A study of coronary dominance pattern in central India population

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Abstract

Aim of the study to know the coronary dominance pattern in central India population. Coronary arteries show wide variations among different populations. Origin of posterior interventricular artery was taken as the basis of dominance. The present study was undertaken on 70 adult human heart specimens from embalmed cadavers. Hearts were dissected and studied. Out of the seventy hearts studied, 55(78.57%) shows right dominance, 14(20%) shows left dominance and 1(1.42%) shows co-dominance or balanced dominance. The results of the study were compared with authors and variations were noted.

Keywords: Posterior interventricular artery, Left circumflex artery, Right coronary artery, Coronary dominance, Right dominance, Left dominance, Co-dominance or balanced dominance

Introduction

Today, with the widespread use of new imaging diagnostic techniques and the development of non-aggressive treatments, a thorough knowledge of the normal coronary anatomy and its variations and/or anomalies is essential.[1]

The term 'coronary' comes from the Latin term "Corona" meaning "Crown". The heart is normally supplied by two coronary arteries: The right coronary artery (RCA) and left coronary artery (LCA).Variability in the origin of the posterior interventricular artery (PIVA) is expressed by the term "Dominance". The term right and left "Coronary Preponderance" or "Dominance" was used to show which coronary artery irrigates the heart' diaphragmatic surface, based on the origin of the posterior inteventricular artery (PIVA). Origin of PIVA from the RCA was termed 'Right Dominance'; from the circumflex artery was called 'Left Dominance'. Origin from both the RCA and the circumflex artery was known as balanced pattern.[2]

Left dominance seems to be associated with higher mortality due to acute infarction and a higher incidence of Arteriosclerosis. Because of the importance of the anatomy in the planning of coronary disease surgeries, the dominance of the circulation is a common theme for discussion in the literature.[3]

The present study was undertaken to determine the pattern of coronary artery dominance in central Indian population and document its association with coronary artery disease.

Materials and Method

The present study was carried out in the Department Of Anatomy, Indira Gandhi Government Medical College, Nagpur, India. A total of 70 adult human hearts procured from dissection room cadavers of adult age groups from the Department of Anatomy, preserved in 10% formalin, were included in this study irrespective of sex.

The heart was exposed and removed from the thoracic cavity by cutting through the ribs and sternum, cutting the great vessels and finally incising the pericardium. The heart was taken out of the pericardial cavity. The aorta was cut open longitudinally, just on the right side of the anterior aortic sinus reaching up to a level just distal to the aortic sinuses.

The specimens thus collected are serially numbered from 1 to 70. The right and left coronary arteries are dissected out, noting down their branching patterns and variations if any at the subepicardial level. Dominance of coronary arteries was determined.

Result

Table 1: Showing Dominance of coronary arteries

| Dominance of coronary arteries	Number of Hearts	Percentage (%)
Right dominance	55	78.57%
Left dominance	14	20%
Co-dominance	1	1.42%
Total	70	100%

Table 1 shows the dominance of heart in present study. Out of the total 70(100%) heart studied Right dominance is observed in 55(78.57%) cases i.e. posterior interventricular artery arises from right coronary artery. The posterior interventricular artery runs in the posterior interventricular sulcus. The origin of posterior interventricular artery from right coronary artery is commonest in human hearts. Left dominance is seen in 14 (20%) cases i.e. posterior interventricular artery arises from circumflex branch of left coronary artery. In 1.42% of heart co- dominance is seen i.e.

