Original Article

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Dominance of Coronary Arteries: A Combined Gross Anatomical & Angiographic Study

Thakre Gourav D.[1], **Inamdar Vaishali V.**[2]

Abstract

Introduction: The dominant coronary artery is that which gives the posterior interventricular branch, traversing the posterior interventricular sulcus and supplying the posterior part of the ventricular septum and often part of the posterolateral wall of the left ventricle as well. In various studies the right coronary artery dominance was observed in 63-90% cases, left coronary artery dominance was observed in 6-20% cases and Co-dominance was observed in 1-28% cases by various methods of study. *Material and Methods:* 55 heart specimens were dissected and 82 cases of angiography were studied. The dominance pattern along with sexual dimorphism were noted and analysed. *Result:* Amongst the total 137 cases right dominance was found in 72.3%, left dominance in 15.3% and co-dominance in 12.4%. Right dominance was found in 67.6% males & 85.7% females, Left dominance in 15.7% males & 14.3% females, Co-dominance in 16.7% males & in females no case of co-dominance was found. *Conclusions:* In females Right dominance was more than in males, while Left dominance and Co-dominance was more in males. The difference in dominance pattern male and females is statistically significant.

Keywords: Dominance; Co-Dominance; Right Coronary Artery; Left Coronary Artery.

Introduction

The arteries which are the first branches from the ascending aorta occupy atrioventricular and interventricular groove in a shape of crown, hence named coronary arteries [1].

Coronary arteries are classified as "end circulation" since they represent only source of blood supply to the myocardium; there is very little redundant blood supply, which is why blockage of these vessel can be so critical [2].

The term 'dominant' coronary artery was introduced by Schlesinger (1940) who used it to indicate the areas of heart supplied by each artery. Although the left coronary artery always supplies a greater mass of myocardium than does the right, it is not usually 'dominant'. The dominant coronary artery is that which gives the posterior interventricular branch, traversing the posterior interventricular sulcus and supplying the posterior part of the ventricular septum and often part of the posterolateral wall of the left ventricle as well (Allwork, 1980) [1].

In various studies the right coronary artery dominance was observed in 63-90% cases, left coronary artery dominance was observed in 6-20% cases and Co-dominance was observed in 1-28% cases by various methods of study [3-16].

The present study observes the dominance in males and females by doing the dissection on cadaveric hearts and observing the angiograms of various patients.

Material and Methods

The study was carried out with the permission of institutional ethics committee in the department of Anatomy, in collaboration with the Private cardiology institute in the city.

For gross study 55 heart specimens were dissected,

Author's Affiliation: [1]Assistant Professor, Department of Anatomy, Shri Shankaracharya Institute of Medical Sciences, Junwani, Bhilai, Chhattisgarh 490020, India. [2]Associate professor, Department of Anatomy, Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra 431601, India.

Corresponding Author: Gourav Dadarao Thakre, C/O. D.S. Thakre, Plot No.25, Mahalaxmi Nagar-3, Manewada Road, Nagpur-440024, Maharashtra, India.
E-mail: gdthakre143@gmail.com

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For angiography study, angiographic data of 82 cases was studied which were already recorded with the help of CT Angiographic machine from the well equipped cardiology unit from a private institute in the city. In both type coronary arteries were traceable up to its termination.

By stripping the visceral pericardium from the anterior and posterior interventricular sulcus, as well as from right & left atrioventricular sulcus, the right coronary artery (RCA), left main coronary artery (LMCA), left circumflex artery (LCX) was identified.

Dominance was decided by the origin of posterior interventricular artery, if it was given by RCA then it was termed as Right Dominance, if it was given by LCX then it was termed as Left dominance. If both RCA & LCX were giving branches in the posterior interventricular sulcus then it was termed as co-dominance.

Group of 82 samples of angiography were selected randomly from the vast data which was already recorded in a private cardiology institute in the city, With the help of DICOM software on computer interface attached with the CT Machine under guidance of the senior interventional cardiologist the dominance pattern was observed. Collectively 137 cases observations were analyzed on SPSS V.13 software by Pearson Chi-square test.

Result

As shown in table 1, there were total 137 cases studied, amongst that 102 were males and 35 were females. Amongst 137 of total, 55 cases were of Gross samples and 82 cases were of Angiography.

As shown in table 2, Amongst the total 102 males right dominance was found in 67.6% (Figure 1 & 2), left dominance in 15.7% (figure 3 & 4) and co-dominance in 16.7% (Figure 5, 6 & 7).

Amongst the total 35 females right dominance was found in 85.7%, left dominance in 14.3% and no case of co-dominance found.

