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A Cadaveric Study on Coronary Dominance in South Indian Population

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ABSTRACT

Background: Adequate insight about coronary dominance is important to understand coronary artery diseases, interpret the radiological images and to devise a proper treatment protocol in cardiovascular diseases. It determines the amount and the area of myocardium being perfused by the left or right coronary arteries.
Aim: The aim of the present study is to observe the origin of posterior interventricular artery which determines the coronary dominance.
Materials and Methods: The study was done on 50 formalin fixed adult heart specimens in the Institute of Anatomy, Madras Medical College irrespective of age, sex, socio-economic status, religion and education status. The coronary arteries were examined by gross dissection and analyzed statistically.
Results: Right dominance was seen in 26(52%) hearts, left dominance in 10 (20%) hearts and balanced or codominance was seen in 14(28%) hearts.
Discussion: The coronary artery dominance has an important clinical & surgical significance. Most of the studies have reported a higher percentage of right dominance including the present study.
Conclusion: The present study on coronary dominance would be of assistance to interventional cardiologist and cardiothoracic surgeons to plan ahead during angioplasty & coronary artery bypass surgeries. Coronary dominance is also considered as an indicator in the incidence of myocardial infarction & also used as a prognostic factor during recovery.

Key Words: codominance, coronary artery, coronary diseases, coronary dominance, coronary preponderance

INTRODUCTION

Coronary artery disease is one of the leading causes of mortality and morbidity across the world. Coronary artery disease is one of the major causes of death in developed countries. The incidence of coronary artery disease is increasing today in developing countries too, because of a sedentary life style, binge eating of junk food, reduced physical activity and stress. Recent trends show a rise in coronary artery associated death in young people. It is seen significantly both in males and females irrespective of socio economic status [1]. In the young, the primary cause of death is non atherosclerotic coronary abnormalities [1]. Dominance pattern of the heart has got important clinical significance. Left dominance was found to have significantly higher mortality than right dominance and codominance [2]. Dominance also plays important role in inferior wall infarcts of the heart. Inferior wall infarcts although less extensive than anterior infarcts, are more important as they can cause various degrees of atrioventricular blocks in approximately 30% of cases. The dominanat right coronary artery usually supplies atrioventricular node. Therefore an inferior wall infarcts caused by occlusion of right coronary artery will have higher risk of AV blocks [3].

The arterial supply to the heart is by two coronary arteries: Right coronary artery (RCA) and left coronary (LCA). There is a

wide variation with regard to origin, course, termination and branching pattern of coronary arteries. The term 'dominance' also called as 'coronary preponderance' is used to refer to the coronary artery giving off the posterior interventricular (PIV) branch, which supplies the posterior part of the ventricular septum and also part of the posterolateral wall of the left ventricle. In 'right dominance', the PIV (descending) artery is derived from the right coronary artery; in 'left dominance' it is derived from the left coronary artery. In the so called "co dominance", branches of both arteries run in or near the groove [5]. The most common is right dominant pattern, which is present in approximately 67% of people. In approximately 15% of hearts the LCA is dominant, in which the PIV artery is a branch of circumflex artery. There is codominance in approximately 18% of people, in which branches of both the right and left coronary arteries reach the crux and give rise to branches that course in or near the posterior inter ventricular sulcus [7]. A thorough knowledge of coronary artery variations is important in the interpretation of findings and planning the treatment of cardiovascular diseases, hence the need for the present study.

MATERIALS & METHODS

A total of 50 formalin fixed adult heart specimens were collected from the Institute of Anatomy, Madras Medical College irrespective of age, sex, socio-economic status, religion and education status.

The visceral pericardium was stripped and subepicardial fat was removed to study the coronary artery and its branching pattern. The branches were dissected manually and carefully till their termination. The coronary artery giving rise to the posterior inter ventricular artery was noted. Photographs were taken; required data were noted and the results were compared with that of previous studies.

