MRI-Induced Stent Dislodgment Soon After Left Main Coronary Artery Stenting

Harikrishnan Parthasarathy, MD, MRCP; Omar Saeed, MD; Danny Marcuzzi, MD; Asim N. Cheema, MD, PhD

Several studies have shown the safety of MRI after coronary stenting; however, few of them included patients soon after stenting. In this report, we describe a case of MRI-induced stent dislodgment from left main coronary artery (LMCA) 2 weeks after stenting.

Case Report

A 56-year-old woman underwent coronary angiography for recurrence of angina 12 months after coronary artery bypass graft surgery. Coronary artery bypass graft surgery had been performed with left internal mammary artery grafted to left anterior descending artery and a saphenous vein graft to obtuse marginal branch for LMCA stenosis (Figure 1). The comorbidities of patient included hypertension, dyslipidemia, diabetes mellitus, and prior neurosurgery for a pituitary adenoma. The repeat angiogram showed known stenosis in LMCA, nonobstructive disease of left anterior descending artery and right coronary artery, patent saphenous vein graft to obtuse marginal branch, and an occluded left internal mammary artery (Figure 2). After discussion, stenting of the LMCA with a 3.5×8 mm drug-eluting stent (Cypher; Cordis Corp, Markham, Ontario) was deployed after predilatation under intravascular ultrasound guidance (Figure 3).

The patient underwent MRI of the head in a 1.5-Tesla scanner for surveillance of pituitary pathology 2 weeks after stenting. Follow-up angiography (Figure 4) was performed to investigate the symptoms of chest pain and assess stent patency. The implanted stent could not be visualized in the LMCA on angiography, and an intermediate residual stenosis was observed. A whole-body screening computed tomography was performed to locate the missing stent that was successfully identified in the proximal branch of the left iliac artery (Figure 5). In the absence of symptoms for arterial insufficiency, no attempt was made to retrieve the embolized stent. Normal perfusion on repeat nuclear imaging confirmed that residual LMCA stenosis was not hemodynamically significant, and patient was continued on medical therapy with no clinical events occurring during long-term clinical follow-up.

Discussion

To our knowledge, this is the first report of coronary stent dislodgment related to an MRI procedure. Although the clinical implications of stent dislodgment can be serious, fortunately no adverse consequences were observed in this case as the stent migrated to a peripheral vessel in pelvis, an area with significant collateral circulation.

Safety of MRI After Coronary Stenting

Careful screening of patients undergoing MRI is mandated in patients with metallic objects and implants.1 To improve safety, all implant devices are classified as MR safe, MR conditional, or MR unsafe based on the hazard posed in strong magnetic fields. The stents are composed of metal alloys, such as stainless steel, tantalum, nitinol, cobalt, titanium, chromium, and nickel, which are weak ferromagnetic metals and classified as MR conditional, which means that there is no known hazard in a specified MR environment within standard use. The currently available stents are predominantly made of 316 low-carbon stainless steel (316L) and titanium. Steel 316L contains nickel (10%–14%) that diminishes the occurrence of ferromagnetism. Factors influencing the risk of MRI with metallic implants are (1) strength of the static magnetic field, (2) gradients of the magnetic field, (3) degree of ferromagnetism, (4) geometry of device, and (5) the location and orientation of the implant in situ during MRI.2 Several studies have reported on the safety of 1.5- to 3-Tesla MRI for coronary stents, but few included patients soon after stenting.3

Potential Mechanism of Stent Dislodgment After MRI

Despite the demonstrated safety of MRI for most patients with coronary stents, we advise careful risk assessment. A short stent at an aorto-ostial location, use of drug-eluting stent with delayed endothelial coverage, and a short time of MRI after stenting are high-risk features for an adverse effect in a strong magnetic field.

Conclusions

The available evidence supports the safety of MRI after coronary stenting in general. However, careful risk assessment should be undertaken for an individual patient with regard to the type and location of stents and the timing of MRI after stenting.
Disclosures

None.

References


Key Words: coronary artery disease ■ magnetic resonance imaging ■ percutaneous coronary intervention

Figure 1. Baseline coronary angiography. Baseline coronary angiography showing a significant and eccentric left main coronary artery (LMCA) stenosis (A) that was managed by surgical revascularization. Right coronary artery showed no significant plaque (B). Arrowhead indicates stenosis in the LMCA.

Figure 2. Repeat coronary angiography with intravascular ultrasound of the left main coronary artery. Repeat coronary angiography 12 months after coronary artery bypass graft surgery showed previously known stenosis of left main coronary artery (LMCA; arrowhead), nonobstructive disease of left anterior descending artery and circumflex (A), minor plaque of the right coronary artery (B), patent vein graft to obtuse marginal branch (C), and occluded left internal mammary artery graft (D). Intravascular ultrasound of LMCA (E) confirmed an eccentric plaque with significant stenosis (minimal lumen diameter, 2.5 mm; minimal lumen area, 5.1 mm²). C indicates intravascular ultrasound catheter; line with 2 arrowheads, minimal lumen diameter; and P, eccentric plaque.

Figure 3. Follow-up coronary angiography with stenting of the left main coronary artery under intravascular guidance. PCI of the left main coronary artery (LMCA) with drug-eluting stent that was postdilated with a noncompliant balloon with excellent angiographic result (A–E). Intravascular ultrasound (IVUS) images showed appropriate stent sizing, adequate and symmetrical expansion (F), and stent struts extending proximal to the ostium of LMCA in cross-sectional (G) and longitudinal views (H). Arrowheads indicate stent struts extending proximal to the ostium of LMCA; C, IVUS catheter; PCI, percutaneous coronary intervention; and S, stent struts. *Well-expanded stent struts with good apposition to the vessel wall (minimal lumen diameter, 4 mm).

Figure 4. Follow-up coronary angiogram after MRI. Follow-up coronary angiogram showed absence of previously implanted stent (A) and an intermediate residual stenosis in the left main coronary artery (B). Arrowheads indicate previously stented segment.

Figure 5. Noncontrast computed tomography of abdomen and pelvis showing dislodged stent. A whole-body noncontrast computed tomography identified the dislodged stent in the proximal part of left internal iliac artery (arrowheads). The stent location is shown in transverse (A), coronal (B and C), and sagittal planes (D).
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