Noninvasive Follow-Up of Patients With Spontaneous Coronary Artery Dissection With CT Angiography

Spontaneous coronary artery dissection (SCAD) is a rare cause of acute coronary syndrome with a pathophysiology that is not well understood (1). Published series suggest an excellent prognosis in patients with conservative therapeutic strategy, albeit rates of recurrence are not negligible (2). The objective of the present study was to assess the feasibility of computed tomography angiography (CTA) in evaluating the resolution of SCAD.

This is a prospective registry conducted in a single center. From 2009 to 2013, all consecutive patients with suspected coronary artery disease undergoing coronary angiography with angiographic findings suggesting SCAD were included. Patients with SCAD were classified following previously reported criteria (3). Intravascular ultrasound or CTA was not performed for all dubious angiographies, implying a possible loss of cases.

All patients were treated with a conservative approach, and only those with persistent chest pain and severe disruption of the artery flow were acutely revascularized.

A CTA with a 64-slice CT was scheduled for all patients 3 to 6 months after the event. All patients provided written informed consent, and the protocol was approved by the local ethics committee. Scan parameters were as previously described (4).

A total of 34 patients were included, representing 0.2% of all angiographies performed. Mean age was 47 ± 12 years, and 94.1% of patients were women. A low rate of classic atherosclerotic risk factors was found. Nearly 15% of patients presented the initial episode in a postpartum period. ST-segment elevation myocardial infarction was the clinical presentation diagnosis in more than 55% of patients. Left anterior descending coronary artery was the most common affected vessel.

Eight patients of the overall population (23.5%) underwent percutaneous coronary intervention (PCI) during the index hospitalization. The procedure was considered successful in 6 of these subjects, achieving a final coronary Thrombolysis In Myocardial Infarction (TIMI) flow grade 3. The other 2 patients were considered to have undergone an unsuccessful PCI, finishing with persistent coronary dissection and TIMI flow grade 1.

CTA was performed in 24 patients (71%) at a median follow-up of 121 days (interquartile range: 99 to 130 days) after SCAD without any procedural complication. Figure 1 shows the study flow chart. CTA showed complete healing of the coronary dissection in 20 patients (83%; 18 of the conservative group and 2 of the PCI group).

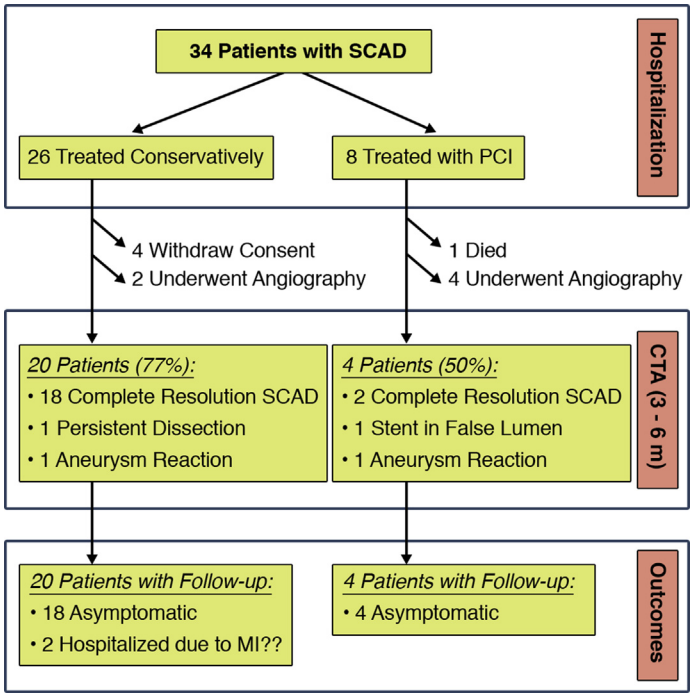
One asymptomatic patient treated with conservative management showed persistent dissection of the left anterior descending coronary artery. Another patient treated conservatively had an aneurysm reaction in the location of the coronary dissection. Neither of these patients was treated.

In the PCI group, 1 patient with stents implanted in the right coronary artery presented an occlusive in-stent restenosis with patent distal vessel due to subintimal implantation. True lumen remained patent persistent. Follow-up CTA of another patient treated with balloon angioplasty with an unsuccessful procedure showed a patent right coronary artery but with evidence of an aneurysm in the proximal segment.

