Unprotected Left Main Distal Bifurcation Lesion

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Left main coronary artery disease is a high-risk condition with significant mortality. Currently, bypass surgery is considered the gold-standard treatment for unprotected left main disease. The introduction of drug-eluting stents for the treatment of coronary artery disease has proved to reduce the rates of restenosis and, consequently, the need for repeat revascularisation; therefore, recently, percutaneous coronary intervention in the unprotected left main using drug-eluting stents has been considered another therapeutic option for patients at high risk for bypass surgery, or for patients who simply refuse bypass surgery. Based on the updated guidelines on myocardial revascularisation of the European Society of Cardiology, treating left main lesions by angioplasty is feasible and safe in selected patients. In this case report we demonstrate the successful implantation of drug-eluting stents for the treatment of an unprotected left main bifurcation lesion in an 85-year-old patient with high perioperative risk.

Coronary artery disease (CAD) is the leading cause of mortality worldwide. Its prevalence increases with age and this, coupled with increasing life expectancy, has led to a sharp rise in the number of elderly patients undergoing percutaneous coronary intervention (PCI). It is well recognised that, compared to the general population, the elderly are more likely to present with more complex lesions and multiple comorbid conditions. Taking into account the extremely high perioperative mortality rate in very elderly patients (>80 years old) with severe comorbid conditions, the therapeutic goal is mainly an acceptable quality of life rather than life prolongation.1

Advances in PCI technology, especially the use of drug-eluting stents (DES), have rendered most coronary lesions technically amenable to PCI, extending the ability of interventional cardiologists to treat patients with more complex coronary artery disease.2 In this case report, we describe a revascularisation procedure in a patient with unprotected left main (ULM) disease and high surgical risk, focusing on the recently published guidelines of the European Society of Cardiology (ESC) for myocardial revascularisation.3

Case presentation

An 85-year-old man with hyperlipidaemia and a family history of premature CAD was referred to our hospital for coronary angiography because of unstable angina. He had a known history of CAD presenting with exertional angina since 2001. At that time, coronary angiography revealed a 40% lesion in the distal left main (LM) coronary artery and a 50% stenosis at the ostium of the left circumflex (LCX), with a decreased ejection fraction of 35%. In 2004, he had a permanent pacemaker implanted because of second-degree heart block and recurrent syncope. He also suffered from chronic obstructive pulmonary disease treated with oral and inhaled regimens.

Over the last 9 months, he complained
of gradually deteriorating angina on effort, with episodes at rest during the last 2 weeks. An echocardiogram revealed an ejection fraction of 25%, with severe anterior and lateral wall hypokinesis, and paradoxical motion of the ventricular septum. Coronary angiography showed a distal 70% LM stenosis involving the left anterior descending artery (LAD) ostium, a 60% lesion of the mid LAD, an ostial 80% lesion of the LCX, and a normal right coronary artery (RCA) (Figure 1). The patient’s data were reviewed with cardiac surgeons in a meeting that takes place in our hospital once a month. He was considered a poor candidate for conventional bypass, having a high risk of mortality as estimated by a logistic EuroSCORE of 19.74%. Moreover, the patient’s low SYNTAX score (=17) made PCI an attractive alternative therapeutic option.

The procedure was performed with support from a cardiac surgery team. First, an intra-aortic balloon pump was inserted. Both the LAD and LCX were wired and the inverted culotte technique was selected as the most appropriate strategy for our patient’s coronary anatomy (Figure 2). The procedure began with LM/ostial LCX balloon predilation, followed by implantation of a zotarolimus-eluting stent (3 × 18 mm) in the LM/prox LCX. The non-stented branch (LAD) was then rewired through the struts of the stent and dilated. A second zotarolimus-eluting stent (3.5 × 18 mm) was advanced and expanded into the LM/LAD. Finally, kissing balloon inflation was performed with an excellent final angiographic result. An intravascular ultrasound study confirmed complete stent apposition.

The patient was discharged 2 days after intervention and 3 months later is free of symptoms with normal physical activity.

