Spontaneous coronary artery dissection (SCAD) is an infrequent cause of acute coronary syndromes but is represented disproportionately in young female patients. No specific guidelines exist concerning the appropriate treatment (medical therapy, intracoronary stents, coronary bypass surgery) or the optimal type of stents in otherwise atheroma-free vessels. The role of intracoronary imaging with intravascular ultrasound (IVUS) and optical coherence tomography (OCT) has yet to be fully established.

**Figure 1.** A, Distal normal left anterior descending (LAD) artery. The intact normal arterial wall was shown well by both modalities (arrow on optical coherence tomography [OCT] image. B, Distal dissection. Intravascular ultrasound (IVUS) images showing intramural hematoma and luminal compression, but it was unable to demonstrate the intimal flap. OCT showed clearly the distal exit point of the dissection with the intimal flap and communication between the intramural hematoma and true lumen (arrow). C, Mid-LAD dissection. A large crescent-shaped eccentric hematoma (*). IVUS showed well the inner lumen (thick arrow) and external vessel reference (thin arrow); OCT showed the hematoma compression and demonstrated the integrity of an otherwise disease-free intima but did not reveal the vessel reference diameter as clearly as IVUS. D, Normal proximal LAD. OCT measurement of reference lumen area and diameter for stent sizing are shown.
A 39-year-old woman with no traditional risk factors for coronary artery disease presented with an anterior ST-segment elevation myocardial infarct after undergoing rigorous aerobic exercises. The patient was gravida 3 para 3, not known to be pregnant, and not postmenopausal. Her last pregnancy was 5 years earlier, and subsequent β human chorionic gonadotropin was negative. Coronary angiography suggested a long spiral dissection in the left anterior descending artery. Her other coronary arteries were smooth walled with no evidence of atherosclerosis. With ongoing symptoms and persisting ST elevation of the surface ECG, percutaneous coronary intervention (PCI) was undertaken on this culprit lesion. To confirm coronary dissection and provide guidance for intervention, intracoronary imaging was undertaken with IVUS and OCT. Imaging with IVUS was performed using an iLab ultrasound imaging system (Boston Scientific; Boston, MA), whereas OCT was performed using the C7 Dragonfly Imaging Catheter (LightLab Imaging; Westford, MA).

IVUS and OCT images were capable of confirming the presence of SCAD, demonstrating the longitudinal extent and location of the intramural hematoma (Figure 1). The additional resolution from OCT imaging allowed confirmation of the wire position before the placement of stents (Figure 1C) as well as showed clearly the distal exit of the dissection and the intimal flap (Figure 1B).

Figure 2. Coronary angiogram showing the final result after 4 drug-eluting stents were placed in the left anterior descending artery (LAD), restoring completely the luminal patency of the LAD. Optical coherence tomography images at corresponding levels are as follows: A, distal stent edge showing well the apposed struts, covering distal exit of dissection; B, no extension of hematoma into side branch; C, compared to previously identified luminal compression, obliteration of intimal flap and restoration of lumen; D, tissue prolapse seen acutely on stent implant (previously identified hematoma area nearly completely obliterated by stent [*]); and E, proximal stent edge showing well symmetrically apposed stent struts.

A series of drug-eluting stents were placed in an overlapping fashion from distal to proximal vessel to cover the dissection (2.25X8, 2.25X24, 3.0X15, 3.0X9; Endeavor Resolute stents; Medtronic Inc; Edgewater, MN). A good angiographic result was achieved with containment of the dissection proximally and distally and no propagation of hematoma proximal or distal to the stents. OCT imaging confirmed that the stents were successful in sealing the distal dissection (Figure 2) as well as revealed the soft hematoma being indented by the stents (Figure 2D) and the satisfactory apposition of stent struts to the intima with minimal residual intramural hematoma (Figure 2E).

Intracoronary imaging has been advocated by some to be incorporated into the assessment algorithm for SCAD. It has been previously reported in a large database that IVUS improves the detection of angiographically silent SCAD, although such data currently do not exist for OCT. The benefits of intracoronary imaging in PCI include confirmation of diagnosis, differentiation of true and false lumen, determination of the extent of intramural hematoma, and accurate measurement of stent length required. OCT, with its additional resolution, may be particularly suited to this application in SCAD. The OCT application for PCI in SCAD could potentially prevent excessive or inadequate stent coverage, and avoid inadvertently sealing of the intimal flap prematurely and propagating the hematoma subintimally.
OCT may be a useful intracoronary imaging modality to
guide PCI in suspected SCAD lesions.

**Disclosures**
Prof Jang has received research grants $>10,000 USD from LightLab
Imaging, Medtronic Inc, and Abbott Vascular. Drs Poon, Bell,
Raffel, and Walters report no conflicts of interest.

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**Key Words:** ultrasonography ▪ tomography optical tomography
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_Circ Cardiovasc Interv._ 2011;4:e5-e7
doi: 10.1161/CIRCINTERVENTIONS.110.959593

_Circulation: Cardiovascular Interventions_ is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 1941-7640. Online ISSN: 1941-7632

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