Amongst the total 137 cases right dominance was found in 72.3%, left dominance in 15.3% and co-dominance in 12.4%.

Table 1: Sample Distribution

	Gross	Angiography	Total
Male	42	60	102
Female	13	22	35
Total	55	82	137

Table 2: Coronary Dominance

	Right dominance	Left dominance	Co-dominance	p-Value & Significance
Male (n=102)	67.6% (n = 69)	15.7% (n = 16)	16.7% (n = 17)	0.030
Female (n=35)	85.7% (n = 30)	14.3% (n = 5)	0.00% (n = 0)	**Significant**
Total (n=137)	72.3% (n = 99)	15.3% (n = 21)	12.4% (n = 17)	

Table 3: Comparison of Coronary Artery Dominance In Different Studies

Authors	Right dominance	Left dominance	Co-dominance
Abdelmoneim AAA et al [3]	77%	8%	15%
Ballesteros LE et al [4]	76%	6.8%	17.2%
Bezerra FS [5]	80%	20%	----
Bhimalli Shilpa [6]	65%	17.5%	10%
Cheemalapati S et al [7]	75%	15%	10%
Hussain MA et al [8]	90%	10%	----
Jeffrey J. Popma [9]	85%	7.5%	7.5%
Kahn [10]	70%	10%	20%
Kalpana, R [11]	89%	11%	----
Kini s et al [12]	80-85%	15-20%	5%
Koşar P. et al [13]	76%	9.1%	14.8%
Laurens FT et al [14]	87%	12%	1%
Paolo Angelini [15]	89.1%	8.4%	2.5%
Rahman [8]	70%	13%	17%
Sarami et al [16]	87.25%	10.78%	1.97%
Sarker [8]	63%	9%	28%
Present study	72.3%	15.3%	12.4%

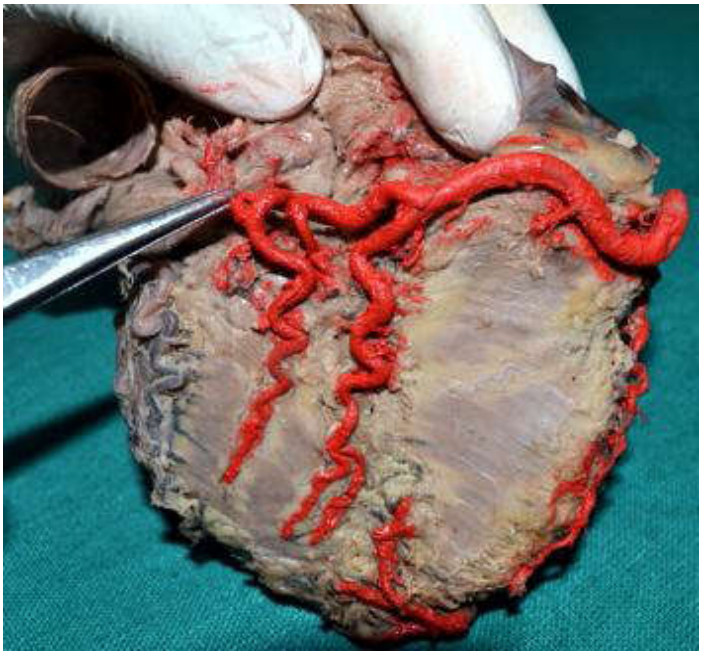

Fig. 1: Right dominance (Gross)

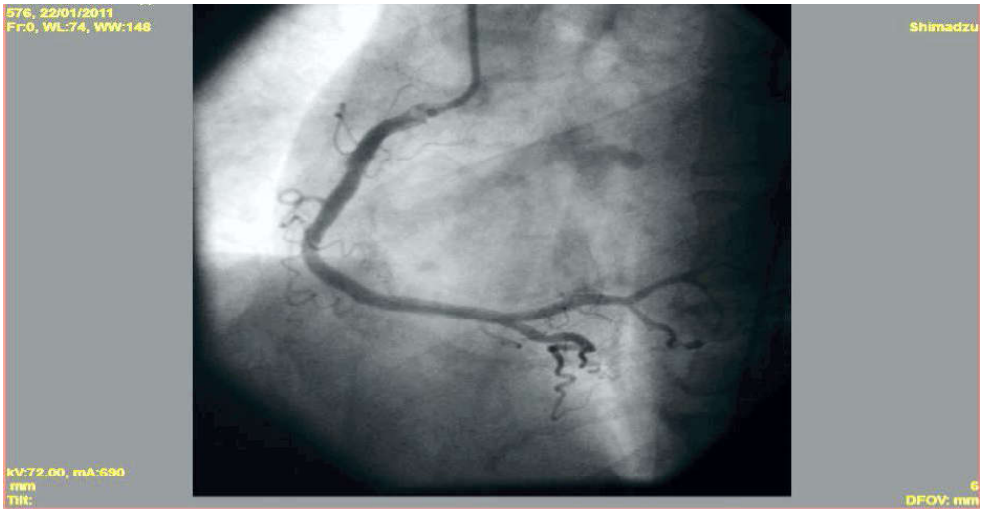

Fig. 2: Right Dominance (Angiographic) (Left Anterior Oblique View)