Discussion

In this report we have described successful PCI for the treatment of a ULM distal bifurcation lesion, Medina type 1-1-1, in an 85-year-old man with high peroperative risk.

The risk factors for morbidity and mortality after coronary revascularisation surgery have been analysed extensively and several different models have been developed for risk stratification, with the EuroSCORE being the most commonly used. However, the EuroSCORE, validated to predict surgical mortality, was recently shown to be an independent predictor of major adverse cardiac events in studies with both percutaneous and surgical treatment arms.4,5

A significant lesion of the ULM is identified in approximately 5% to 10% of coronary angiographies.6 Patients with ULM disease treated medically have a 3-year mortality rate of 50%.7,8 Even though coronary artery bypass grafting has been considered the “gold standard” treatment for these patients, PCI is becoming a rather popular procedure in many catheter laboratories all over the world. This is mainly due to the introduction of DES, which reduce the
restenosis and target lesion revascularisation rate in comparison to balloon-only or bare metal stents. Furthermore, more cardiologists are performing PCI in a ULM in emergent situations, allowing initial revascularisation and rapid stabilisation of the patient who experiences acute myocardial infarction and concomitant cardiogenic shock.

Besides the fact that formulation of the best possible revascularisation approach will often require interaction between cardiologists and cardiac surgeons in complex cases, non-emergent high risk PCI procedures, such as our patient’s, should be performed at centres that have access to circulatory support and intensive care treatment, and also have cardiovascular surgery on site.
While previous ESC guidelines on PCI stated that “Stenting for unprotected left main disease should only be considered in the absence of other revascularisation options,” emerging evidence suggests that PCI provides at least equivalent if not superior results to CABG for lower severity LM lesions, at least over 2 years of follow up. Thus, PCI is indicated in the current guidelines as a Ia class recommendation for such lesions, and IIb for LM bifurcation. Several reports support the potential of PCI, at least in lower risk LM lesions. In a meta-analysis of 10 studies, including 2 randomised controlled trials and the large MAIN-COMPARE registry, involving 3773 patients with LM stenosis, Naik et al reported that there was no difference between PCI and CABG in mortality, or in the composite endpoint of death, myocardial infarction, and stroke up to 3 years, but up to a four-fold incidence of repeat revascularisation with PCI. These results were confirmed at 5-year follow up in the MAIN-COMPARE registry.

The most ‘definitive’ current account of treatment of LM disease by CABG or PCI is from the hypothesis-generating subgroup analysis of the SYNTAX trial. In this study, and in the subgroups of patients with 3-vessel disease and/or left main disease, the prognostic value of the SYNTAX score is even more significant. Irrespective of their diabetic status, the 1-year outcome of all patients with left main and/or 3-vessel disease with a SYNTAX score <22 was comparable between those randomised to PCI or surgery. The SYNTAX score has become pivotal in the selection of revascularisation. While previous ESC guidelines on PCI stated that PCI for ULM disease is feasible and safe, with excellent angiographic results and a low rate of short- and mid-term major adverse cardiac events. The periprocedural morbidity of bypass surgery is an important disadvantage for elderly patients with comorbid conditions. The ULM bifurcation lesion remains a challenge for interventional cardiology, with PCI being a challenging alternative to bypass surgery in high-risk patients. New data and risk scores offer more tools that can help us give our patients the best treatment. The challenge will be to dissect out those subsets of patients who fare particularly well with interventional treatment or particularly well with surgery.

Conclusions

PCI for ULM disease is feasible and safe, with excellent angiographic results and a low rate of short- and mid-term major adverse cardiac events. The periprocedural morbidity of bypass surgery is an important disadvantage for elderly patients with comorbid conditions. The ULM bifurcation lesion remains a challenge for interventional cardiology, with PCI being a challenging alternative to bypass surgery in high-risk patients. New data and risk scores offer more tools that can help us give our patients the best treatment. The challenge will be to dissect out those subsets of patients who fare particularly well with interventional treatment or particularly well with surgery.

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