Original Research Article

Coronary dominance pattern among the population of coastal Karnataka: A cadaveric study

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Abstract

Background: The anatomy of coronary arteries is of great clinical importance and any variation is significant for proper interpretation of coronary angiogaraphies and for further surgical repair. The term 'coronary dominance' is described based on the artery that gives rise to posterior interventricular branch. If the posterior interventricular artery is a branch of right coronary artery, then it is said to be right dominant circulation. If from the left circumflex artery, then it is left dominant circulation and if it arises from both right coronary and left circumflex arteries then it is said to be co-dominant or balanced circulation. **Materials and Methods:** The study was carried out in the department of Anatomy, Kasturba Medical College, Manipal, India. The study was performed on 50 formalin fixed human hearts of unknown sex and age. The coronary arteries and their branches were carefully dissected out till their termination. The coronary dominance pattern was observed, noted and photographed. **Results:** Of the 50 human hearts that were studied, 45 hearts showed right coronary dominance with posterior interventricular artery originating form right coronary artery, 04 hearts showed left coronary dominance with posterior interventricular artery originating form left circumflex artery and the remaining 01 heart showed co-dominance with posterior interventricular artery originating from both right coronary artery and left circumflex artery. **Conclusion:** Right coronary dominance was the most commonest and the co-dominance was the least common among the samples studied.

Key Word: Coronary dominance, Left circumflex artery, Posterior Interventricular artery, Right coronary artery.

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INTRODUCTION

The anatomy of coronary arteries is of great clinical importance and any variation is significant for proper interpretation of coronary angiogaraphies and for further surgical repair. The coronary arteries arise from the aortic sinuses. The initial portion of the aortic root is occupied by the aortic sinuses, also called the sinus of Valsalva[1]. These sinuses are named according to their position as the anterior, right posterior and left posterior aortic sinuses. The right coronary artery arises from the anterior aortic sinus and the left coronary artery from the left posterior aortic sinus. In clinical terminology, the anterior, left posterior and right posterior sinuses are often called the right, left and non-coronary sinuses, respectively. The major branches of right coronary artery proximo-distally includes, the conus artery, right atrial branches, right ventricular branches, AV nodal branch, left ventricular branches, posterior interventricular branch and interventricular septal branches. The left coronary artery has two major branches, the left anterior interventricular and left circumflex arteries. Posterior interventricular artery is usually a branch or just a continuation of right coronary artery or a branch of left circumflex artery. It gives off septal branches supplying the posterior part of interventricular septum. The term 'coronary dominance' is described based on the artery that gives rise to posterior interventricular branch. If the posterior interventricular artery is a branch of right coronary artery, then it is said

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to be right dominant circulation. If from the left circumflex artery, then it is left dominant circulation and if it arises from both right coronary and left circumflex arteries then it is said to be co-dominant or balanced circulation. Approxiamately 60% of general population is right dominant, 20% left dominant and rest are co dominant[2]. The present study is conducted to find out the incidence of coronary dominance pattern among the population of coastal Karnataka.

MATERIALS AND METHODS

The study was carried out in the department of Anatomy, Kasturba Medical College, Manipal, India after obtaining ethical approval from the Institutional ethics committee. The study was performed on 50 formalin fixed human hearts of unknown sex and age. Visceral pericardium was first striped off and the sub epicardial fat removed. The coronary arteries and their branches were carefully dissected out till their termination. Then the source of posterior interventricular artery which determines the coronary dominance pattern was observed and noted. To enhance contrast, the arteries were then painted with red fabric colour and photographs were taken.

OBSERVATION AND RESULTS

In the present study conducted on 50 samples of human hearts, 45 samples (90%) showed the right coronary dominance with posterior interventricular artery originating from the right coronary artery (Fig.01). 04 samples (08%) showed left coronary dominance with posterior interventricular artery originating from the left circumflex artery (Fig.02). Remaining 01 sample (02%) showed co-dominance with the posterior interventricular artery originating from both the right coronary artery and left circumflex artery (Fig.03).

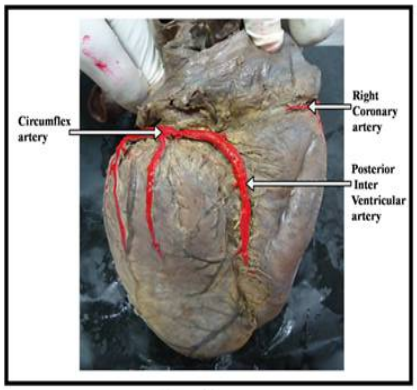

Figure 1:

