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A Novel Descriptive Coding System for Coronary Bifurcation Lesions

SCIENTIFIC LETTER

INTRODUCTION

Coronary bifurcation lesion interventions account for 15%-20% of all percutaneous coronary interventions and represent one of the most challenging lesions in interventional cardiology. Several coronary bifurcation classification systems have been proposed, including Lefevre,[1] Medina,[2] Mohaved,[3] and DINO[4] classification. Medina classification has become the most accepted classification system due to its simplicity. However, it does not include additional lesion characteristics such as bifurcation site, main and side branch vessel sizes, lesion length, and bifurcation angle, which are crucial characteristics of a bifurcation definition. Moreover, such additional lesion characteristics may help decision-making regarding stenting technique and device selection.

Numerous bifurcation lesions may be defined based on the location of bifurcation, involvement of main and side branches, bifurcation angle, and vessel sizes. All bifurcation lesions are unique, making our exhausting efforts—to fully classify a bifurcation lesion—unnecessary. As interventional cardiologists, besides binary classification, we need to describe our bifurcation lesion thoroughly and transfer our descriptive information for communication.

Herein, we proposed a novel coding system for coronary bifurcation lesion definition without ignoring the simplicity of the Medina classification. Our proposed coding system includes information regarding the anatomical location of bifurcation, angle of bifurcation, vessel sizes, and 2 essential characteristics of the side branch: first, whether the side branch lesion length is ≥ 10 mm, and second, whether the side branch's percent stenosis is more than 70% and 90% for left main coronary artery (LM) and non-LM bifurcations, respectively. In the proposed descriptive model (Figure 1), we use a prefix to indicate the region of bifurcation. This prefix could either be LM (indicates a bifurcation lesion at distal LM), LAD (left anterior descending coronary artery) (indicates a LAD-diagonal branch bifurcation), (CX) (circumflex coronary artery) (indicates a CX stem-OM (obtuse marginal branch) branch bifurcation), RCA_m (indicates a mid right coronary artery (RCA)-significant right ventricular (RV) branch bifurcation), RCA_d (indicates a distal RCA bifurcation at crux), diagonal branch (D) or OM (indicates bifurcation lesions involving branches of diagonal or obtuse marginal). Information about bifurcation angle is expressed near prefix, such as LM_{70}, which defines the angle between LAD and CX as 70˚ Vascular dimensions are expressed after binary MEDINA codes, as in the LM_{70} (15, 04, 13) schema, which shows that LM, LAD, and CX dimensions are 5 mm, 4 mm, and 3 mm, respectively. The presence of significant stenosis in the side branch (≥70% for CX and ≥90% for non-left main bifurcations) is indicated by adding an asterisk on the dimension code of the side branch as in the LM_{70} (15, 04, 13*) representation. The final information regarding the side branch's lesion length is expressed by adding L (long) or S (short) codes depending on whether the lesion length is ≥10 mm, as in the LM_{70} (15, 04, 13*, L) representation. The final diagram shows (Figure 1) the 1.0.1 distal LM bifurcation lesion with a bifurcation angle of 70˚, which includes a 5 mm LM as the main vessel, 4 mm LAD as the distal vessel, and a 3 mm CX as the side branch having 2 main characteristics of ≥70% stenosis and ≥10 mm lesion length (Figure 2).

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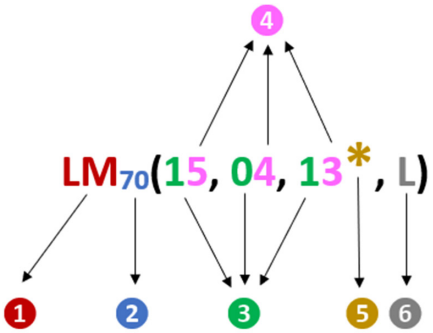

1 Bifurcation site

2 Bifurcation angle

3 Medina binary codes

4 Vessels sizes

5 Asteriks indicates the presence of side branch's percent stenosis ≥70 and ≥90 for LM and non-LM bifurcations

6 S or L codes indicate the side branch's lesion length <10 mm or ≥10 mm, respectively

Figure 1. Novel descriptive coding system for bifurcation lesions.

CONCLUSION

We believe that adding information regarding bifurcation site, angle, and vessel sizes would increase the explanatory power of classical Medina classification. Inclusion of data regarding the 2 side branch characteristics, lesion length, and % stenosis, which were shown to impact the selection of stenting strategy,[5] may aid in the creation of the best mathematical model representing the bifurcation. Accumulated data on mathematical bifurcation models and short- and long-term results will aid artificial intelligence-based software development, which possibly helps interventionalists choose the best stenting technique for the individual patient.

HIGHLIGHTS

- Medina bifurcation classification is the most accepted classification system due to its simplicity.
- Although practical to use, it does not include some important lesion characteristics.
- Novel descriptive coding system includes additional lesion characteristics, which has the potential to describe the bifurcation thoroughly for interventional strategy planning.

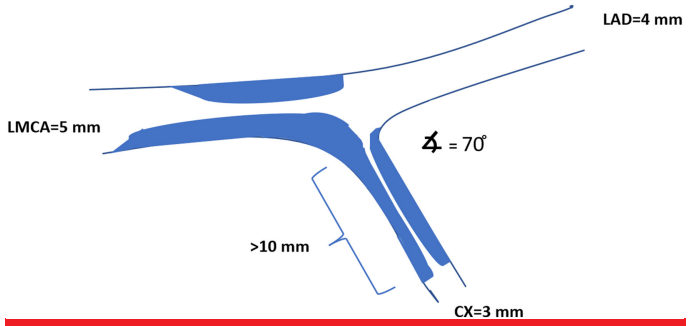

Figure 2. Schematic presentation of 1.0.1 distal LM bifurcation lesion with a bifurcation angle of 70°, which includes a 5 mm LM as the main vessel, 4 mm LAD as the distal vessel, and a 3 mm CX as the side branch having 2 main characteristics of ≥ 70% stenosis and ≥ 10 mm lesion length. LAD, left anterior descending coronary artery; LM, left main coronary artery; CX, circumflex coronary artery.

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