Unstable Saphenous Vein Graft Atheroma in Patients With Stable Angina Pectoris

Fumiyasu Seike, MD; Shuntaro Ikeda, MD; Hideo Kawakami, MD; Toru Miyoshi, MD; Akira Oshita, MD; Shinji Inaba, MD; Takafumi Okura, MD; Jitsuo Higaki, MD; Hiroshi Matsuoka, MD

Although saphenous vein grafts (SVGs) are widely used as conduits for coronary artery bypass grafting (CABG), SVG atheroma following CABG remains one of the major concerns. However, the morphological characteristics of old SVGs are not fully understood, especially in patients with stable angina pectoris. We imaged 9 consecutive SVGs in patients with stable angina pectoris using optical coherence tomography and coronary angioscopy. The clinical, optical coherence tomography, and coronary angioscopy characteristics of the SVGs are summarized in the Table. Multimodality imaging observations were performed in 4 SVGs without stenosis (nonculprit) and in 5 SVGs with significant stenosis before percutaneous coronary intervention (culprit). The graft age of the 7 SVGs (old SVGs) was >10 years, and the remaining 2 SVGs (young SVGs) were aged <1 year. Regardless of whether the SVG was a culprit, a thrombus was observed in all old SVGs. Most of the old SVGs had lipid plaque with macrophage accumulation on optical coherence tomography and fragile yellow plague on coronary angioscopy, suggestive of active atheroma. Moreover, optical coherence tomography–derived thin-cap fibroatheroma and plaque rupture were detected in 3 of 4 of the culprit old SVGs (Figure 1) and in 1 nonculprit old SVG (Figure 2). In contrast, these unstable plaque morphologies were not detected in the young SVGs (Figure 3). Advanced vulnerability is a feature of old SVGs, even in patients in a stable clinical condition. This suggests that careful long-term follow-up and management are important for patients with old SVGs. Furthermore, our case series had one more clinical implication at the time of redo CABG. Perioperative myocardial infarction following redo CABG is one of the leading contributors of in-hospital mortality, and it has been recognized embolization from atheromatous SVGs was associated with this unfavorable outcome.[1,2] Therefore, management of SVGs is an important issue during redo CABG. Our case series demonstrated that SVGs had active atheroma and thrombus even with no severe obstruction. Although the management of SVGs during redo CABG is still under debate, surgeons should pay the best attention to the manipulation of old SVGs during redo CABG, irrespective of angiographic findings.

Disclosures

None.

References

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KEY WORDS: angioscopy ■ attention ■ coronary artery bypass ■ myocardial infarction ■ plague

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Table. Clinical and Saphenous Vein Graft Characteristics on OCT and CAS

Patient No.	Age, y	Sex	Grafted Vessel	PCI or Evaluation	Graft Age	Thrombus Detected by OCT or CAS		Plaque Characteristics by OCT and CAS				
								OCT				CAS
						Red Thrombus	White Thrombus	Lipid Plaque	Macrophage	TCFA	Plaque Rupture	Yellow Plaque
Old SVGs (>10 y of age)												
1 (Figure 1)	74	M	LCX	PCI	11 y	Present	Present	Present	Present	Present	Present	Present
2	75	M	LAD	PCI	12 y	Present	0	0	Present	0	0	Present
3	71	M	RCA	Evaluation	17 y	Present	Present	Present	Present	0	0	Present
4	66	M	LCX	PCI	20 y	Present	Present	Present	Present	Present	Present	Present
5 (Figure 2)	77	M	LAD	Evaluation	21 y	Present	Present	Present	Present	Present	Present	Present
6	64	M	LAD	Evaluation	23 y	Present	Present	0	0	0	0	0
7	71	M	D1	PCI	24 y	Present	Present	Present	Present	Present	Present	Present
Young SVGs (< 1 y of age)												
8 (Figure 3)	72	M	RCA	Evaluation	3 mo	Present	0	0	0	0	0	0
9	63	M	RCA	PCI	6 mo	0	0	0	0	0	0	0

CAS indicates coronary angioscopy; D1, first diagonal branch; LAD, left anterior descending coronary artery; LCX, left circumflex coronary artery; M, male; OCT, optical coherence tomography; PCI, percutaneous coronary intervention; RCA, right coronary artery; SVG, saphenous vein graft; and TCFA, thin-cap fibroatheroma.

