The patient is a 34-year-old woman, para 3, gravida 3, with dyslipidemia and former tobacco use, who 1-week postpartum experienced an acute myocardial infarction. Initial angiography revealed a left main (LM) artery dissection with probable subintimal hematoma extending into the proximal left anterior descending (LAD) and left circumflex (LCX) coronary arteries (Figure 1A). Left ventriculography revealed anterior and apical akinesis with an ejection fraction of 30%. Because definitive therapy with percutaneous revascularization carries the risk of dissection extension and occlusion and because there was minimal luminal encroachment and TIMI (thrombolysis in myocardial infarction) flow grade 3, we elected for medical therapy, including aspirin, and further observation. Also controversially, we elected not to anticoagulate because of the theoretical potential to maintain false lumen patency.

Because of the high-risk nature of the problem and the unpredictable natural history, surveillance angiography 1 week after myocardial infarction was performed and revealed obvious progression of the LM dissection flap into the proximal LAD and LCX arteries, with significant luminal narrowing and TIMI 2 flow in the LAD artery (Figure 1B). Therefore, the patient was scheduled for urgent coronary artery bypass graft surgery, receiving 3 grafts: a left internal mammary artery to the LAD and vein grafts to the diagonal and obtuse marginal (OM) branches.

As part of her follow-up, the patient underwent a cardiac CT angiography (CCTA) 1-month after the coronary artery bypass graft surgery, which suggested an occluded diagonal vein graft and the development of an LM pseudoaneurysm (Figure 2A). A repeat CCTA 7 months later suggested enlargement of the pseudoaneurysm (Figure 2B). An elective coronary angiogram was performed to further evaluate the patient’s coronary anatomy. The ejection fraction had improved to 55%. There was a 40% stenosis in the LM with what appeared to be a large pseudoaneurysm (Figure 3A and Movie 1). The LAD, LCX, and right coronary artery had minimal disease. The left internal mammary artery was patent but was small and atretic (<1.5 mm) with competitive flow. The vein graft to the diagonal branch was chronically occluded. The vein graft to the OM branch was widely patent with good retrograde flow into the LAD.

Because of the wide neck of the pseudoaneurysm, which was unlikely to be excluded with conventional percutaneous coronary intervention, we elected to proceed with a covered coronary stent (JOSTENT GRAFTMASTER Coronary Stent Graft System; Abbott Vascular Inc; Murrieta, CA) to the LM artery. Because use of the covered stent would be off label, approval for use was obtained for a Humanitarian Device Exemption through the Internal Review Board.

Before the procedure, an intravascular ultrasound was performed to accurately measure the diameter (3.27 mm) and length (13.9 mm) of the LM artery (Figure 4).

Figure 1. A, Initial angiography suggests left main coronary dissection (X). Narrowing of the proximal left ascending (Y) and proximal left circumflex (Z) coronary artery segments compared to the corresponding midsegments suggests intramural hematoma. B, Surveillance angiography 1 week later reveals clear extension of dissection into left circumflex artery and near obliteration of the mid-left ascending artery (arrow).
Stenting was then performed with a 3.0 mm × 16 mm stent. In an attempt to ensure LCX patency, a retrograde injection through the OM vein graft was performed before balloon inflation, paying particular attention to the distal stent edge (Figure 3B and Movies 2 and 3). After high-pressure balloon inflation, intravascular ultrasound revealed a widely patent stent. Final angiography showed complete obliteration of the LM pseudoaneurysm, with TIMI 3 flow into the LAD artery and successful maintenance of patency at the LCX ostium (Figure 3C and Movie 4). Subsequent elective coronary angiography 3 months later revealed a widely patent stent and preserved coronary grafts (Figure 3D).

Discussion
The present case illustrates the rare postpartum complication of coronary artery dissection. In 1 series, 16% of pregnancy-related MIs were attributed to coronary dissection. Although the patient had adequate revascularization with coronary artery bypass grafting, an LM pseudoaneurysm developed as a sequela.

The natural history of LM pseudoaneurysm, if left untreated, is unknown. Given the finding of enlargement over a relatively short period by CCTA, the chance of spontaneous rupture was a concern. The literature pertaining to the use of CCTA for evaluating coronary artery aneurysms and pseudoaneurysms is sparse and limited to case reports and descriptive reviews. To our knowledge, the present study is the first to document the application of CCTA for serial evaluation of known lesions. The technique has several benefits that may make it suitable to follow pseudoaneurysms serially: (1) It is noninvasive, and using current technology, the radiation dose is relatively modest; (2) data are acquired as a 3D volume, allowing multiplanar morphological comparison between studies; and (3) it provides information beyond lumenography, including the presence and extent of mural thrombus.
Although conventional stenting for LM pseudoaneurysm has been used, it usually is performed in the acute phase when the goal is to seal a dissection plane. In the present patient, intravascular ultrasound images revealed a well-healed dissection plane and a very wide pseudoaneurysm neck, necessitating use of a covered stent to ensure complete exclusion. To minimize the risk of periprocedural pseudoaneurysm rupture, primary stenting with the covered stent was planned. One potential problem with primary stenting is the possibility of inadequate visualization of distal edge position with antegrade injection before stent deployment. With an estimated 30% restenosis rate of the LM covered stent and the potential for left internal mammary artery occlusion, 1 goal was to ensure LCX patency, allowing the OM vein graft to provide potential future flow into the LAD artery. Therefore, dual femoral artery access was used to allow retrograde injection through the OM vein graft after stent positioning but before deployment (Figure 3B and Movies 2 and 3).

By definition, a pseudoaneurysm is an encapsulated hematoma that communicates with the arterial lumen because of incomplete sealing of the media. Therefore, a coronary dissection left untreated carries the potential risk of this adverse outcome and should be considered in the follow-up care of patients. In the present case, covered stenting was successful in excluding the pseudoaneurysm and maintaining patency of the LCX ostium. Although widely patent at 3 months, the restenosis process may not be complete, and future elective angiography is planned.

Disclosures
None.

References

Key Words: myocardial infarction catheters stents imaging angiography ultrasonography
Left Main Pseudoaneurysm After Postpartum Coronary Dissection
Wayne B. Boyer, Michael K. Atalay and Barry L. Sharaf

Circ Cardiovasc Interv. 2011;4:303-305
doi: 10.1161/CIRCINTERVENTIONS.110.960351
Circulation: Cardiovascular Interventions is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2011 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-7640. Online ISSN: 1941-7632

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circinterventions.ahajournals.org/content/4/3/303

Data Supplement (unedited) at:
http://circinterventions.ahajournals.org/content/suppl/2011/06/09/4.3.303.DC1

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation: Cardiovascular Interventions can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation: Cardiovascular Interventions is online at:
http://circinterventions.ahajournals.org/subscriptions/
SUPPLEMENTAL MATERIAL

Video Legend

Cine 1. Angiographic assessment of pseudoaneurysm
Cine 2. Positioning of distal stent edge, utilizing retrograde injection
Cine 3. Assessment of distal stent edge and left circumflex ostium with retrograde injection
Cine 4. Final angiography revealing pseudoaneurysm obliteration