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Left main coronary stenting in a non surgical octogenarian population: a possible approach ☆

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ABSTRACT

Coronary artery bypass grafting is conventionally considered the standard treatment for significant left main coronary artery (LMCA) disease. The management of LMCA disease in octogenarians is however still debated. The aim of this study was to appreciate the safety and effectiveness of percutaneous coronary intervention (PCI) for LMCA disease in octogenarians who were denied for surgical revascularization. The study included 70 consecutive patients ≥80 years of age who had undergone PCI for the treatment of LMCA and who were primary denied by our center's heart team for surgical revascularization. Mean age was 83.4±2.6 years. Mean Euroscore was 21.1±16.7 and mean Syntax score was 28.6±8.7. Overall in-hospital mortality was 11%. Mean follow-up time was 30.5±24.2 months. Overall mortality at the end of follow-up was 28%. Cardiac death was found in 18 patients and 2 patients died from terminal renal insufficiency. One patient (2%) presented with a new STEMI, 7 (11.3%) with a new non-STEMI, 13 (21%) with heart failure, and 2 (3.2%) had minor hemorrhage. There was a percutaneous target vessel revascularization in 6 (10%) patients. During follow-up, the total major adverse cerebral and cardiovascular event (MACCE including death, non-fatal acute myocardial infarction (AMI), target lesion revascularization (TLR), or stroke) was 27.4%. Stent implantation was relatively safely applied for the treatment of LMCA disease in octogenarians who were refused for surgery and who represented a high risk population. Despite a non-negligible rate of MACCE, the clinical long term outcome seems correct for this specific population with heavy basal status.

1. Introduction

Coronary artery bypass grafting (CABG) is conventionally considered the standard treatment for significant left main coronary artery (LMCA) disease [1–4]. Percutaneous coronary intervention (PCI) of unprotected LMCA has increased with improvements in equipment, interventional techniques, and drug therapy [5]. Indeed, the wide diffusion of drug eluting-stent (DES) that significantly reduces the restenosis and the repeat target vessel revascularization (TVR) has improved the outcome of PCI for these lesions [6–27]. Despite the compelling evidence supporting the PCI with a DES [28] and the reduction in cardiac events during the peri-interventional period [8,14,17], LMCA lesions continue to be treated surgically because recent randomized trials failed to prove superiority or at least non-inferiority of DES for unprotected LMCA stenosis compared with CABG [2,22]. Furthermore, the elderly represent a specific subgroup of patients at particularly high risk for surgery. The management of severe coronary artery disease like the LMCA disease in octogenarians is challenging; the most appropriate revascularization strategy is still highly debated in this population. In a nonrandomized study comparing CABG and PCI for the treatment of unprotected LMCA disease in octogenarians [29], there were no significant differences in cardiac death or myocardial infarction and major adverse cerebrovascular and cardiac events (MACCE) after a mean follow-up of 2 years but the majority of the patients included were at high surgical risk rather than non surgical candidates. Available data concerning outcome of LMCA disease in patients non suitable for surgery are limited and are even more scarce regarding the octogenarians. In this study, we report our experience of LMCA PCI and the follow-up in octogenarians who were denied by the heart team for surgical revascularization. The aim of this study was to appreciate safety and effectiveness of cardiovascular interventions.

Abbreviations: ACE, Angiotensin-converting enzyme; AMI, Acute myocardial infarction; CABG, Coronary artery bypass grafting; DES, Drug eluting-stent; LMCA, Left main coronary artery; LVEF, Left ventricular ejection fraction; MACCE, Major adverse cerebrovascular and cardiac events; NSTEMI, Non ST-segment elevation myocardial infarction; PCI, Percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction; TLR, Target lesion revascularization; ULMCA, Unprotected left main coronary artery.

☆ Conflict of interest: none.

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2. Material and methods

2.1. Design

This was an observational, retrospective, single center study involving a cohort of patients with a prospective follow-up.

2.2. Patient population

The study included all patients ≥80 years of age who, between June 2004 and November 2010, had undergone PCI for the treatment of LMCA and who were primary denied by our center's heart team (cardiologists, cardiovascular surgeons, and/or anesthetists) for surgical revascularization, except for those who presented with ST-segment elevation myocardial infarction (STEMI) who were discussed, only for the principle, with the cardiovascular surgeons, in emergency, and were denied for surgical revascularization. Significant LMCA disease was defined as stenosis ≥50% of the reference segment determined by angiographic diameter. LMCA was considered unprotected if there were no patent arterial or venous bypass grafts of the left anterior descending (LAD) or the left circumflex arteries or on their major branches. Eligible patients had significant stenosis of the LMCA that was not treated surgically because of pathological distal bed and/or non-cardiac comorbidities which cause very high operative risks and/or in an emergency situation for life-saving. Patients who were eligible for surgery and who refused CABG were excluded.

