as a localized segmental and crescent high



Figure 3. TEE (120°) of the proximal ascending aorta (Asc Aorta) illustrates the subintimal hematoma (arrows). Its maximum thickness measured as 13.3 mm.

attenuation area along the aortic wall on noncontrast CT, and relatively low attenuation area without enhancement on contrast-enhanced CT.^{9,10} The presented case had both CT and TEE features found in AIH. However, as spontaneous AIH usually requires months to disappear by noninvasive imaging,¹¹ this patient's aortic subintimal hematoma "disappeared" within 2 days.

Diagnosis of AIH has been described as somewhat difficult,¹² and it is suspected that there may be a significant number of "false negative" studies for this variant of acute aortic dissection.¹³

In summary, the case presented had an iatrogenic subintimal dissection of the ascending aorta, occurring during selective left main coronary artery catheterization. The proximal left main coronary artery had a preexisting stent in place. The patient was treated conservatively, with the resolution of CT and TEE findings

within 2 days. Findings by CT and TEE were consistent with AIH, a relatively uncommon variant of acute aortic dissection.

References

1. Yip HK, Wu CJ, Yeh KH, et al: Unusual complication of retrograde dissection to the coronary sinus of Val-salva during percutaneous revascularization. *Chest* 2001;119:493–501.
2. Maiello L, La Marchesina U, Presbitero P, et al: Iatrogenic Aortic dissection during coronary intervention. *Ital Heart J* 2003;4:419–422.
3. Dunning DW, Kahn JK, Hawkins ET, et al: Iatrogenic coronary artery dissections extending into and involving the aortic root. *Cath Cardiovasc Interv* 2000;51:387–393.
4. Gorog DA, Watkinson A, Lipkin DP: Treatment of iatrogenic aortic dissection by percutaneous stent placement. *J Invasive Cardiol* 2003;15:84–85.
5. Eitz T, Kawohl M, Fritzsche D, et al: Aortic dissection after previous coronary artery bypass grafting. *J Cardiac Surg* 2003;18:519–523.
6. Kong SY, Shankar S: Iatrogenic aortic dissection complicating cardiac surgery. *Asian Cardiovasc Thorac Ann* 2000;8:361–363.
7. Mohr-Kahaly S, Erbel R, Kearney P, et al: Aortic intramural hemorrhage visualized by transesophageal echocardiography: Findings and prognostic implications. *J Am Coll Cardiol* 1994;23:658–664.
8. Kang DH, Song JK, Song MG, et al: Clinical and echocardiographic outcomes of aortic intramural hemorrhage compared with acute aortic dissection. *Am J Cardiol* 1998;81:202–206.
9. Kaji S, Nishigami K, Akasaka T, et al: Prediction of progression or regression of type a aortic intramural hematoma by computed tomography. *Circulation* 1999;100(suppl II):II-281–II-286.
10. Yamada T, Tada S, Horada J: Aortic dissection without intimal rupture: Diagnosis with MR imaging and CT. *Radiology* 1988;168:347–352.
11. Nishigami K, Tsuchiya T, Shono H, et al: Disappearance of aortic intramural hematoma and its significance to the prognosis. *Circulation* 2000;102(suppl III):III-243–III-247.
12. O'Gara PT, DeSanctis RW: Acute aortic dissection and its variants: Towards a common diagnostic and therapeutic approach. *Circulation* 1995;92:1376–1378.
13. Svensson LG, Labi SB, Eisenhauer AC, et al: Intimal tear without hematoma: An important variant of aortic dissection that can elude current imaging techniques. *Circulation* 1999;99:1331–1336.