Is it time for elective left main percutaneous coronary intervention to become ‘main stream’?

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Left main (LM) stenting is considered by many to be one of the last frontiers of interventional cardiology. Beginning with the VA cooperative study published in 1976 demonstrating a mortality benefit for patients undergoing coronary artery bypass grafting (CABG), the standard of care for treatment of left main coronary artery disease has been surgical. The most recent 2005 update of the ACC/AHA/SCAI Practice Guidelines on PCI again notes that “CABG using IMA grafting is the ‘gold standard’ for treatment of unprotected left main disease and has proven benefit on long-term outcomes.”

While its inventor, Dr. Andreas Grunzig, initially felt that percutaneous transluminal coronary angioplasty (PTCA) would be well suited for LM disease given its proximity to the aorta, early reports suggested 2 major problems with this approach after balloon angioplasty. The first was acute procedural complications causing abrupt closure of the LM and sudden procedure-related death. The second was the high rate of restenosis in the LM artery and the fact that restenosis in this critical area can present as sudden cardiac death in asymptomatic patients. The advent of bare metal stenting (BMS) largely solved the first problem of acute procedure related complications, and it was discovered that patients with normal left ventricular function could do quite well with transient balloon occlusion of the LM during predilation and stenting. However, the rate of restenosis (especially for distal LM bifurcation lesions) remained higher than could be accepted given the potential for sudden death as a first presentation. The introduction and widespread acceptance of drug eluting stents (DES) has opened the possibility of eliminating the second major problem of LM stenting by significantly reducing in-stent restenosis.

Recent observational studies such as that of Park et al. have begun to document the lower rate of DES restenosis in LM disease just as that seen in other coronary lesion locations. In their study, the rate of DES restenosis was only 7% compared with 30% for a historical BMS control group. Of note, all patients with angiographic restenosis in the DES group involved the LM bifurcation and not the ostium or mid-shaft. This observation that the LM bifurcation disease presents unique challenges for current DES stent technology is shared by other recent single-center non-randomized trials. The risk of LM restenosis in this population has led to the recommendation that patients undergo routine surveillance angiography to rule out restenosis, however, the optimal interval or threshold for repeat revascularization remains unknown.

In the December 2005 issue of this Journal, Lu et al. presented the follow-up of 138 consecutive patients treated percutaneously for LM stenosis at 6 hospitals in China. The study period spans the introduction of DES with 56 patients receiving BMS before June of 2003 and the majority getting DES thereafter. The high (98%) acute procedural success rate is a testament to the success that stenting has had in reducing the problems of acute vessel closure, flow limiting dissection, and acute recoil which plagued early PTCA of LM lesions. The issue of BMS restenosis is reflected in the 8.5% rate of late follow-up MACE in the BMS group compared to 0% in the DES group. In addition, 83% of the DES patients were treated for more complex bifurcation LM disease (primarily with T-stenting), while only 9% of the BMS group had distal bifurcation lesions.

Indications for adjunctive intra-aortic balloon pump (IABP) counterpulsation require attention for unprotected LM PCI. The authors did not report the frequency of IABP support in their series. Patients with hemodynamic instability clearly could benefit from an IABP or another form of hemodynamic support, such as the TandemHeart. IABP support could be considered for those with acute coronary syndrome and/or congestive heart failure.

An important technical aspect of the PCI is whether to use intravascular ultrasound (IVUS). There is a higher prevalence of stent underdeployment in heavily calcified left main lesions. The use of IVUS may help detect stent underdeployment and malapposition. We would recommend consideration of IVUS-guided stenting in patients with ostial or distal LM disease, and in those with heavy calcification.

Lastly, the duration of dual antiplatelet therapy after LM stenting deserves comment. Because of the devastating consequences of late stent thrombosis after LM stenting, we would recommend a prolonged course of therapy with aspirin and clopidogrel for a minimum of 6 months post-PCI. If there are no contraindications to prolonged dual antiplatelet therapy, we
would consider therapy for one year post-PCI.

The impact of that paper is to add additional weight to the observations that acute procedural complications for LM PCI are low and that the addition of DES to the interventional armamentarium has reduced the problem of in-stent restenosis for ostial and mid-shats lesions to acceptable levels. However, the treatment of distal LM bifurcation lesions remain problematic given the known issues of stent malposition and late thrombosis involved in all of the current bifurcation stenting strategies. While the advent of dedicated drug eluting bifurcation stents and long-term antiplatelet agents may reduce these risks, the treatment of choice for patients who are candidates for bypass surgery should remain surgical at the current time. In patients with contraindications to surgery, LM stenting is an acceptable option if approachable technically. The question of LM DES stenting compared with CABG will likely remain an unsettled topic for debate unless there is investment in a randomized multicenter clinical trial to compare these two strategies.

References