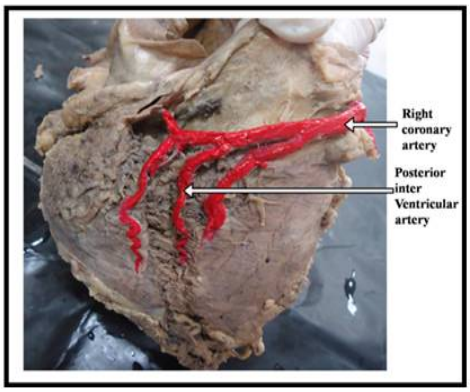

Figure 2

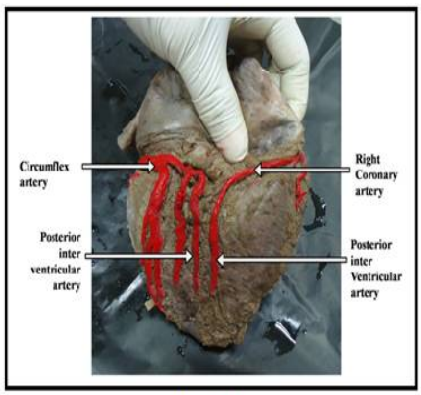

Figure 3:

Figure 1: Right Coronary Dominance; **Figure 2:** Left Coronary Dominance; **Figure 3:** Co-Dominance

Table 1: Coronary dominance

	Number of samples	Incidence
Right Dominance	45/50	90%
Left Dominance	04/50	08%
Co-dominance	01/50	02%

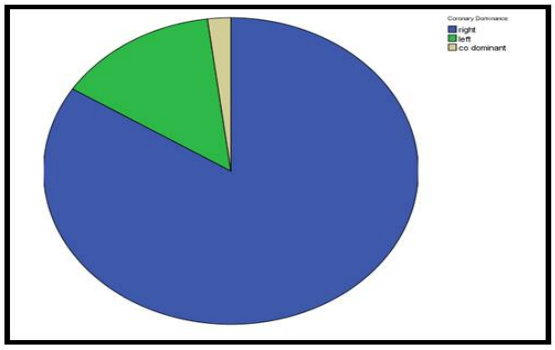

Figure 4: Coronary dominance pattern

Table 2: Dominance pattern reported by different authors (in %)

Author	Right	Left	Co-dominance
Saltissi S (1979)[6]	85	15	---
Cavalcanti JS (1995)[7]	88.18	11.82	---
Kalpana R (2003)[8]	89	11	---
Ballesteros LE (2009)[9]	76	7.8	16.2
Kosar P (2009)[10]	76	9.1	14.9
Abdellah AAA (2009)[11]	77	08	15
Christensen KN (2010)[12]	85.7	9.5	4.8
Fazliogullari Z (2010)[13]	42	14	44
Das H (2010)[14]	70	18.57	11.43
Bhimalli S (2011)[15]	60	23.33	16.66
Present study	90	08	02

DISCUSSION

The term 'dominant' is used to refer to the coronary artery giving off the posterior interventricular (descending) branch, which supplies the posterior part of the ventricular septum and often part of the posterolateral wall of the left ventricle. The dominant artery is usually the right (60%). The term 'dominant' is misleading, because the left artery almost always supplies a greater volume of tissue than the right. In 'right dominance', the posterior interventricular artery is derived from the right coronary artery; in 'left dominance' it is derived from the left coronary artery. In the so-called 'balanced' pattern, branches of both arteries run in or near the posterior interventricular groove[2]. Out of 50 cadaveric hearts dissected, 45 (90%) hearts were right dominant (Fig.01), four (08%) were left dominant (Fig.02) and one (02%) case was co dominant (Fig.03). One heart showed two posterior interventricular arteries and one heart showed 4 posterior interventricular arteries. The total incidence of right dominance in our study was 90%, left dominance was 08% and co dominance was 02%. Dominance pattern of heart has lots of clinical significance. Left dominance has significantly higher mortality rates when compared to right and co-dominant hearts.[3] Dominance also has a role in anterior interventricular branch stenosis. It is observed that in left dominance the anterior interventricular branch wraps round the apex of heart supplying major portions of myocardium. In right dominance it is the posterior interventricular branch of right coronary artery which supplies the majority of myocardium. Thus any lesion in anterior interventricular branch in a left dominant heart has a profound effect than a right dominant heart[4]. Dominance also plays an important role in inferior infarcts of the heart. Dominant right coronary artery usually supplies the atrioventricular node in majority of the cases. Hence, inferior wall infarct caused by the occlusion of the right coronary artery will have a higher risk of AV block[5]. The present study showed the right dominant circulation to be more common than the left dominant and co-dominant circulation similar to other studies conducted before. Dominance pattern reported by various authors is depicted in Table.02.

CONCLUSION

The present study describes the different coronary dominance pattern among the population of coastal Karnataka. It also proves the right dominant circulation to be the most commonest and the co-dominant circulation to be the least common. This provides a basis for interventional cardiologists and cardio-thoracic surgeons to understand the normal anatomy and variations in the dominance pattern among the patients and thus helps them to manage patients with various coronary artery diseases with appropriate care and treatment.

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