Coronary Artery Bypass Grafting Following In-Stent Restenosis of Drug-Eluting Stents Deployed in the Left Main Coronary Artery

Shinji Kanemitsu, MD; Keizo Tanaka, MD; Jin Tanaka, MD; Hitoshi Suzuki, MD; Toshihiko Kinoshita, MD

Two cases of drug-eluting stent restenosis after percutaneous coronary intervention in the left main coronary artery and its bifurcation are presented. An off-pump coronary artery bypass grafting following in-stent restenosis was performed. Drug-eluting stents have shown a reduced frequency of in-stent restenosis and a good safety profile compared with bare metal stents. However, intervention with drug-eluting stents for left main coronary artery disease should be undertaken with care. It is also important to note that preoperative anti-platelet drug administration can increase the risk of major bleeding during and after emergent surgery. (Circ J 2008; 72: 502–504)

Key Words: Coronary artery bypass graft; Drug-eluting stent; Restenosis

A drug-eluting stent (DES) has been heralded as the next breakthrough technology in the fight against coronary artery disease. A DES reduces the incidence of restenosis after percutaneous coronary intervention (PCI) compared with a bare metal stent. This may prove to significantly improve percutaneous treatment results and is likely to influence the surgical treatment of coronary artery disease. The number of PCIs with DESs has been increasing in Japan, and DESs have been deployed in lesions of the left main coronary artery and its bifurcation with good results. Patients are now rarely referred for surgery for either the occurrence or threat of stent restenosis.

Case Reports

Case 1
A 71-year-old woman was admitted with unstable angina pectoris. She had previously undergone PCI using a DES (Cypher; Cordis, Miami Lakes, FL, USA) for left main coronary artery disease (LMCAD). A Cypher 3.5/18-mm stent was deployed at the proximal end and a Cypher 3.5/23-mm stent was deployed at the distal end of the LMCA using the kissing ballooning technique. Coronary angiography 4 months after PCI showed in-stent restenosis (Fig 1). She had been taking anti-platelet drugs (ticlopidine 200 mg daily and aspirin 100 mg daily). As her condition was unstable, emergent off-pump coronary artery bypass (OPCAB) grafting was performed. Anti-platelet drugs were not stopped before the operation, resulting in intra- and postoperative bleeding. She was transfused 6 units of blood, 10 units of fresh frozen plasma and 10 units of platelets. Rethrocotomy was not required. The postoperative course was otherwise uneventful, and postoperative coronary angiography revealed that all grafts were patent.

Case 2
A 74-year-old man was admitted with angina pectoris on effort. He had previously undergone PCI using a DES for LMCAD. A Cypher 3.0/33-mm stent was deployed in the LMCA using the kissing ballooning technique, and a Cypher 3.0/13-mm stent was deployed at the ostium of the left circumflex coronary artery using the T-stenting technique. Coronary angiography 6 months after PCI showed in-stent restenosis (Fig 2). He had been taking the same anti-platelet drugs as the patient in Case 1 (ie, ticlopidine 200 mg daily and aspirin 100 mg daily). As his condition was stable, anti-platelet drugs were stopped 5 days before surgery. Elective OPCAB grafting was performed without blood transfusion. The postoperative course was uneventful, and postoperative coronary angiography revealed that all grafts were patent.

Discussion
Technological advancements in PCI have resulted in a reduced restenosis rate and a broader range of lesions that can be treated successfully, thereby shifting the focus of coronary artery intervention from coronary artery bypass grafting (CABG) to PCI. In-stent restenosis of a DES occurs with a frequency of 2.3%, and is more frequent among patients with diabetes mellitus, multivessel disease, complex lesions, and small vessels. The expanding indications for angioplasty have already had an unquestionable impact on the practice of coronary revascularization. DES was released in Japan in 2004, and more than 100,000 DESs are used annually, including deployment for the treatment of LMCAD. Lee and colleagues compared CABG with PCI using DESs for the treatment of LMCAD. They found that even though there was a high percentage of high-risk patients, PCI was not associated with an increase.

(Received July 30, 2007; accepted October 16, 2007)
in immediate or medium-term complications compared with CABG.

The outcome of PCI for bifurcation lesions using BMSs is hindered by an increased rate of procedural complications and long-term major adverse cardiac events compared with non-bifurcation lesions. In one study of bifurcation lesions, the overall restenosis rate was 23%, with the majority of side branch restenoses occurring at the ostium after use of the T-stenting technique. Side branch restenosis occurred in 16.7% after T-stenting, compared with 7.1% after other stenting techniques. The crush technique of bifurcation stenting with DESs is associated with favorable clinical outcomes when compared with BMSs, but the incidence of post-procedural stent thrombosis (ST) is of concern and is higher than after stenting of more simple lesions. Previous DES data have suggested a higher restenosis rate after T-stenting, with the hypothesis that this might relate to incomplete coverage of the side branch ostium. Preliminary data have indicated acceptable short-term results, suggesting that the crush technique might be more effective for bifurcation lesions than the T-stenting technique. The crush technique was not used in these 2 cases; the kissing balloon technique was used in Case 1, and the kissing and T-stenting techniques were used in Case 2. Restenosis may have been caused by these stenting techniques.

Prolonged dual anti-platelet therapy with aspirin and clopidogrel is generally mandatory after DES implantation because of the potentially increased risk of ST compared to a BMS. The optimal management of perioperative anti-platelet therapy is not well established. The risk of excessive bleeding associated with anti-platelet therapy needs to be balanced against the risk of ST with the interruption of anti-platelet therapy on a case-by-case basis. In Japan, cardiologists have to substitute clopidogrel with ticlopidine, a thienopyridine derivative similar to clopidogrel. Recovery of platelet function can occur 10 days after discontinuation of ticlopidine. The optimal duration of dual anti-platelet therapy after DES implantation is not known. Despite the lack of evidence from randomized trials, prolonged dual anti-platelet therapy for up to 12 months is recommended because of the risk of late thrombosis. Exposure to clopidogrel markedly increases postoperative bleeding, transfusion requirement, and re-exploration rate after OPCAB. It is difficult to discontinue the dual anti-platelet therapy, and for emergent operations as in Case 1, it is impossible. One must balance the risk of excessive bleeding against the risk of ST when anti-platelet therapy is discontinued for surgery. We recommend stopping dual anti-platelet therapy 5 days before an elective operation, such as in Case 2. There are some reports that aprotinin reduces bleeding during CABG in patients on dual anti-platelet therapy.

As more DESs are being implanted, some of these patients will inevitably undergo CABG surgery. In the absence of outcome data, cardiologists, surgeons and anesthetists will need to weigh the perceived risks and benefits of continuing or stopping anti-platelet agents during the perioperative period on a case-by-case basis to optimally reduce the risk of ST without unduly increasing the risk of severe bleeding.
References


