Iatrogenic aortic dissection following percutaneous coronary intervention

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Section: Cardiovascular
Area of Interest: Arteries / Aorta
Imaging Technique: CT-Angiography
Special Focus: Dissection Case Type: Clinical Cases
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Patient: 76 years, male

Clinical History:

A 76-year-old male with systemic atherosclerosis had a history of coronary artery bypass (8 years earlier) and coronary stenting (2 years earlier), and chronic exertional angina. Currently, he experienced a bout of nocturnal angina and arrived dyspneic at the emergency department. Electrocardiogram (ECG) and troponin levels weren’t consistent with acute myocardial infarction.

Imaging Findings:

Four hours after hospitalisation, the patient underwent coronary angiography which revealed chronic occlusion of the right coronary artery (RCA). Despite effectively achieving RCA recanalisation, the interventional cardiologist recognised the development of iatrogenic aortic dissection (IAD) beginning at the RCA ostium, which was treated by positioning a stent at the entry defect. Immediately thereafter, CT-angiography (Fig.1) confirmed IAD extending approximately 8.5 cm along the ascending aorta, with a non-perfused false lumen measuring 21 mm maximum thickness and containing residual contrast medium (CM) injected during coronary intervention. Considering stable vital signs and absence of active CM leakage, cardiologists opted for conservative management and strict imaging follow-up of IAD: 48 hours later repeated CT-angiography (Fig.2) showed decreased thickness and attenuation of the non-perfused aortic false lumen. The patient did not experience myocardial infarction. At discharge, CT-angiography (Fig.3) showed further decrease in thickness and attenuation of the IAD’s false lumen, persistently non-perfused.

Discussion:

Although uncommon, iatrogenic aortic dissection (IAD) is increasingly observed due to the growing number and complexity of coronary angiography (CA) and percutaneous coronary interventions (PCI) procedures performed. The reported incidence is 0.006-0.01% for diagnostic CA and 0.098-0.12% for therapeutic PCI, most usually performed (three out of four patients) to manage acute coronary syndromes. IAD mostly occurs during interventions to the RCA (76% of cases), with an incidence approaching 2% during aggressive recanalisation attempts for chronic RCA occlusion. The key mechanism is intimal injury from catheter trauma to the coronary ostium. Patients are predominantly males with multiple cardiovascular risk factors, with an average age of 69 years. Interestingly, PCI accounts for 2% of aortic dissections in the elderly [1-8].

In the majority of cases, IAD is recognised and treated during PCI by positioning a coronary stent to seal the intimal tear. Patients experience variable degrees of chest/back pain and hypotension. Emergency CT-angiography within a few hours is required for diagnostic confirmation and staging. Similarly to spontaneous aortic syndromes, when
available ECG-gated multidetector CT techniques greatly improve assessment of acute aortic abnormalities by eliminating the pulsation artifacts in the ascending aorta. As in this case, in IAD very high attenuation corresponding to CM injected during PCI is seen accumulating in the false lumen, which typically appears non-circulating, provided that the entry defect is occluded spontaneously or by stent placement. Conversely, an enhancing false lumen indicates the presence of an ongoing communication with the true aortic lumen. According to Dunning et al., IAD is graded as class I (limited to the ipsilateral aortic cusp), II (extending >4 cm up the aorta) and III (over 4 cm in length). Retrograde extension to the aortic arch (13%) or descending aorta (7%) is uncommon [1, 9-12].

Differently from spontaneous Stanford type-dissections which require immediate surgery, IAD is increasingly managed conservatively provided that the patient is stable, the coronary arteries are patent, and the dissection does not evolve. Although guidelines are debated, the key indications for emergency surgery (aortic repair, coronary bypass or both) include: a) extensive dissection; b) aortic insufficiency; c) haemopericardium; and d) CT evidence of active CM extravasation into the false lumen. Close imaging follow-up (repeated CT-angiography at 48 hours and 1 week) is recommended, and generally shows partial or complete interval resolution. After acute phase, the prognosis of IAD is excellent [1, 5, 7, 13].

Differential Diagnosis List: Iatrogenic aortic dissection following percutaneous coronary intervention, Heavily calcified atheromatous plaque, Intramural haematoma, Hemomediastinum / haemopericardium

Final Diagnosis: Iatrogenic aortic dissection following percutaneous coronary intervention

References:

Tam DY, Mazine A, Cheema AN, et al (2016) Conservative Management of Extensive Iatrogenic Aortic Dissection...
Aorta (Stamford, Conn) 4:229-231 (PMID: 28516099)
Description: Axial pre-contrast images (a,b) showed dependent, strongly hyperattenuating (>2000 Hounsfield units, HU) material (*) in the aortic root and ascending aorta, corresponding to residual contrast medium (CM) injected during coronary intervention. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
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