Five patients underwent follow-up invasive angiography due to physician criteria; all but 1 presented no evidence of persistent coronary artery dissection. One patient presented in-stent restenosis with persistent coronary artery dissection in 2 major coronary arteries.

A total of 20 patients presented a normal follow-up CTA, and only 1 patient presented a recurrent

FIGURE 1 Noninvasive Follow-Up of SCAD



Study flow chart. MI = myocardial infarction; PCI = percutaneous coronary intervention; SCAD = spontaneous coronary artery dissection.

dissection of a secondary branch 20 months after the initial event.

To the best of our knowledge, this is the first study reporting a large series of patients with SCAD with a noninvasive angiographic follow-up. This technique appears to be an excellent follow-up technique, free of complications, and allows confirmation of vessel wall healing among most of the patients, but especially those that did not receive PCI. Moreover, patients without signs of dissection in the CTA performed at 3 to 6 months after the SCAD episode had excellent prognosis at long-term follow-up. Invasive coronary angiography of patients with SCAD is risky because the injection of contrast at high flow can make the possible persistent intimal flap progress. CTA is a noninvasive technique that can be of great usefulness in assessing the patency of coronary vessels at follow-up.

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Detection of Deep Venous Thrombosis Using a Pocket-Size Ultrasound Examination Device

Early and accurate diagnosis of deep vein thrombosis (DVT) is required for prognostication and appropriate clinical management. Ultrasound examination is well recognized as an initial screening imaging modality for the presence and extent of DVT (1). Advances in electronic miniaturization have resulted in the advent of a pocket-size ultrasound examination (PUE) device (2,3) equipped with a linear array transducer. The present study investigated the feasibility and accuracy of the PUE for the diagnosis of DVT compared with the standard ultrasound examination (SUE).

Sixty-one consecutive patients (20 men; age 79 ± 9 years) were scheduled for SUE for the screening of DVT. They had a PUE immediately after the SUE. This study was approved by the ethics committee of the Baba Memorial Hospital. PUE was performed using the Vscan Dual Probe (GE Medical Systems, Milwaukee, Wisconsin), which was equipped with a 3.4- to 8.0-MHz linear array transducer and sector transducer. Compression ultrasonography was conducted in the standard manner. Investigators scanned 4 predefined segments, including the iliac, femoral, popliteal, and peroneal, tibial, and soleal veins. Thrombus was diagnosed as a lack of compressibility, visualization of an intraluminal echo-dense mass, vein dilation, filling defects on Doppler method, or a combination thereof. In cases with DVT, the maximum thickness of the thrombus was measured in each segment.

Pearson's correlation coefficient and Bland-Altman analysis were used to evaluate the correlation of the measurement of DVT thickness between PUE and SUE. Differences were considered significant at $p < 0.05$.

Of the 61 patients (122 lower extremity veins), the feasibility of PUE was 94% for visualizing the iliac vein, 98% for the femoral vein, 100% for the popliteal vein, and 96% for the peroneal, tibial, and soleal veins. The mean time for PUE examination was 7.4 ± 3.0 min. SUE identified 33 DVTs in 16 patients. Numbers of DVT at the different segmental levels were as follows: iliac vein in 11 segments, femoral vein in 11 segments, popliteal vein in 6 segments, and soleal veins in 5 segments (none in the peroneal and tibial veins). All DVTs in the iliac, femoral, and/or popliteal vein were detected using the PUE, resulting in a sensitivity of 100% and a specificity of 100%. However, 1 DVT in the soleal vein was missed using the PUE (80% sensitivity and 100% specificity for the peroneal, tibial or soleal vein level). Pearson's correlation coefficient showed a strong correlation in DVT thickness between SUE and PUE ($r = 0.94$, $p < 0.001$). In the Bland-Altman analysis, the 95% limits of agreement of DVT thickness was 0.36 ± 1.65 mm (mean ± 1.96 SD). The thickness of the missed DVT was 4.4 mm, whereas PUE-detectable DVT was 7.1 ± 2.2 mm. A representative case is shown in **Figure 1**.