

Original Research Article

A Study on the Branching Pattern of Left Coronary Artery in Human Cadaveric Hearts

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ABSTRACT

Introduction: The present study shares the knowledge of normal and the variant anatomy in the branching pattern of main trunk of Left coronary artery which has a vital role in clinical application to overcome the problems that encounter during various surgical procedures of heart.

Materials and methods: The study was conducted in 50 formalin fixed human cadaveric hearts of both sexes obtained from the department of Anatomy and carefully dissected to observe the main trunk of left coronary artery

Results: It is noticed that Left coronary artery shows bifurcation in 60%, trifurcation in 28%, and quadrifurcation in 10% and pentafurcation in 2% of specimens.

Conclusion: The present study helps the physician and the cardiac surgeons for interpretation of the coronary angiograms and their surgical repair.

Key words: Left Coronary Artery, Branching pattern, Coronary Artery Disease.

INTRODUCTION

Left Coronary Artery shows abundant variety of variations in its branching pattern, while bifurcation into Left Anterior Descending and a Left Circumflex branch has considered to be the most common type. ⁽¹⁾ Trifurcation of LCA produces LAD, Circumflex branch and a Diagonal branch. Quadrifurcation gives off LAD, CxB and two diagonal branches. As in the present study pentafurcation gives off LAD, CxB and three diagonal branches. In humans Diagonal branch is having atypical morphological features. It simply travels over the surface of the ventricle but not in a groove unlike other branches. The presence of diagonal branch may decrease the occlusal effects of the LAD and the CxB. The diagonal branch may be the source of

supply to the anterior papillary muscle of left ventricle. ^(2,3)

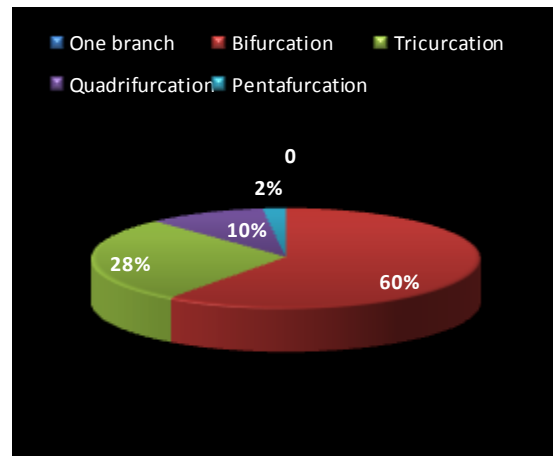
MATERIALS AND METHODS

The present study was done in the department of Anatomy, RKDF medical college and research centre, Bhopal. 50 formalin fixed human cadaveric hearts of both sexes were collected during routine dissection schedule of the undergraduate training and carefully dissected to observe the division of main trunk of left coronary artery. Digital camera was used to take the photographs of the specimens and labelled them. To give contrast in photograph red enamel paints were used to paint the left coronary artery and its branches.

OBSERVATIONS & RESULTS

Observations of the present study as shown in Pie diagram were:

Left coronary artery bifurcates into Left Anterior descending branch and a Left Circumflex branch in 60% of the specimens. Trifurcation into Left anterior Descending, left circumflex and a Diagonal branch is seen in 28% of cases. Quadrifurcation into LAD, CxB, Diagonal branch I and Sinu Atrial Nodal branch were observed in 10% of specimens. Pentafurcation into LAD, CxB, Diagonal branch I, Diagonal branch II, Diagonal branch III is observed in 2% of cases.



Graph 1: Pie diagram showing division of main trunk of left coronary artery

Table1: Comparison of division of main trunk of left coronary artery

| Branches | Baptista | Cavalcanti | Kalpna R.A. | Shilpa M. | Present study |
|-----------------|----------|------------|-------------|-----------|---------------|
| One Branch | - | - | 1% | - | |
| Bifurcation | 54.7% | 60% | 47% | 56.66% | 60% |
| Trifurcation | 38.7% | 38.18% | 40% | 33.33% | 28% |
| Quadrifurcation | 6.7% | - | 11% | 8.33% | 10% |
| Pentafurcation | - | - | 1% | 1% | 2% |

