A 65-year-old black woman with hypertension and type 2 diabetes mellitus presented to her local hospital with acute chest discomfort. She had no history of connective tissue disease or family history of aortic catastrophes. An ECG showed inferior ST-segment elevation. Coronary angiography revealed multiple high-grade lesions in the right coronary artery (RCA) with evidence of thrombus (Movie I in the online-only Data Supplement). There were also critical stenoses in the left coronary system. Percutaneous coronary intervention of the RCA with 3 bare metal stents was successful in establishing Thrombolysis in Myocardial Infarction grade 3 flow, but deployment of the fourth stent was complicated by proximal RCA dissection with extension into the aortic sinuses (Figure 1 and Movie II in the online-only Data Supplement). Despite obliteration of the RCA dissection with the stent, persistent dye staining of the ascending aorta was present on final angiographic views (Figure 2). A computed tomography scan performed 2 days later showed an ascending aorta intramural hematoma (IMH; Figure 3). Plans were made for complete surgical revascularization in 6 weeks, and she was discharged. Aside from several brief episodes of chest discomfort in the first week after discharge, she remained asymptomatic. Three weeks after the initial event, the patient presented for a second opinion at our institution.

On physical examination, her pulse rate was 68 bpm and blood pressure was 100/61 mm Hg, equal in both arms. Auscultation revealed no diastolic murmur. An ECG showed no evidence of ischemia. A portable roentgenogram suggested a widened mediastinum compared with before catheterization at the previous institution (Figure 4). Transesophageal echocardiography demonstrated a type A crescentic aortic IMH (Figure 5); however, there was a point of entry...
within a calcified plaque above the RCA ostium (Figure 6 and Movies III and IV in the online-only Data Supplement). The patient was hospitalized, and magnetic resonance angiography revealed a crescentic type A IMH or aortic dissection (AD) with thrombosed lumen (Figure 7 and Movie V in the online-only Data Supplement). This extended from the right sinus of Valsalva to the origin of the brachiocephalic artery. The maximum ascending aortic diameter was 45 mm. In the operating room the next day, the anterior ascending aorta showed bluish discoloration on inspection (Figure 8). The aortic valve was trileaflet without abnormalities, but the right sinus and noncoronary sinus were dissected down to the aortic annulus with evidence of an intimal tear above the RCA ostium (Figure 9). The dissected sinuses were resuspended, and the ascending aorta was repaired with 30-mm Hemashield Dacron graft from the sinotubular junction to the proximal arch. Bypass grafting was performed. The patient recovered well after surgery and was discharged 7 days later.

Discussion

Iatrogenic coronary artery dissection extending to the coronary sinuses during percutaneous coronary intervention is observed in 0.06% to 0.1% of cases. Iatrogenic retrograde dissection into the ascending aorta during percutaneous coronary intervention is rare, reported in 0.04% of interventional procedures and 0% to 0.008% of diagnostic coronary angiographies. The majority of cases involve dissection of the proximal RCA with retrograde extension into the aorta. Clinical risk factors for coronary dissection extending into the sinuses include older age, hypertension, and calcification of the aortic root (Figure 6). Procedural risk factors for further propagation of coronary dissection include aggressive guidewire manipulation and continuous forceful contrast injection into the false lumen within the coronary (Movie II in the online-only Data Supplement). We speculate that the abrupt right coronary sinus intimal expansion caused a second intimal tear into a “weakened” area of root calcification above the RCA ostium that propagated to the ascending aorta. Another possibility is direct catheter damage of the right coronary sinus. The International Registry of Aortic Dissection Investigators reported diabetes mellitus and hypertension as clinical risk factors for iatrogenic AD and significantly fewer visualized classic intimal flaps or patent false lumens.

Figure 3. Computed tomographic coronal reformatted contrast-enhanced image showing an ascending aortic intramural hematoma (arrows) extending from the sinuses of Valsalva to the origin of the brachiocephalic artery. Ao indicates aorta.

Figure 4. Portable anterior-posterior upright chest radiographs immediately before cardiac catheterization (A) and from 3 weeks after cardiac catheterization (B). Despite a difference in patient rotation between the 2 examinations, which limited the accuracy in evaluation, there is apparent widening of the right mediastinal border (black lines) from the first (A) to second (B) radiograph.

Figure 5. Short-axis transesophageal view of the ascending aorta (Ao) at the level of the pulmonary artery (PA) bifurcation. Crescentic aortic dissection resembles intramural hematoma appearance (arrows).
compared with spontaneous AD, suggesting that iatrogenic AD often occurs in the form of IMH and may be a more focal process,3 likely related to the damage being inflicted on a healthy aorta. Nevertheless, the mortality of iatrogenic AD is no different from that of spontaneous AD and could be higher.3 Our patient had a true AD and not IMH, owing to clear evidence of an intimal tear (as opposed to primary vasa vasorum bleed of the IMH), although the initial appearance was suggestive of IMH. Although iatrogenic sinus dissection and iatrogenic focal AD may not progress and even heal,1,2 our patient’s AD was extensive and should have been treated more aggressively earlier.

Disclosures
None.

References

Figure 6. Transesophageal echocardiogram. A. The long-axis view of the aorta (Ao) demonstrates intimal disruption above the right coronary artery (RCA) ostium at the site of a calcific plaque (arrow). False lumen extends from the level of the right coronary ostium throughout the visualized aorta. B. The short-axis view again demonstrates the intimal tear (arrow) and crescentic rim of the false lumen. Lm indicates left main coronary artery.

Figure 7. Magnetic resonance (A) oblique coronal and (B) axial noncontrast balanced steady-state free-precession images showing a crescentic intramural hematoma or aortic dissection with thrombosed lumen (arrows). Ao indicates aorta.
Figure 8. Intraoperative photograph reveals bluish discoloration of the proximal ascending aorta, greater curvature (arrows).

Figure 9. Intraoperative photograph reveals a right coronary sinus intimal aortic tear (arrow) and extensive thrombosed aortic dissection lumen. AV indicates aortic valve.
Iatrogenic Aortic Dissection … or Intramural Hematoma?
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Circulation. 2012;125:e415-e418
doi: 10.1161/CIRCULATIONAHA.111.056937
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/125/9/e415

Data Supplement (unedited) at:
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