VOL. 11, NO. 1, 2018
ISSN 1936-878X/$36.00

iMAIL

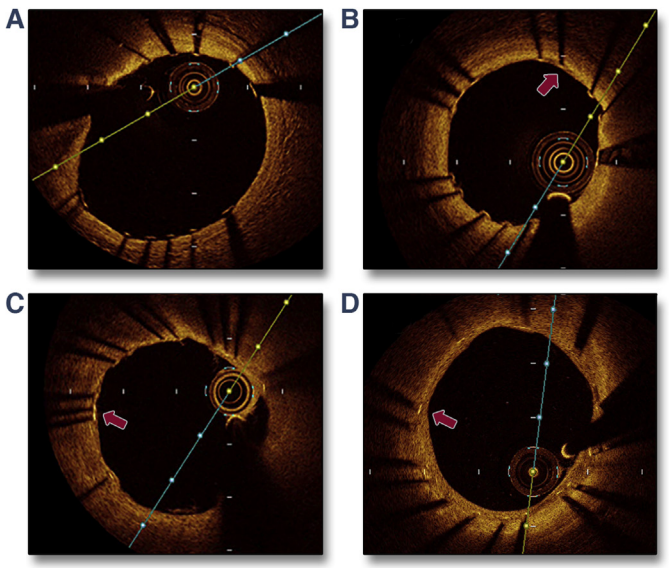
LETTERS TO THE EDITOR

Serial OCT Imaging in Vascular Healing After Everolimus-Eluting Stent Implantation

Late stent thrombosis is a rare but serious complication of drug-eluting stent implantation and is associated with delayed healing and incomplete neointimal hyperplasia (NIH) (1). Neointimal coverage (NIC) of stent struts protects against late stent thrombosis and may influence the optimal duration of dual-antiplatelet therapy (DAPT) (2). Currently, the best morphometric predictor of late stent thrombosis is the ratio of uncovered to total stent struts determined using optical coherence tomography (OCT). However, sequential changes in endothelial thickness and NIC beginning soon after implantation have not been evaluated. We assessed these vascular responses using OCT.

Thirty-five patients with 3-vessel disease who underwent Xience stent (Abbott Vascular, Santa Clara, California) implantation in new lesions of American College of Cardiology/American Heart Association type A/B1 (40%) and B2/C (60%) were studied. Optimal results were confirmed using OCT after the first procedure, and follow-up OCT studies were conducted at 2, 4, and 12 weeks after the first stent implantation when treating the 2 remaining lesions and performing follow-up angiography. The study protocol was approved by our institutional

FIGURE 1 Representative Serial OCT Images and Data (n = 35)



	Post-intervention	2 Weeks	4 Weeks	12 Weeks	p-value
Lumen Cross-sectional Area (mm²)	7.4 ± 1.3	7.0 ± 1.1	6.7 ± 1.0	6.6 ± 1.3	<0.001
Neointimal Thickness (μm)	n/a	35.9 ± 16.9	51.8 ± 20.4	108.2 ± 44.8	<0.001
Neointimal Coverage (%)	n/a	20.5 ± 8.5	80.4 ± 14.9	99.6 ± 0.4	<0.001
Malapposition (%)	5.7 ± 1.2	1.2 ± 0.4	0.5 ± 0.4	0	<0.001
Stent Edge Dissection (%)	7 (20.0)	1 (2.9)	0	0	
Presence of Thrombus (%)	5 (14.3)	1 (2.9)	0	0	

(Top) Red arrows indicate the stent struts that were covered by the neointima. **(A)** Post-intervention. **(B)** At 2 weeks after Xience implantation, few stent struts **(upper right)** are covered by tissue/fibrin. **(C)** At 4 weeks, 80% of the struts **(lower left)** are covered by thin neointima. **(D)** At 12 weeks, all struts are almost completely covered by high-signal neointima. **(Bottom)** Optical coherence tomographic (OCT) findings. n/a= not applicable.

ethics committee on human research, and informed consent was obtained. A frequency-domain OCT system, nonocclusive technique, motorized pullback at 20 mm/s, and rotation speed of 100 frames/s were used. Cross-sectional analysis of the OCT images was performed offline. Stent and lumen contours were outlined semi-automatically, and the stent and luminal cross-sectional areas, NIH thickness, NIC, and apposition were evaluated for the entire circumference of the vessel. If tissue/fibrin was found on the stent strut surface, it was calculated as NIH thickness, especially at 2 weeks. The image of each frame was evaluated for the presence of thrombi, defined as unusual masses protruding beyond the stent strut into the lumen on signal attenuation. Strut malapposition was defined as a distance of >100 μm between the stent strut surface and the inner vessel wall. The rates were calculated in each series.

Continuous variables are expressed as mean ± SD. The Friedman 2-way analysis of variance by ranks was used to determine statistical significance ($p < 0.05$).

No serious complications were observed. Representative OCT images and data at 2, 4, and 12 weeks are shown in **Figure 1**. The mean NIH thickness of all struts in the entire lesion increased uniformly from 2 to 12 weeks. NIC rapidly progressed from 2 to 4 weeks and was almost complete at 12 weeks. Malapposition was almost fully resolved at 4 weeks and was completely resolved at 12 weeks. Immediately after percutaneous coronary intervention, edge dissections were observed in 7 stents and intrastent mural thrombi were observed in 5; however, these completely resolved by 4 weeks. Of the 32 stents, 29 were completely covered with neointima after 12 weeks, and few uncovered stent struts remained (0.7% to 1.6%) in the other 3 stents.

We found that the percentage of uncovered struts rapidly decreased by 55.2% from 2 to 4 weeks after implantation, and all were almost completely covered within 12 weeks and that malapposition of struts completely resolved within 4 weeks. The favorable vascular response after Xience stent implantation may have resulted from not only decreased arterial injury and accelerated re-endothelialization related to the thin strut configuration, but also to the biocompatible fluorinated-copolymer with thromboresistant and hemocompatible properties (3). The recently approved second-generation drug-eluting stent includes information in the CE Mark instructions for use indicating a low thrombosis risk after only 1 or 3 months of DAPT. Additionally, based on clinical evidence from drug-eluting stent trials, the American College of Cardiology/American Heart Association guidelines were updated in March 2016 with a Class IIb recommendation that DAPT discontinuation after 3 months may be reasonable in patients with stable ischemic heart disease and high bleeding risk. Our data further support a short-duration DAPT with the use of the Xience stent. NIC of struts and apposition were almost completely achieved at 3 months after implantation. In conclusion, the Xience stent has a favorable, rapid vascular healing process that may justify short-duration DAPT.

Hideki Yano, MD*
Shigeo Horinaka, MD
Toshihiko Ishimitsu, MD

*Department of Cardiology and Nephrology
Dokkyo Medical University
880 Kitakobayashi
Mibu
Tochigi 321-0293
Japan
E-mail: hideki-y@dokkyomed.ac.jp

https://doi.org/10.1016/j.jcmg.2017.02.009

Please note: The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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Prognostic Value and Determinants of CMR-Derived Left Atrial Function Assessed in STEMI

In recent years, assessment of left atrial (LA) volumes and function as prognostic markers after acute myocardial infarction (AMI) have gained increasing attention (1). Impairment of both systolic and diastolic left ventricular (LV) function is a frequent finding in patients after AMI and is mainly caused by the amount of infarcted tissue and scar formation (2). The diastolic dysfunction based increase in LA volumes and reduction of LA contractility have been found to be independent predictors for adverse clinical outcome after AMI (1). However, the direct