

Incidences, Predictors, and Clinical Outcomes of Acute and Late Stent Malapposition Detected by Optical Coherence Tomography After Drug-Eluting Stent Implantation

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Background—We investigated the incidences, predictors, and clinical outcomes of acute and late stent malapposition detected by optical coherence tomography (OCT) after drug-eluting stent implantation.

Methods and Results—We analyzed the OCT images from 351 patients with 356 lesions who received poststent and follow-up OCT examinations. Acute stent malapposition was observed in 62% of lesions. Approximately half of the acute stent malappositions were located within the edges of the stents. Severe diameter stenosis, calcified lesions, and long stents were independent predictors of acute stent malapposition. Follow-up OCT examinations were performed 175 ± 60 days after drug-eluting stent implantation. Thirty-one percent of lesions with acute stent malapposition remained malapposed (late-persistent stent malapposition) and were typically (72%) located within the edges of the stent. The location within the stent edges and the volume of acute stent malapposition were independent predictors of late-persistent stent malapposition. Acute stent malapposition with a volume $>2.56 \text{ mm}^3$ differentiated late-persistent stent malapposition from resolved acute stent malapposition. Late-acquired stent malapposition was detected in 15% of all lesions and was usually (61%) located within the stent body. Late-acquired stent malapposition was more frequently associated with plaque/thrombus prolapse on poststent OCT images (70% versus 42%; $P < 0.001$). Clinical events, including cardiovascular death, nonfatal myocardial infarction, and stent thrombosis, did not occur in patients with late stent malapposition during the follow-up period of 28.6 ± 10.3 months after drug-eluting stent implantation.

Conclusions—Acute, late-persistent, and late-acquired stent malapposition had relatively high incidences but different predictors. The clinical outcome of stent malapposition was favorable. (*Circ Cardiovasc Interv.* 2014;7:00-00.)

Key Words: coronary disease ■ drug-eluting stents ■ tomography, optical coherence

Coronary stent malapposition is the separation of ≥ 1 stent strut from the intimal surface of the coronary arterial wall without involvement of side branches.¹ In the era of drug-eluting stents (DESs), late-acquired stent malapposition is a well-recognized problem in interventional cardiology because it may constitute a potent substrate for late stent thrombosis.¹⁻³ The incidence of late-acquired stent malapposition was reported to be as high as 25% in patients with acute myocardial infarction.⁴ In addition, predictors of late-acquired stent malapposition include plaque or thrombus absorption or positive vascular remodeling.^{1,5,6} Intravascular ultrasound (IVUS) imaging was used to detect stent malapposition in previous studies. IVUS may not completely detect stent malapposition because of limited axial resolution (100–200 μm) or stent-related artifacts.⁵ However, optical coherence tomography (OCT) with a higher resolution (12–18 μm) may detect stent malapposition with greater accuracy. There are limited data

on detection of acute and late stent malapposition by OCT in small sample sizes. Therefore, we investigated the incidences, predictors, and clinical outcomes of acute and late stent malapposition detected by OCT in a large number of patients who received DESs.

Methods

Study Population

Patients who received implantation of DESs for de novo coronary lesions between January 2009 and December 2011 with poststent and follow-up OCT were identified from the OCT registry database of our institute. Exclusion criteria included the following (1) the DES was implanted for left main coronary disease, (2) there were overlapping DESs implanted in the lesion, (3) the clinical follow-up period after DES implantation was <1 year, (4) follow-up OCT was performed >1 year after DES implantation, and (5) the OCT image had poor quality. Ultimately, 351 patients with 356 lesions were enrolled in this study. During the same study period, there were 3235 patients (3587 lesions)

Received August 20, 2013; accepted December 15, 2013.

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The Data Supplement is available at <http://circinterventions.ahajournals.org/lookup/suppl/doi:10.1161/CIRCINTERVENTIONS.113.000797/-/DC1>.

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Circ Cardiovasc Interv is available at <http://circinterventions.ahajournals.org>

DOI: 10.1161/CIRCINTERVENTIONS.113.000797