Fig. 3: Left dominance (Gross)

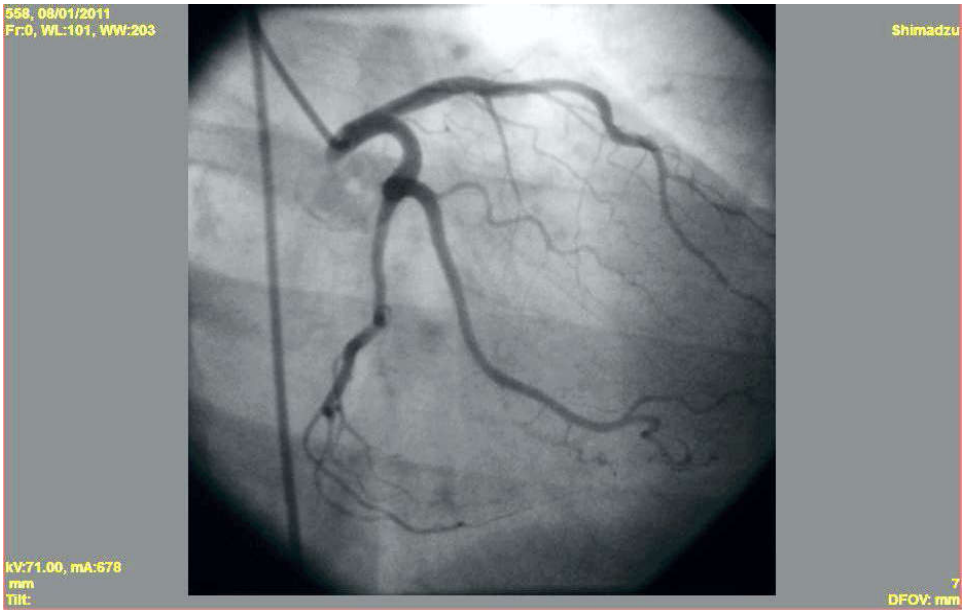

Fig. 4: Left Dominance (Angiographic) (Right Anterior Oblique View)

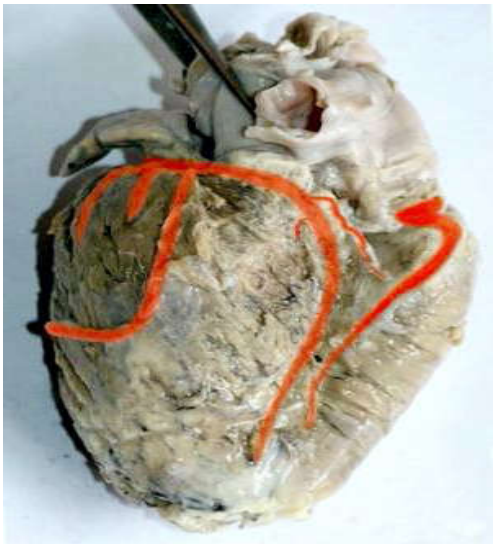

Fig. 5: Co-Dominance (Gross)