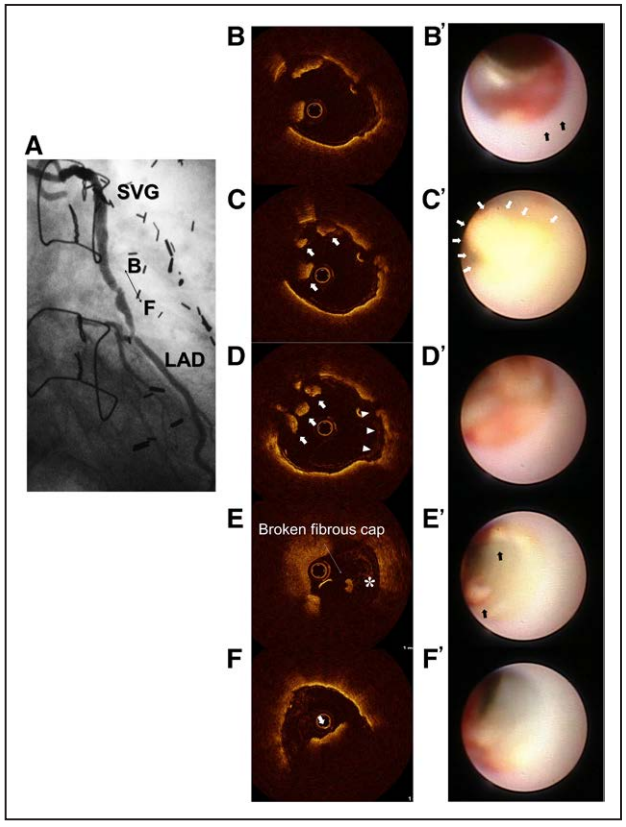

Figure 1. Unstable culprit saphenous vein graft (SVG) atheroma (case No. 1). **A**, Coronary angiography showing significant stenosis at the distal part of the SVG in the left anterior descending artery (LAD). **B**–**F**, Optical coherence tomography showing complex vulnerable plaque morphologies (plaque rupture [asterisk=ruptured cavity] and erosion [white arrowheads]) with a massive red thrombus (white arrows; Movie I in the Data Supplement). **B′**–**F′**, Coronary angioscopy showing a fragile yellow plaque (white allows) with a massive mobile thrombus with white and red segments (black arrows; Movie II in the Data Supplement).