2.3. Target lesion characteristics and revascularization procedure

LMCA disease was classified as ostial when it was located within 3 mm of the ostium of the left coronary artery, distal when there was a need to cover the LAD artery or the left circumflex artery with the stent, and median when it was not ostial and did not affect the 3 mm of the LMCA upstream the bifurcation. Calcifications were classified as mild when single or multiple image of non-linear well-defined calcium density located on the target lesion, moderate when image of linear calcium density located on one side of the target lesion non-visible under detailed fluoroscopic imaging, and severe when linear calcium density image located on both sides of the target lesion and visible under detailed fluoroscopic imaging. The severe calcifications were treated by rotational atherectomy before the stenting. Bifurcation treatments were considered when an intracoronary guide wire was crossed through the stented vessel into the unstented vessel to dilate the stent. Procedure could be completed by a final kissing balloon either after implantation of a second stent at the ostium of the side branch or not. Emergency was considered as a procedure performed outside of normal scheduling that obliged the postponement of a programmed procedure or which required the catheterization room to be opened outside of normal working hours. Patients were considered in cardiogenic shock when they presented signs of peripheral hypoperfusion and their invasive systolic blood pressure was less than 90 mmHg or when vasoactive drugs were needed to maintain systolic blood pressure superior or equal to 90 mmHg. When the PCI resulted in a residual stenosis of the LMCA lesion of less than 20% with a distal TIMI III (thrombolysis in myocardial infarction III) flow, the procedure was considered an angiographic success and when added to a no worsening of the hemodynamic status nor any other major complications (death in the catheterization room, cerebrovascular accident, acute myocardial infarction (AMI), or ischemic cardiomyopathy in the 12 h following the procedure), it was considered a successful procedure PCI. The use of a ventricular assist-device *per se* intra-aortic counter pulsation balloon pump or Impella®, a pre- or post- dilation, the choice of the specific type of BMS or DES, and the post-dilation were at the operator's discretion. Lesions at the ostium or shaft without involvement of the bifurcation were treated with single stent. Bifurcation lesions were treated using a provisional T-stent technique. Final kissing balloon was mandatory in case of suboptimal results at the branch ostium and at the operator's choice otherwise. The Euroscore and the Syntax score were calculated according to their logistic regression models. Antiplatelet therapy and periprocedural anticoagulation followed standard regimens. All patients, except for those with extreme emergency situations, were pre medicated by a dual anti-platelets therapy at least 4 h before the PCI. After the procedure, aspirin was continued indefinitely. Patients treated with BMS were prescribed clopidogrel (75 mg once/day) for at least 1 month and patients treated with DES were prescribed clopidogrel (75 mg once/day) for at least 12 months regardless of DES type. Treatment beyond this duration was at the discretion of the physician and essentially depending on the tolerability of the platelets inhibition.

2.4. Data collection

Data collected were patient demographics, comorbid conditions, cardiac history, cardiac function as determined by cardiac ultrasound and/or left ventricular angiogram, procedural indication and priority, procedural details, and clinical outcomes.

2.5. Patient follow-up

A clinical follow-up by telephone calling the patients if they were still alive and/or their physician was done in April 2011. The following events were registered during follow-up: death, non-fatal AMI, re-admission for ischemic cardiomyopathy, acute congestive heart failure, stroke, major bleeding, and target lesion revascularization (TLR). A MACCE was defined as the occurrence of at least one of the following events: death, non-fatal AMI, new revascularization of the LMCA called TLR or stroke during follow-up. So, combined events during follow-up were reported. Deaths were classified as cardiac or non-cardiac. Deaths of unknown origin were considered cardiac. TLR was defined as any percutaneous re-intervention performed on the LMCA.

2.6. Angiographic measurements

The pre- and post-intervention LMCA lesions were analyzed off-line by two experienced cardiac interventionists who were not involved in the procedures using a Philips DICOM viewer program R2.5 Version 1 Level 1 (Philips Medical Systems Nederland B.V., Veenpluis 4-6, 5684 PC, Best, the Netherlands).

2.7. Statistical analysis

Data were expressed as mean±standard deviation for continuous variables and as frequencies for categorical variables. Using variables recorded in the literature as associated with poorer prognosis, Cox regression models were used to perform univariate analyses to determine the predictors of death and combined events during follow-up in all patients. Significance was set at $P<.05$. Survival and MACCE-free survival distribution were estimated according to the Kaplan–Meier method. Statistical significance was performed using the StatView software (version5.0) for windows (SAS Institute Inc., USA).

3. Results

3.1. Clinical, angiographic, and procedural baseline characteristics

Between June 2004 and November 2010, 70 patients met the inclusion criteria of the study. During this period, 206 procedures of LMCA PCI were done in patients who were under 80 years and non suitable for surgical revascularization. Baseline clinical characteristics