Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://www.elsevier.com/locate/crvasa

Review article

Current treatment of left main coronary artery disease

Lucian M. Predescu [a,b,*], Lucian Zarma [a], Pavel Platon [a,b], Marin Postu [a], Adrian Bucsa [a], Marian Croitoru [a], Dan E. Deleanu [a], Carmen Ginghina [a,b]

[a] Emergency Institute for Cadiovascular Diseases "Prof. Dr. C. C. Iliescu", Bucharest, Romania
[b] University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania

ARTICLE INFO

Article history:
Received 20 March 2015
Received in revised form
7 May 2015
Accepted 11 May 2015
Available online 22 June 2015

Keywords:
Left main stem
Percutaneous coronary intervention
Coronary artery bypass grafting
Drug eluting stent
Intravascular ultrasound

ABSTRACT

The patients with severe left main stem (LMS) stenosis have a very high risk of major cardiovascular events because of the extent of ischaemic myocardium. At 3rd year, the mortality rate for patients with significant LMS stenosis treated medically is 50%. Coronary artery bypass grafting (CABG) is considered the gold standard for the treatment of complex LMS stenosis, especially if it is associated with multivessel coronary disease. Many studies have showed that percutaneous coronary interventions (PCI) can be a safe and efficient alternative to CABG in carefully selected patients by the Heart Team, with similar mortality rates. The LMS PCI results have been continuously improved by the new PCI techniques developed and by the use of newer generation drug eluting stents. Furthermore, different invasive imagistic methods (intravascular ultrasound or optical coherence tomography) or haemodynamic assessment tools (fractional flow reserve) can improve the LMS PCI results. With those new developments in the technique of LMS PCI, the current guidelines about the treatment of left main coronary artery disease can be modified in the future.

Contents

* *Corresponding author at*: University of Medicine and Pharmacy "Carol Davila", Bucharest, Emergency Institute for Cadiovascular Diseases "Prof. Dr. C. C. Iliescu", Fundeni Street, No. 258, Sector 2, 022328 Bucharest, Romania. Tel.: +40 727588031.
E-mail address: lucianpredescu@gmail.com (L.M. Predescu).

http://dx.doi.org/10.1016/j.crvasa.2015.05.007

Introduction

Left main coronary artery disease is of particular importance because left main stem (LMS) is responsible for 84% of the blood supplied to left ventricle in case of left coronary dominant system [1]. The patients with severe LMS stenosis have a very high risk of major cardiovascular events because of the extent of ischaemic myocardium. So, we can say that left main coronary artery disease is the most prognostically important coronary lesion. Significant stenosis of LMS is diagnosed in 5–7% of patients undergoing coronary angiography [2]. A three-year mortality rate of 50% has been reported for the patients with significant LMS stenosis treated medically [3]. Many studies have reported survival benefits of coronary artery bypass grafting (CABG) compared to medical treatment alone in LMS stenosis and CABG has been regarded as the gold standard for the treatment of left main coronary artery disease [4–7]. Percutaneous coronary intervention (PCI) was reserved for patients with significant LMS stenosis that had a very high risk for surgery. Many improvements in interventional technologies and techniques and adjunctive pharmacotherapies have been achieved in recent years, that puts the question of whether LMS stenting is safe and efficient compared to CABG. There is a lack of randomised controlled trials of PCI versus CABG in left main coronary artery disease that takes into account the newer techniques that had demonstrated to lower the cardiovascular events (third generation drug eluting stents, kissing balloon post dilatation technique, final proximal optimisation technique, etc.) [8–12]. Therefore, we have reviewed the evidence regarding PCI and CABG in patients with LMS stenosis and we have highlighted the newer development in both treatment modalities and their potential future impact.

Particularities of left main coronary artery disease

LMS arises from left aortic sinus of Valsalva and in two thirds of patients bifurcates into left anterior descending artery (LAD) and left circumflex artery (LCx) and in one third of patients trifurcates into LAD, LCx and ramus intermedius (RI) [13]. This anatomic characteristic of LMS bifurcation is important in distal LMS stenosis because PCI poses more difficulties in a trifurcated then a bifurcated LMS. LMS is divided in three segments: ostium, mid-segment and distal-segment. The segment of LMS that is affected influences the chosen PCI technique [14]. Histologically, the LMS has more elastic fibres than other coronary arteries, which explains the higher restenosis rate after balloon angioplasty due to elastic recoil [15].

LMS has an average length of 10.8 ± 5.2 mm (range 2–23 mm) and an average diameter of 4.9 ± 0.8 mm based on 100-autopsy cases study [16]. This study found that it is a relationship between the length of the LMS and the angle between the branches in which it bifurcates. A larger angle of division is found in long LMS [16].

The most common cause of left main artery disease is atherosclerosis, as with other coronary arteries [17]. Different than LAD and LCx lesions, LMS can be involved in disorder that affects the ascending aorta. Other causes of left main coronary artery disease are: irradiation, Takayasu's arteritis, syphilitic aortitis, rheumatoid arthritis, aortic valve disease, Kawasaki disease, injury after left main coronary intervention or cardiac surgery, aortic dissection [17].

There is a relationship between the length of LMS and the LMS segment that is diseased. In short LMS (<10 mm), the stenosis are more frequent localised at the ostium then at the distal bifurcation (55% versus 38%), in contrast to long LMS that develops stenosis more frequently near the distal bifurcation