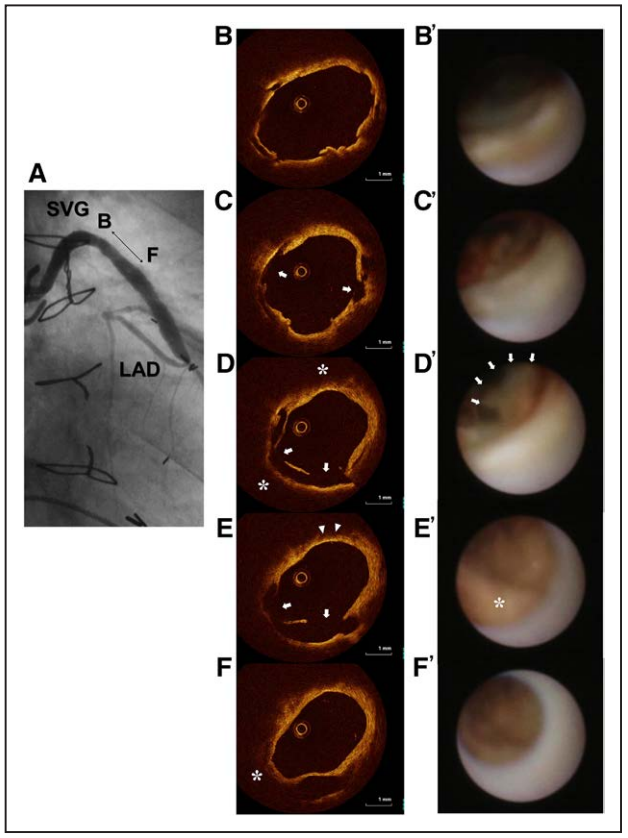

Figure 2. Unstable nonculprit saphenous vein graft (SVG) atheroma (case No. 5). **A**, Coronary angiography showing an SVG at the left anterior descending artery (LAD) without significant stenosis. **B**–**F**, Optical coherence tomography showing complex vulnerable plaque morphologies (multiple plaque ruptures [white arrows], lipid-rich plaque [asterisk], and macrophage accumulation [white arrowheads]; Movie III in the Data Supplement). **B′**–**F′**, Coronary angioscopy showing a ruptured fragile yellow plaque (asterisk) with a mobile white thrombus (white arrows; Movie IV in the Data Supplement).

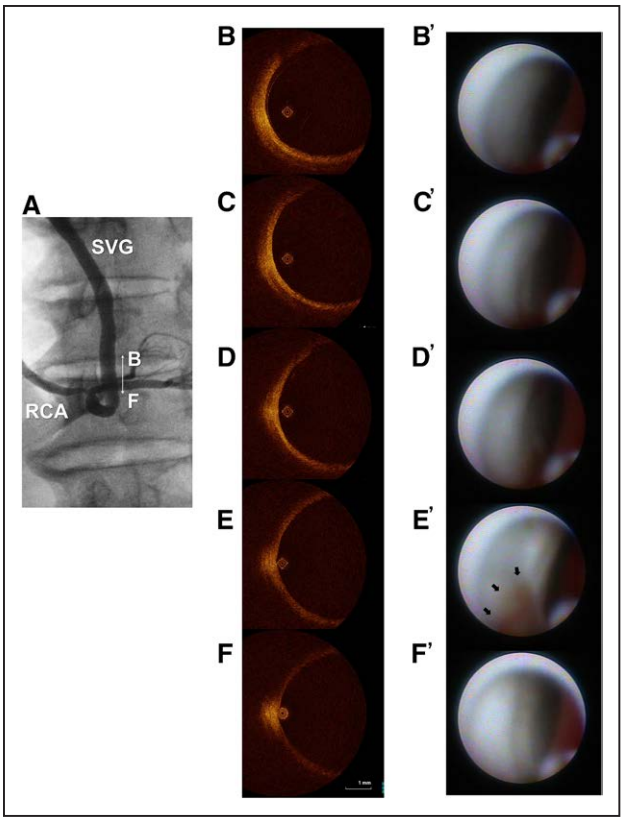

Figure 3. Young saphenous vein graft (SVG; case No. 8). **A**, Coronary angiography showing an SVG at the right coronary artery (RCA) without significant stenosis. **B**–**F**, Optical coherence tomography with no evidence of atheromatous plaque (Movie V in the Data Supplement). **B′**–**F′**, Coronary angioscopy showing no evidence of yellow plaque, although a mural red thrombus is seen on the vessel wall (black arrows; Movie VI in the Data Supplement).

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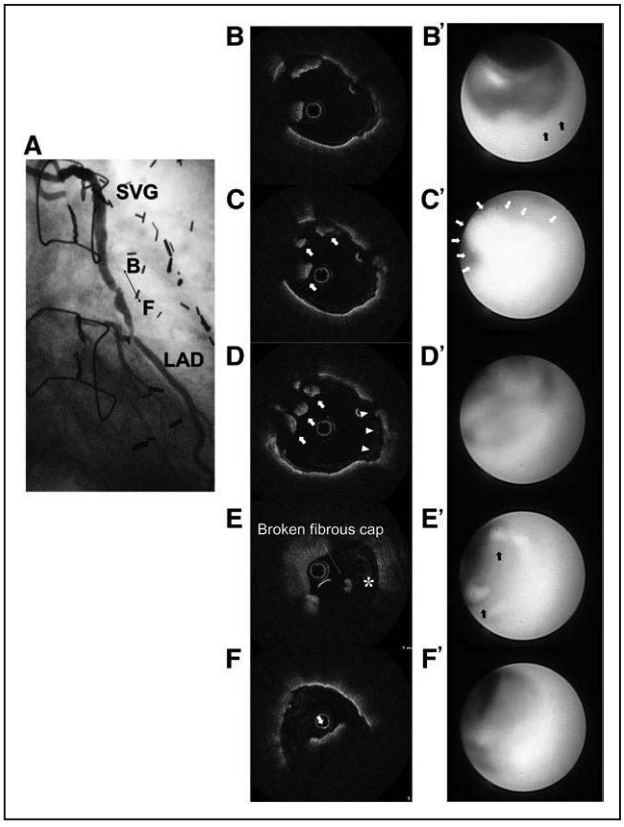

