Combined Use of OCT and IVUS in Spontaneous Coronary Artery Dissection

Manuel Paulo, MD, Jorge Sandoval, MD, Vera Lennie, MD, Jaime Dutary, MD, Miguel Medina, MD, Nieves Gonzalo, MD, Pilar Jimenez-Quevedo, MD, Miguel, Javier Escaned, MD, PhD, Camino Bañuelos, MD, Rosana Hernandez, MD, PhD, Carlos Macaya, MD, PhD, Fernando Alfonso, MD, PhD

SPONTANEOUS CORONARY ARTERY DISSECTION (SCAD) REPRESENTS A DIAGNOSTIC CHALLENGE (1,2). In this study, we used a combined imaging strategy, intravascular ultrasound (IVUS) and optical coherence tomography (OCT), in 8 patients with SCAD. The diagnosis of SCAD required the visualization of an intimomedial membrane with a double-lumen or intramural hematoma (Figs. 1, 2, and 3). Their mean age was 50 ± 10 years, 6 patients were female, and all presented with acute coronary syndromes. Angiographically, all patients had diffuse lesions (38 ± 23 mm), but only 1 showed a radiolucent flap. Both imaging techniques clearly depicted the true and false lumens (Figs. 1, 2, and 3). OCT was superior to IVUS in the identification of intimal ruptures and intraluminal thrombi (Table 1). OCT nicely depicted the false lumen/intramural hematoma, but its full extension could not be measured in some areas because of residual blood, shadowing, or insufficient penetration. On IVUS, the lumen-intimal interface was not as sharply delineated, but this technique enabled a more complete vessel visualization with significantly longer assessment of the diseased segment and larger false lumen areas (Table 1). In 5 cases, IVUS unraveled a characteristic heterogeneous pattern within the false lumen (Fig. 3). In 2 patients, the dissecting membrane had blurred trailing edges on OCT, whereas IVUS revealed a characteristic 3-layered appearance overhanging a darker thrombosed false lumen (Fig. 2). After stenting (n = 3), residual abluminal and distal hematomas were well detected with both techniques, but malapposed struts were more clearly visualized by OCT (Table 1). Our findings suggest that the combined use of OCT and IVUS provides valuable, unique, and complementary diagnostic insights on the pathophysiological substrate of SCAD.

From the Interventional Cardiology Unit, Cardiovascular Institute, Clínico San Carlos, University Hospital, Madrid, Spain. Dr. Escaned is a speaker for St. Jude Medical. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.
Figure 1. Combined Intravascular Imaging in a Patient With Suspected SCAD

(A) Angiographic image of a long lesion in the left anterior descending coronary artery suggestive of spontaneous coronary artery dissection (SCAD). The proximal aspect of the diseased segment shows an intimomedial membrane and a double lumen appearance by optical coherence tomography (OCT) (B) and intravascular ultrasound (IVUS) (B'). At this site, the complete vessel is visualized by both techniques, although thrombus in the false lumen is more clearly depicted by IVUS. (C) More distally, OCT detects a severely narrowed lumen and a side branch exit from the true lumen (4 o'clock position). The thickness of the intimomedial membrane is well visualized (5 to 11 o'clock position), but severe attenuation prevents visualization of dorsal structures. (C') IVUS displays the false lumen content better and detects the side branch take off from the true lumen (3 o'clock position). *Denotes wire artifact.

Figure 2. Combined Intravascular Imaging in a Patient With Normal Angiography Findings

(A) Angiographically silent spontaneous coronary artery dissection (SCAD). (B, C) Optical coherence tomography: images of intramural hematoma. The external elastic lamina is poorly visualized. (B', C') Intravascular ultrasound. Intramural hematoma with homogeneous (B') and heterogeneous (C') content. Notice the 3-layered membrane overlying the false lumen and the complete visualization of the external elastic lamina. *Denotes wire artifact.
REFERENCES


Address for correspondence: Dr. Fernando Alfonso, Interventional Cardiology, Cardiovascular Institute, Clínico “San Carlos” University Hospital, IdISSC, Ciudad Universitaria, Plaza de Cristo Rey. Madrid 28040, Spain. E-mail: falf@hotmail.com.