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Study of Coronary Domination in North Indian Population

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Abstract
Background: *Coronary artery disease is one of the major reasons for death in developing countries like India. Dominance pattern of the heart has an important clinical significance. Left dominant anatomy is believed to be associated with worse prognoses for patients with acute coronary syndrome and stable coronary artery disease. Not much study has been done in North India regarding dominance of coronary artery. This study was to determine the pattern of coronary artery dominance in North Indian hearts.*
Results: *This study was carried on 76 specimens of cadaveric hearts and observed for the dominance of coronary arteries. Out of 100 specimens studied, the posterior interventricular artery originated from RCA (right coronary artery) in 83 (83%) cases, in 14 (14%) cases posterior interventricular artery originated from LCA, in 3 (3%) cases posterior interventricular artery originated from both RCA and LCA*
Conclusions: *Considering the risk of higher mortality in left coronary dominance and coronary co-dominance pattern, more prevalence of myocardial infarction in left coronary dominance.. This study would be helpful to the cardiologists, radiologists and surgeons of North India.*
Keywords:*Coronary artery disease, coronary domination, myocardial infarction.*

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I. Background

In developed countries, Coronary artery disease is one of the major reasons for death. Hettler classified the following types of coronary circulation:right coronary artery dominance(RD), left coronary artery dominance(LD), and co-dominant(CD)(1).

In eighty five percent of the individuals, the right coronary artery (RCA) is dominant. In fifteen percent,the RCA is non dominant in which one half have PDA and posterolateral branch arising from the distal circumflex artery called left dominance and in the remaining half the RCA gives rise to PDA and the left circumflex artery (LCx) provides all the posterolateral branches called codominant circulation(2).

Dominance pattern of the heart has an important clinical significance. Left dominant anatomy is believed to be associated with worse prognoses for patients with acute coronary syndrome (ACS) and stable coronary artery disease(3), (4). LD was found to have significantly higher mortality than RD and mixed types(5). Knowledge of coronary artery variations and pathologies is important in planning the treatment and in interpretation of findings of cardiovascular diseases(6).

Not much study has been done in North India regarding dominance of coronary artery. This study was to determine the pattern of coronary artery dominance in North Indian human hearts.

II. Methods

This study was carried out in 76adult heart specimens. The specimen human hearts used for this study were obtained from routine dissection conducted for undergraduate students from the Department of Anatomy, Rohilkhand medical college, Bareilly and Department of anatomy, Santosh Medical College, Ghaziabad.

Thoracic cavity was opened by cutting the ribs and sternum, the great vessels were ligated. The parietal pericardium was incised and heart along with great vessels were taken out of the pericardial cavity. Each specimen was thoroughly washed to free it from the blood clots. All specimens were preserved in 10% formalin solution. The specimens were labelled numerically. The origin of right coronary artery from the ascending aorta is identified. The right coronary artery lies in between right auricle and right side of pulmonary trunk. Then the right coronary artery is dissected along its course running in the right atrioventricular groove and traced on the

posterior surface of heart running in the coronary sulcus towards the crux ofheart and noted for origin of posterior interventricular artery.

On the anterior surface of the heart, Origin of the left coronary artery arising from the ascending aorta is identified i.e. between the left auricle and the left side of the pulmonary trunk. The LCA (left coronary artery) was traced until its division on the superior end of anterior interventricular groove which branched into LAD (left anterior descending) and LCX (left circumflex) artery. The LCX artery is dissected along its course on the posterior surface of the heart and noted for origin of posterior interventricular artery.

The PIVA running in the posterior interventricular sulcus is identified. The posterior interventricular arterywas dissected along its course upto the termination. The origin, course of posterior interventricular arterywas noted.

III. Results And Discussion

This studywas carried on 76 specimens of cadaveric hearts and observed for the dominance of coronary arteries.As shown in Table 1, In this study, we observed that out of 76 specimens studied, the posterior interventricular artery originated from RCA (right coronary artery) in 83 (83%) cases, in 14 (14%) cases posterior interventricular artery originated from LCA, in 3 (3%) cases posterior interventricular artery originated from both RCA and LCA.

Table 1. Showing origin of PIVA

Sl.no	Origin of PIVA	Specimens	Percentage
1	Right coronary artery	83	83 %
2	Left coronary artery	14	14%
3	Both Right & Left coronary artery	03	03%

In our study Right dominance is found in 83%, left dominance in 14% and co dominance in 3% cases. Considering the risk of higher mortality in left coronary dominance and coronary co-dominance pattern, more prevalence of myocardial infarction in left coronary dominance, the present study was done.

The incidence of left coronary arterial dominance in present study was 14% as compared to 18.5% reported by Hirak Das et al(7), 11.5% by Vasudeva Reddy J et al (8), 10% by MaEiSayed et al(9), 8% by Jose Roberto Ortale et al (10). The variation in result could be due to racial and geographical variation.Keshav Kumarstudied the relation between coronary arterial pattern and coronary artery disease. They described about the types of dominant pattern. Right coronary arterial dominance (83%), Left coronary arterial dominance (16%), Right coronary arterial great dominance (0.7%), and Coronaryarterial dominanceabsent (0.3%). There is increased incidence of coronary heart disease in the persons with left coronary arterial dominance and co dominance heart. In left coronary dominance and co dominance, the left coronary artery has to supply entire interventricular septum due to which the pulse pressure of blood rises more than 60mmHg in it producing atherosclerosis(11).Hirak das et alstudied coronary dominance in population of Assam in 70 hearts and found right dominance in 70%, left dominance in 18.75% and co-dominance in 11.43%(7). Hussein Ali Fakhir et alstudied the coronary artery dominance by angiography and their relationship with coronary artery disease in 657 Iraqi patients consecutively suffering from coronary artery disease. The right coronary artery was dominant in 76.4%, left dominant in 12.6%, co dominant in 10% cases. No significant difference in type of coronary dominance in relation to sex and age. There was significant association between right dominant system and coronary artery disease especially 3 vessel disease & right coronary artery occlusion(12).J. Vasudeva Reddy et al studied the origin, branching pattern and termination of coronary arteries in population of Andhra Pradesh. They dissected 80 human heart specimens by using vascular corrosion technique. Out of 80 specimens dissected 69 were of right dominance, 9 specimens were of left dominance and 2 specimens were of co-dominance type of coronary circulation. Incidence of right coronary dominance is higher in males than females. Left predominance is higher in males indicating the reason for higher incidence of myocardial infarction in males when compared to females(8).

IV. Conclusion

In our study Right dominance is found in 83%, left dominance in 14% and co dominance in 3% cases. Considering the risk of higher mortality in left coronary dominance and coronary co-dominance pattern, more prevalence of myocardial infarction in left coronary dominance. This study would be helpful to the cardiologists, radiologists and surgeons of North India.

Competing interests: None

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