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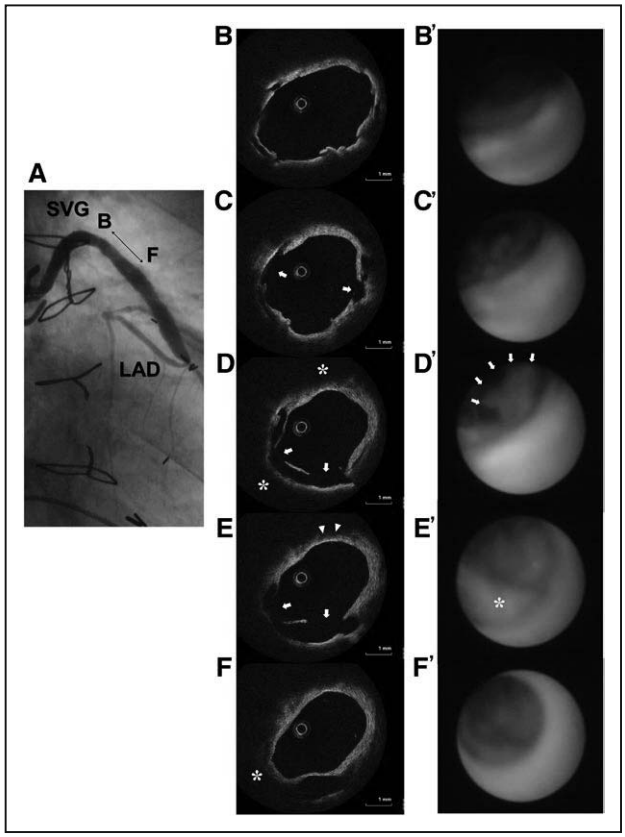

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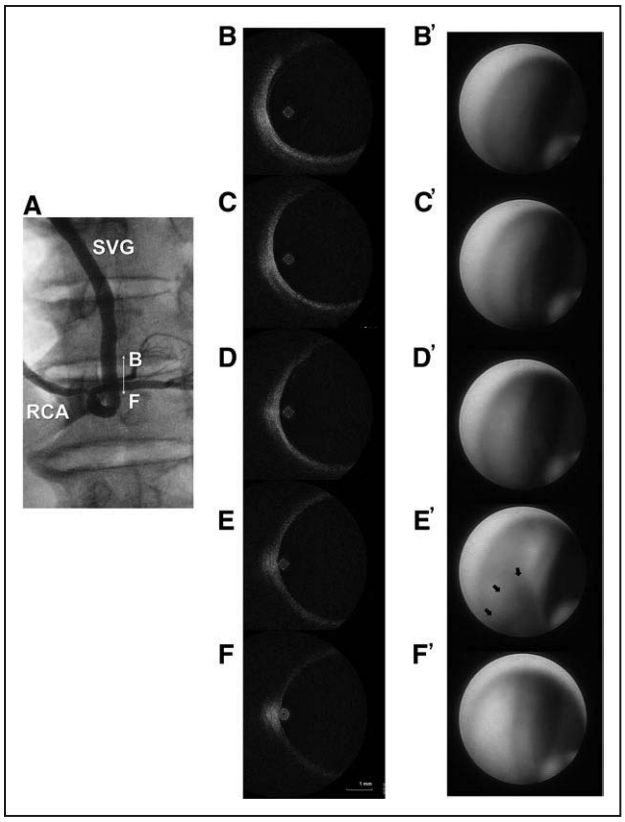

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