

Editorial

Current Aspects of Interventional Cardiology from the Standpoint of a Japanese Interventional Cardiologist as well as an Angiographic Core Laboratory

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Modern interventional cardiology has progressed in terms of technology and technical skills, resulting in coronary revascularization becoming the preferred substitute for coronary artery bypass grafting (CABG) in some particular patients with lesions suitable for percutaneous coronary intervention (PCI). There is, however, room for further improvement in order to achieve better long-term outcomes in this area. In this editorial, I would like to address several topics that I believe will undergo development and progress in the future.

Late term results of coronary stents

Currently available new generation drug-eluting stents (DES) have a decreased restenosis rate and improvements of the shortcomings found in first generation stents, [1,2] such as coronary endothelial dysfunction and very late stent thrombosis, due to improvements made in stent struts, polymers, and drug-releasing dynamics. Thus, the incidence of late stent thrombosis was reported to be even lower than that of bare-metal stents in a meta-analysis. Even the most superior DES must remain in the coronary vessels forever, which may be a cause of neoatherosclerosis that is also seen with bare-metal stents (BMS). The timing of neoatherosclerosis in the stents appears to be earlier in DES than in BMS. The cause of this neoatherosclerosis remains to be clarified. Furthermore, it is still not known whether more LDL cholesterol lowering can prevent neoatherosclerosis. The existence of a metal or polymer itself can cause inflammation leading to late restenosis and stent thrombosis. From this standpoint, a biodegradable vascular scaffold and drug-coated balloon would be other strategies that could be selected for some particular lesions. Optical coherence tomography (OCT) is the most useful imaging technique with which to evaluate stent status at the index procedure and during the follow-up period. OCT imaging has a resolution that is 10-fold higher than intravascular ultrasound, and can precisely evaluate thin cap fibroatheroma, healing, and malapposition. We

have utilized this imaging modality to evaluate the mechanism and relationships with pathology in several cases [3-6].

Contrast-induced nephropathy

Contrast-induced nephropathy (CIN) is a complication associated with PCI as well as endovascular interventional therapy due to contrast media. This complication is serious and intrinsic due to the use of contrast, as is the case with radiation exposure. Many methods have been reported. Intravascular imaging techniques such as ultrasound or optical coherence tomography which use little or no contrast are the most promising. MRI navigating systems are also currently under development. Extraction of administered contrast from the coronary sinus is also based on a similar idea. Secondly, methods preventing oxidative stress, which has been deemed as a cause of CIN, may work, although most data are controversial. Adequate hydration is the most promising. Interventional cardiologists should not hesitate to provide hydration as long as possible before and after a procedure. Other drugs such as NAC, vitamin C, and sodium bicarbonate have also been used. In our hospital, in addition to adequate hydration, we routinely use high concentration sodium bicarbonate (known as Meylon® in Japan) whose concentration is more than 5 times higher than that previously reported [7]. This reduced the incidence of CIN, most likely due to urine alkalization to reduce oxidative stress. We are also investigating the efficacy of nicorandil in association with high dose sodium bicarbonate in emergency and elective settings in a prospective and randomized single center study. In this study, 200 subjects were randomly divided into two groups. The nicorandil group was administered 12 mg nicorandil with high concentration sodium bicarbonate over a 30-minute period before contrast administration. The control group received only high concentration sodium bicarbonate. We evaluated the adjunctive efficacy of nicorandil at decreasing the incidence of CIN. The results will be reported in the near future.

Bifurcation lesion optimal strategy and dedicated device, and analysis methods

The most challenging lesion subsets of coronary intervention include chronic total occlusion, calcified lesions, and bifurcation. Treatment for these lesions with good acute and chronic results may lead to expansion of the application of PCI in patients with complex coronary lesions in multivessel disease and the left main coronary trunk. Development of drug-eluting stents (DES) has dramatically decreased the restenosis rate but long-term problems, such as (very) late in-stent restenosis and more seriously late stent thrombosis, have also emerged. Debulking is necessary in some lesions for lesion modification in order to obtain the maximal effect of a DES. Development of biodegradable vascular scaffolds as well as drug-coated balloons will replace DES in the future, resolving the very long-

term problems. There are currently no acceptable results with DES for treating true bifurcation lesions. Technical aspects to treat bifurcated lesions that include the left main trunk are one stent or two stents and bifurcated dedicated stents. However, there is no conclusion about the most effective strategy right now. Japan Cardiovascular Imaging Core Laboratory (J-CICL), founded in 2008, is a non-profit organization located in Tokyo that performs quantitative and qualitative analysis as a multi-image core laboratory. Current ongoing projects include BEGIN, J-LESSON, NIPPON, and PROPEL. Quantitative bifurcation analyses are performed using bifurcation segment analysis capability of QAngioXA® ver 7.2 (Medis, The Netherlands). This novel algorithm overcomes the shortcomings of straight line methods preventing over- or underestimation of the reference diameters of main vessels and side branches. BEGIN (Bifurcation stEntinG using 2link stent:Nobori vs 3link steNt:Xience V/Promus) is a randomized controlled trial whose aim is to investigate the difference between DESs with 2 or 3 link struts in the late loss of a side branch in patients who undergo stenting for true bifurcated lesions. Two link DES might be superior to 3 link with respect to the ease of guidewire access and strut dilatation. In this study, the primary endpoint is the minimal lumen diameter at the ostial side branch, which depends on an accurate QCA. J-LESSON (Japan Unprotected Left Main Coronary artery Disease PCI Strategy On New Generation Stents) is a Japanese registry which evaluates the PCI for left main trunks with/without other lesions using everolimus-eluting stents. The feasibility, safety, and long-term prognosis will be determined. In Japan, IVUS guidance can be utilized for most lesions, including bifurcated lesions. We should be able to clarify which lesion sets have better outcomes using the present advanced techniques. 3D QCA is a more reliable model

for analyzing bifurcated lesions when deciding the true carina points, true lesion length, and true bifurcation angle, which may result in better interventional strategy and outcomes.

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