Complete Healing of Spontaneous Coronary Artery Dissection: Serial Follow-up Using Angiography, Intravascular Ultrasound, and Optical Coherence Tomography

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ABSTRACT: Spontaneous coronary artery dissection (SCAD) is a rare cause of acute coronary syndrome with the pathophysiology and prognosis remaining poorly understood. We report here a SCAD case, in which serial angiography, intravascular ultrasound, and optical coherence tomography demonstrated its complete healing.

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Spontaneous coronary artery dissection (SCAD) is a rare cause of acute coronary syndrome (ACS) and should be suspected in young females without coronary risk factors. Spontaneous coronary artery dissection is usually thought to be associated with various pathophysologies such as atherosclerosis, intense exercise, collagen disease, and pregnancy, as well as with the postpartum period. In addition, the details of the cause, prognosis, and treatment are not clearly defined. Recent studies, however, have reported that SCAD may be closely related to fibromuscular dysplasia (FMD) and that a conservative management strategy, defined as selecting revascularization only for patients with ongoing or recurrent ischemia, provided a good long-term prognosis.1-3 Herein, we describe a case of non-ST-segment elevation myocardial infarction from SCAD that healed completely with conservative therapy.

CASE DESCRIPTION
A 47-year-old premenopausal female presented complaining of having suffered chest discomfort for 6 hours the previous day. The patient was an ex smoker but had no other risk factors for coronary artery disease. She had no prior history of pregnancy, medication, intense exercise, connective tissue disease, or family history of coronary artery disease but had noted that she had eaten extremely spicy food the day before which was followed by heavy sweating. An electrocardiogram showed no ST-segment elevation but she received the diagnosis of acute myocardial infarction.
as a result of her elevated cardiac enzymes (creatine kinase [858 U/L; 40-170 U/L], creatine kinase-MB [103.7 ng/mL; 0-5.0 ng/mL], troponin T [1.11 ng/mL; 0-0.10 ng/mL]) and a reduced wall motion of posterolateral left ventricle with ejection fraction (EF) of 55% estimated by echocardiography. Emergent coronary angiography (CAG) showed a longitudinal radiolucent linear image (intimal flap) and a severe stenosis, which suggested the features of SCAD in the left circumflex artery (LCX) with TIMI-3 flow with other coronary arteries having no atherosclerotic change (Figure 1). Lack of symptoms, ST-segment elevation, or coronary flow disturbance led to selection of conservative therapy. The patient was treated with aspirin, imidapril, carvedilol, and pravastatin, and she completed a cardiac rehabilitation program uneventfully with no examinations showing fibromuscular dysplastic lesions in the renal, iliac, carotid, or cerebral arteries. One-month follow-up CAG revealed healing of the SCAD findings with a restored normal coronary flow. Intravascular ultrasound (IVUS; Atlantis SR Pro2, Boston Scientific) and optical coherence tomography (OCT; ILUMIEN OCT Imaging System, St. Jude Medical) demonstrated a double-lumen morphology or an image of intimal flap with an intramural hematoma, which established the diagnosis of SCAD of the LCX with insignificant compression of the true lumen, which supported the strategy of conservative therapy (Figure 2). Seven-month follow-up CAG, IVUS, and OCT demonstrated a complete resolution of the above SCAD findings (Figure 3), resulting in a diagnosis of complete healing of the SCAD. Serial echocardiography calculated EF of 62% at 1 month and 66% at 7 months.

**DISCUSSION**

While the usefulness of IVUS and OCT to detect SCAD has been well known, the serial follow-up of SCAD resulting in complete healing has not been reported. Spontaneous coronary artery dissection is a rare cause of ACS frequently seen in young women without coronary risk factors. Although the most common conditions associated with SCAD are considered to be coronary atherosclerosis and the peripartum period, a recent study suggests FMD may also be associated with it. However, the details of the cause as well as prognosis or treatment including emergency revascularization and long-term pharmacological therapy are not yet clearly defined. In terms of emergency treatment for SCAD, revascularization should be applied if ongoing ischemia is detected, which is very similar to atherosclerotic acute coronary syndromes. In contrast, according to a recent study showing that percutaneous coronary intervention for SCAD in an emergency set-

![Figure 1. First coronary angiography showed severe stenosis and a contrast pooling (white arrow) in the left circumflex artery.](image-url)
Figure 2. Intravascular ultrasound and optical coherence tomography images of the left circumflex artery. Asterisk (*) indicates intramural hematoma in the false lumen; SB, side branch.

Figure 3. Vasa vasorum in a completely healed vessel (white arrow).
ting is often complicated by technical failure especially in crossing a wire, conservative approach would be a choice for those without ongoing ischemia. Based on this evidence, we decided to treat this particular case conservatively. On the other hand, we need to consider that in case of extremely high-risk anatomy such as left main coronary artery involvement, aggressive revascularization strategy should be applied. Based on reports from Alfonso et al that SCAD may spontaneously heal at long-term follow-up, we performed CAG, IVUS, and OCT at 7 months again, which demonstrated complete healing of SCAD. To the best of our knowledge, this is the very first reported case of spontaneously healed SCAD with unique intracoronary images. Intravascular ultrasound and OCT could not detect an entry point of SCAD at 1-month follow-up, possibly because the intimal tear had already healed. In our particular case, a vasa vasorum was detected in a completely healed vessel wall where dissection had existed. These findings may support a hypothesis that hemorrhage of vasa vasorum is responsible for SCAD.

CONCLUSION

Serial angiography, IVUS, and OCT demonstrated a complete healing process of SCAD.

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