Observation:

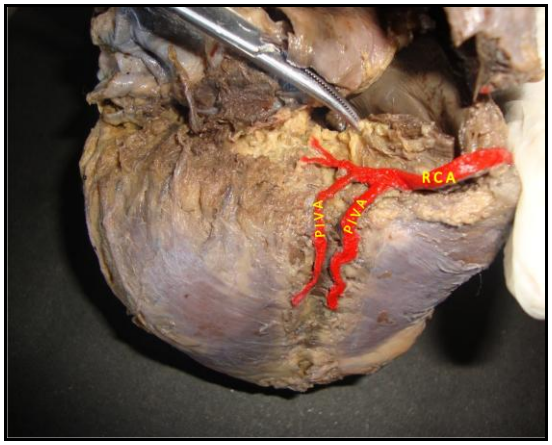

Fig 1 showing *Right dominance* with two PIV arteries arising from RCA

In this study, the posterior inter ventricular artery and posterior left ventricular branches were found to arise from the left circumflex artery in 10 (20%) hearts, the "*left dominance* "(Fig 2). Both arose from the right coronary artery in 26 (52%) hearts, the "*right dominance"* (Fig 1). In the remaining 14 (28%) hearts, there were contributions from both the coronary arteries, the "*co dominance* ".

Thus,

Right dominance: 26 hearts (52%)
Left dominance: 10 hearts (20%)
Co-dominance: 14 hearts (28%)

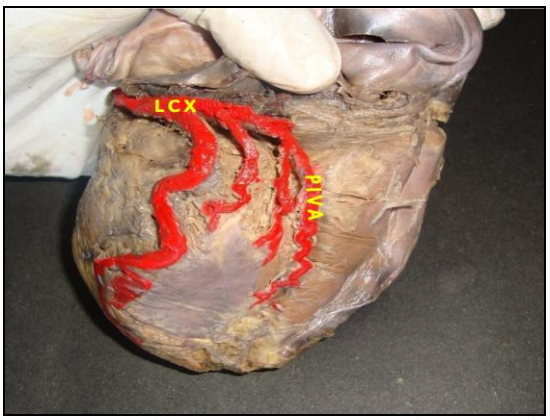

Fig 2 showing *Left dominance* – PIVA arises from circumflex artery

DISCUSSION

Coronary dominance is important in ascertaining the distribution of coronary blood flow. Left dominance signifies more blood flow through circumflex artery and PIVA, comparing to RCA. Hence, the area

of cardiac tissue being perfused by the separate arterial trunks too vary.

Also, coronary dominance herald coronary arterial diseases & disease outcomes. It is said that right dominant individuals are more prone for triple vessel disease & inferior wall myocardial infarction. Literature also states that left dominant individuals have shown increases mortality in the post myocardial infarction recovery period.

Table 1 Comparison of present study results with other studies

Author	Right dominance	Left dominance	Co dominance
Schlesinger(1940)	48%	18%	34%
James	90 %	10%	--
Cavalcanti	69.09 %	11.82%	19.09%
Kalpana (2003)	89%	11%	--
Das (2010)	70%	18.57%	11.43%
Vinitha (2015)	62%	22%	16%
Present study	52%	20%	28%

The present study shows much preponderance to right dominance as suggested by many other studies. The present study shows 52% of right dominance. The various studies compared show a right dominance varying between 42% - 90%. Left dominance in the present study is 20% whereas in other studies it varies between 10% - 22%. Co dominance is observed in 28% of the hearts in the present study. Other studies had documented co dominance from 0%- 34%. (Table 1).

(PIVA - posterior inter ventricular artery, RCA - right coronary artery)

CONCLUSION

Coronary vasculature anatomy and the idea of coronary dominance is mandatory for interventional cardiologists, radiologists and cardiothoracic surgeons to interpret the angiographic findings, to predict the disease severity, to outweigh the treatment strategies & outcomes considering these anatomical factors as predictors.

Conflicts of Interests: None

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