posterior interventricular artery arises from both right coronary artery and circumflex branch of left coronary artery.
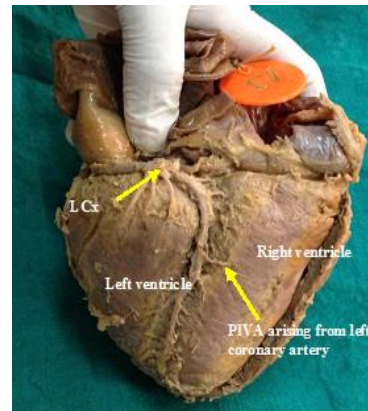
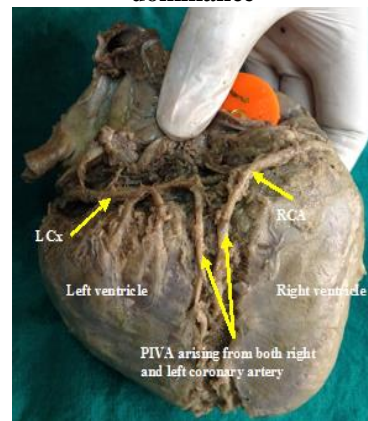**Graph 1: Bar diagram showing dominance of coronary arteries**
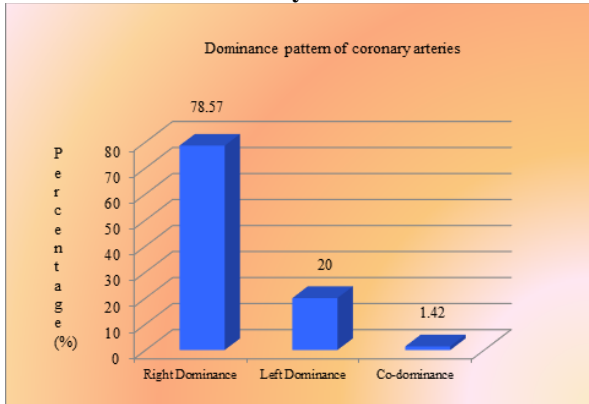
Photograph 1: PIVA arising from RCA - Right dominance
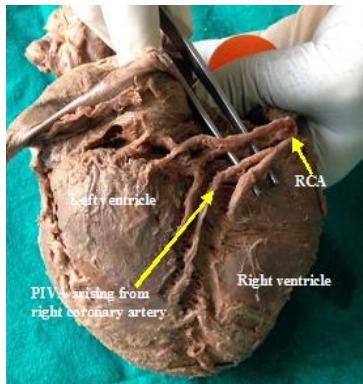
Photograph 2: PIVA arising from LCx branch of LCA - Left dominance

Photograph 3: PIVA arising from both RCA and LCx branch of LCA - Co-dominance or Balance dominance

Discussion

Table 2: Showing comparison of Dominance pattern of present study with other studies

Authors	Right Dominance	Left Dominance	Co-Dominance
Kalpana R. (2003)[4]	89%	11%	-
Abuchaim D. et al (2009)[3]	72%	20%	8%
Das H. et al (2010)[2]	70%	18.57%	11.43%
Bhimalli S. et al (2011)[5]	60%	23.33%	16.66%
Mian F.A. et al (2011)[6]	60.5%	19.5%	20%
Reddy J.V. et al (2013)[7]	86.25%	11.25%	2.5%
Singh P. et al (2014)[8]	73.33%	26.67%	-
Present Study	78.57%	20%	1.42%

Table 2 shows comparison between present study with other studies. Kalpana R. (2003)[4] observed right dominance in 89% of hearts while left dominance was found in 11%. Abuchaim D. C. et al (2009)[3] studied coronary dominance patterns in human hearts by corrosion casting and found that right dominance was seen in 72% of cases. Left dominance was found in 20% while balanced dominance was observed in 8% of hearts. Das H. et al (2010)[2] observed right dominance in 70%, left dominance in 18.57% and balanced dominance in 11.43% of cases. Bhimalli S. et al (2011)[5] found right dominance in 60% and left dominance was present in 23.33%. In 16.66% balanced dominance was seen. Mian F.A. et al (2011)[6] studied

coronary artery dominance and observed right dominance in 60.5% and left dominance in 19.5%. 20% cases showed co-dominance. Reddy J.V. et al (2013)[7] studied human hearts by corrosion casting and observed right dominance in 86.25% of specimen. In 11.25% left dominance was seen while 2.5% of hearts showed balanced dominance. Singh P. et al (2014)[8] studied arterial dominance in human hearts by perfusion method and observed 73.33% cases of right dominance while 26.67% cases of left dominance.

In Present Study right dominance was observed in 78.57% while left dominance was present in 20% of hearts. In 1.42% co-dominance was found. When the present study was compared and co related with other studies. Almost all authors have reported higher percentages of right dominance. Mian F.A. et al (2011)[6] showed the highest incidence of co-dominance.

Conclusion

In the present study right coronary dominance is most common pattern in 78.57% specimens. Left dominance seen in 20% cases while 1.42% cases showed co-dominance or balanced pattern. Knowledge of coronary artery variations and pathologies is important in planning the treatment and in interpretation of findings of cardiovascular diseases. The thorough knowledge of coronary dominance is essential for interventional cardiologists and cardiothoracic surgeons to plan proper intervention/surgery for patients with coronary artery diseases.

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