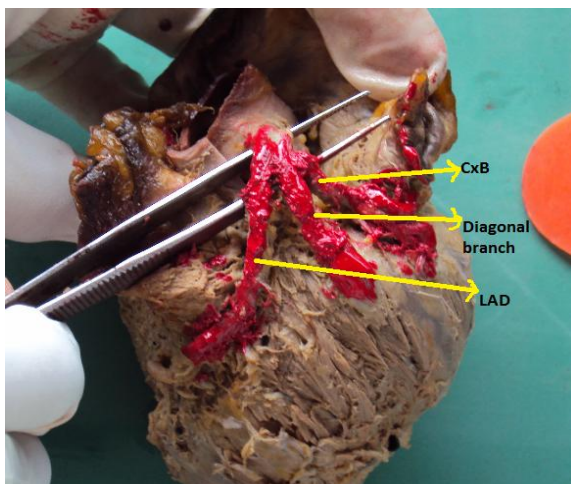


Figure: 1 Trifurcation pattern

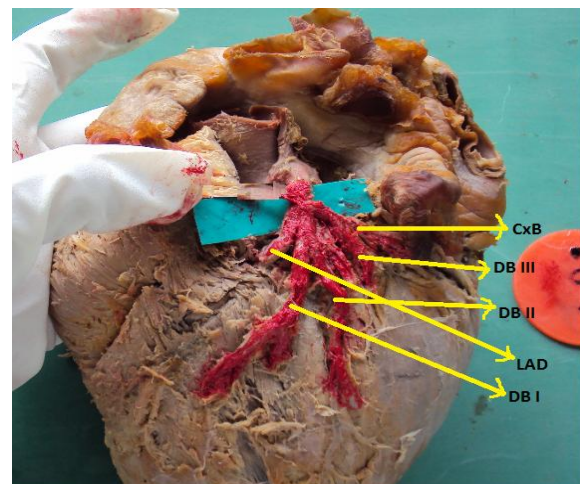


Figure: 3 Pentafurcation pattern

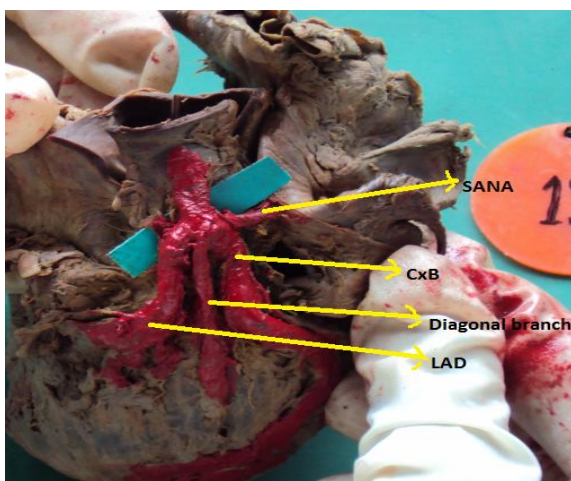


Figure: 2 Quadrifurcaion Pattern

DISCUSSION

As depicted in Table-1, Baptista et al (4) (1991) noticed in a study that 54.7% of the Specimens have shown bifurcation pattern and in 38.7% cases showed trifurcation pattern and in 6.7% of cases is the Quadrifurcation pattern.

Cavalcanti et al (5) (1995) noticed in 60% of Specimens the left coronary artery showed bifurcation pattern and in 38.18% of the Specimens showed trifurcation branching pattern. In a study by Kalpna R (6) (2003) the author observed in 47% of the Specimens the left coronary artery showed

bifurcation pattern, in 40% of the cases showed trifurcation pattern, in 11% of the specimens showed quadrifurcation pattern and in 1% of the specimens showed pentafurcation pattern and 1% of specimens single branch is observed.

In the present study 60% of the specimens showed bifurcation pattern, in 28% of the specimens showed trifurcation pattern (Figure.1) 10% of the specimens showed quadrifurcation pattern (Figure.2) and 2% of the specimens showed Pentafurcation (Figure.3).

A wide range of explanation was given by different authors to describe the diagonal branch. Some authors tell that the diagonal branch is situated at the angle made by the LAD and the Left circumflex branch^(7,8) while some says it takes origin from the vertex of the angle made by the terminal branches of LCA. The variation in the length of the diagonal branch is important clinically because of its use as an autogenous bypass graft in heart surgeries. The Diagonal branch in bifurcation expression is represented as a lateral branch of LAD or as the marginal branch of CxB depending on the area it supplies, of which former variety is most common.⁽⁹⁻¹¹⁾

CONCLUSION

Knowledge in normal anatomy and the variations of LCA branching pattern is helpful for the cardiac surgeons in performing various procedures like coronary angiograms, bypass grafting etc. Hence this study was undertaken to have a detailed knowledge on LCA branching pattern and it is compared with previous studies, thereby insisting the need of proper anatomical knowledge for a good clinical outcome.

Abbreviations:

LAD-Left anterior descending branch
CxB-Circumflex Branch
SANA-Sinu atrial nodal artery
DB I-Diagonal branch I
DB II-Diagonal branch II
DBIII-Diagonal branch III

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