Severe Aortic Regurgitation After Transradial Percutaneous Coronary Intervention

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A 60-year-old man presented to a community hospital with new-onset shortness of breath after a 2-hour episode of typical chest pain. The ECG showed anteroseptal and inferior wall Q-waves. Serum troponin T levels were negative. An echocardiogram revealed anterior wall hypokinesia with left ventricular ejection fraction of 40% and no signs of valvular disease. The patient was transferred to our center for coronary angiography. Arterial access was obtained from the right radial artery. The angiogram showed mild disease of the left coronary artery and a right coronary artery (RCA) arising from the left coronary sinus. The RCA was extremely difficult to cannulate; nonselective injections revealed a long and severe stenosis of the mid segment (Figure 1 and Movie 1). After many unsuccessful attempts to cannulate the RCA with different guiding catheters, the operator decided to engage first the left coronary artery with an Amplatz 2 guiding catheter. A BMW Universal II guide wire was advanced into the left anterior descending artery (LAD) for better stability. This approach made it possible to gently pull the guiding catheter back and to position its tip at the RCA ostium. This maneuver permitted the operator to advance a Choice PT guide wire into the RCA (Figure 2 and Movie 2). However, because the system was extremely unstable, the Amplatz catheter was removed and replaced with a 6F Multipurpose guiding catheter. The RCA was engaged using the same approach as described previously for the Amplatz catheter. Balloon predilatation was then performed, and selective cannulation of the RCA was made possible after removal of the LAD guide wire, with the RCA balloon still inflated. Successful percutaneous coronary intervention (PCI) with stenting of the mid RCA was then carried out (Figure 3 and Movie 3). Cardiac MRI was performed immediately after PCI to investigate the reason for anterior wall hypokinesis in the presence of a normal LAD. Prior nontransmural anterior wall myocardial infarction and mild aortic regurgitation were present. The following day, a new diastolic regurgitation murmur was noted, and a transthoracic echocardiogram showed a new severe aortic regurgitation (Figure 4 and Movie 4). To better characterize the nature of this newly diagnosed valvulopathy, a 3-dimensional transesophageal echocardiogram was performed. The aortic regurgitation was the result of a tear and perforation of the left aortic leaflet (Figure 5 and Movies 5 and 6). Consequently, the patient underwent aortic valve replacement. The anatomopathological examination confirmed the traumatic laceration of the left aortic leaflet (Figure 6). Figure 7 nicely depicts how the tip of the multipurpose guiding catheter was pressing on the aortic cusp during the procedure. This suggests that catheter-induced direct traumatic damage was the most probable mechanism of aortic regurgitation in this patient.

Traumatic aortic valve laceration is a rare complication after cardiac catheterization. In the literature, there are 2 cases of aortic regurgitation after complicated diagnostic heart catheterization.1,2 We carried out a systematic review of all cases of aortic valve replacement performed within 2 months of a PCI at the Quebec Heart and Lung Institute, Quebec City,
Quebec, Canada, between January 2004 and January 2010. During this period, 18,354 PCIs were performed (93% radial access), and only 1 additional case was uncovered. The patient was an 84-year-old woman who underwent transradial PCI of the LAD. In this case as well, the culprit vessel was difficult to engage and multiple guiding catheters were used, including extra backup and left Amplatz catheters. Right radial approach and laceration of the left coronary leaflet were also involved in this additional case. This patient underwent uneventful aortic valve replacement.

To the best of our knowledge, this is the first report of traumatic aortic regurgitation after transradial PCI. Although an unusual complication (≈1:10,000), special care must be taken during catheter manipulation, especially when coronary arteries are difficult to engage and/or in the presence of an anomalous coronary artery. Whether the transradial approach confers an additional risk compared with femoral access in this scenario remains uncertain.

Disclosures
None.

References

Key Words: aortic regurgitation □ percutaneous coronary intervention □ transradial approach □ complex stenting □ coronary artery anomalies □ transradial intervention

Figure 2. After a first guide wire was placed into the left anterior descending artery for better stability, a second guide wire could be positioned into the right coronary artery (RCA) (A) for selective injection (B). Black arrow highlights the severe lesion in the mid portion of the RCA. LCA indicates left coronary artery.

Figure 3. Final angiogram after stent implantation.
Figure 4. Transthoracic echocardiogram performed 24 hours after percutaneous coronary intervention, showing a tear. A (arrows), One of the aortic leaflets. B, Color Doppler showing severe aortic regurgitation.

Figure 5. Three-dimensional transesophageal echocardiogram showing a perforation (arrows) of the left aortic leaflet (A, aortic view; B, ventricular view).

Figure 6. Excised aortic valve showing laceration of the left aortic leaflet (asterisk).
Figure 7. Multipurpose guiding catheter pressing on the left aortic cusp (white arrow). This is the most likely mechanism for the aortic valve damage. Black arrows highlight a 3.5 × 30-mm balloon for predilatation.
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**Supplemental Material**

**Movie Legends**

Movie 1. Non-selective injection (LAO view) showing a severe lesion in the mid portion of the right coronary artery.

Movie 2. Guidewire into the left anterior descending artery for improved stability. A 2nd guidewire is advanced into the right coronary artery for selective injection.

Movie 3. Final angiogram following stent implantation.

Movie 4. Transthoracic echocardiogram showing a tear of one of the aortic leaflets (left panel), and color Doppler showing severe aortic regurgitation (right panel).

Movie 5. Three-dimensional transesophageal echocardiogram showing a perforation of the left aortic leaflet (aortic view).

Movie 6. Three-dimensional transesophageal echocardiogram showing a perforation of the left aortic leaflet (ventricular view).