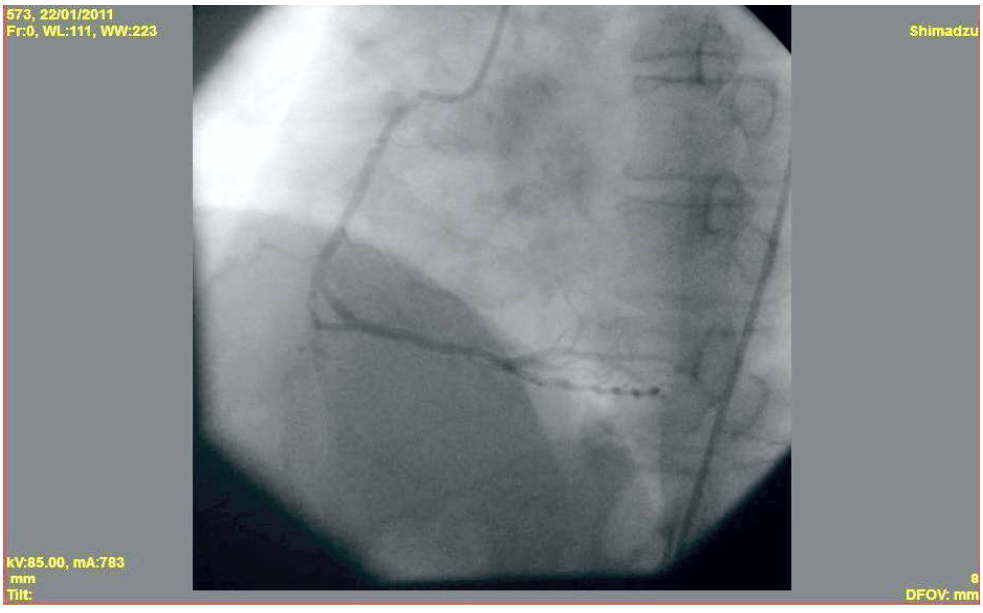

Fig. 6: Co-Dominance (Angiographic) (Left Anterior Oblique View)

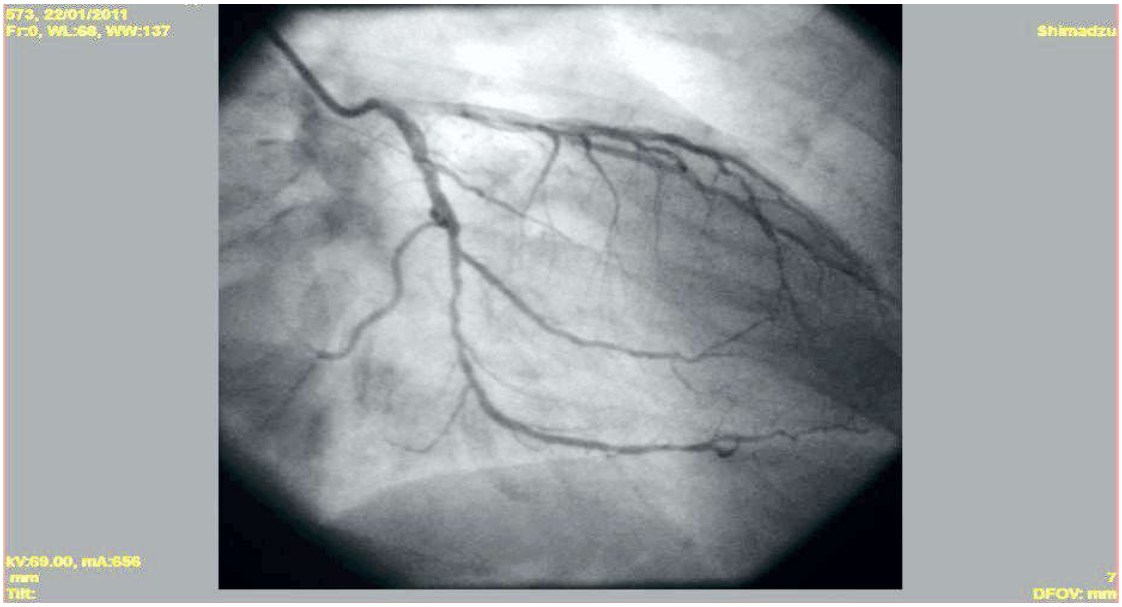

Fig. 7: Co-Dominance (Angiographic) (Right Anterior Oblique View)

Discussion

In present study right dominance was present in 72.3% cases. This result correlates with the results of Ballesteros LE et al [4], Cheemalapati S et al [7], Kahn [10], Kosar P. et al [13] and Rahman [8].

The left dominance in the present study was in 15.3% cases and this result correlates with the results of Bhimalli Shilpa [6], Cheemalapati S et al [7], Kini s et al [12], Laurens FT et al [14] and Rahman [8].

The co-dominance in the present study was found in 12.4% cases which correlate with the results of Abdelmoneim AAA et al [3], Bhimalli Shilpa [6], Cheemalapati S et al [7] and Kosar P. et al [13].

The dominance pattern when compared between male and females of present study, it was found statistically significant.

Conclusions

Right dominance was found in 72.3% (n = 99) cases, Left dominance in 15.3% (n = 21) cases and Co-dominance in 12.4% (n = 17) cases.

In females Right dominance was more than in males, while Left dominance and Co-dominance was more in males. The difference in dominance pattern male and females is statistically significant.

List of Abbreviations

- RCA – Right Coronary Artery.
- LMCA – Left Main Coronary Artery.
- LCX – Left Circumflex Artery.
- N – Sample size

Conflict of Interests: None

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