

A STUDY OF CORONARY DOMINANCE IN PRESERVED HUMAN CADAVERIC HEART SPECIMENS IN KOLHAPUR REGION OF WESTERN MAHARASTRA: A DISSECTION METHOD

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ABSTRACT

Background: With ever increasing load of coronary artery disease on population of developed as well as developing nations, it has become mandatory to have a detailed knowledge about coronary tree. One of the factors, coronary dominance, plays a crucial role in different pathologies of heart.

Materials and Methods: Coronary dominance was studied by gross dissection method in fifty (50) preserved human cadaveric heart specimens at Dr. D. Y. Patil Medical College, Kolhapur, Maharashtra and observations were noted.

Results: In 88% of the specimens, right dominance was noted. In 10% of the specimens, left dominance was noted. Balanced dominance was noted in 2% of the specimens studied. Results obtained from this study are compared with those of others and statistically significant differences are noted amongst some of them.

Conclusion: Each geographical, ethnic, racial group of people has got unique dominance patterns. Considering clinical significance of coronary dominance, similar studies should be carried out in different regions using different methods like angiography, resin corrosive cast etc. for betterment of medical facility for human being.

KEY WORDS: Coronary Artery, Coronary Dominance, Right Dominance, Left Dominance, Balanced Dominance, Posterior Interventricular Artery.

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INTRODUCTION

Coronary artery disease is one of the major cause of death in developed countries. The incidence of coronary artery disease is increasing today in developing countries as well, because of

changing life style, urbanization, sedentary nature of work, hypertension, iabetes mellitus and increased type A personality. Coronary artery disease is responsible for over 70% of sudden cardiac deaths. In the young, the primary cause of death is non atherosclerotic coronary

abnormalities [1].

As per different criteria's stated time to time, coronary dominance is determined. Dominance pattern of the heart has got important clinical significance. Left dominance was found to have significantly higher mortality than right dominance and mixed types [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 dominant 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].

So the present work is undertaken to study the dominance of coronary arteries in preserved human cadaveric heart specimens in Kolhapur region.

MATERIALS AND METHODS

The heart specimens for this study were obtained from Department of Anatomy, D.Y. Patil Medical College, Kolhapur. The sample size of the study comprised of 50 heart specimens. Normal hearts with age groups 20-70 years of both sexes were included, while hearts weighing more than 370 gms. in males and 280 gms. in females, heart specimens in cadavers of age more than 70 yrs. and less than 20 years, grossly abnormal hearts were excluded. Ethical clearance was granted from institutional ethics committee. Study was conducted from July 2010 to June 2012.

Materials used for conducting this study were gloves, dissection box, magnifying lens, vernier caliper, digital camera.

Cadaveric Heart specimen was immersed in 10% formaldehyde to preserve it. The heart was dissected and the coronary arterial dominance was noted. Schlesinger's criteria⁴ was used to determine coronary dominance. Unpaired T test of significance was used for statistical analysis.

RESULTS

Schlesinger's criteria⁴ was used to determine coronary dominance. According to it, the

dominance of the coronary artery is determined by the posterior interventricular artery (PIVA). It is termed as right dominance if the posterior interventricular artery is a branch of right coronary artery (RCA). If the posterior interventricular artery is a branch of left coronary artery (LCA), it is termed as left dominance. If posterior interventricular groove contains branches from both right and left coronary arteries, it is labeled as balanced dominance.

In 88% of the specimens, right dominance is noted. In 10% of the specimens, left dominance is noted. Balanced dominance is noted in 2% of the specimens studied.

Table 1: Showing Dominance in Coronary Circulation.

DOMINANCE	NO. OF SPECIMENS	PERCENTAGE
RIGHT	44	88%
LEFT	5	10%
BALANCED	1	2%
TOTAL	50	100%

Table 2: Showing Comparison of Coronary Arterial Dominance (In Percentage).

STUDIES	CORONARY ARTERIAL DOMINANCE		
	RIGHT	LEFT	BALANCED
SCHLESINGER 1938 [4]	48	18	34
JAMES TN 1931 [6]	90	10	0
KALPANA R et al 2003 [10]	89	11	0
HIRAK DAS et al 2010 [9]	70	18.57	11.43
Shilpa BHIMALLI et al 2011 [11]	66	23	0
PRESENT STUDY	88	10	2

Graph 1: Coronary Dominance.

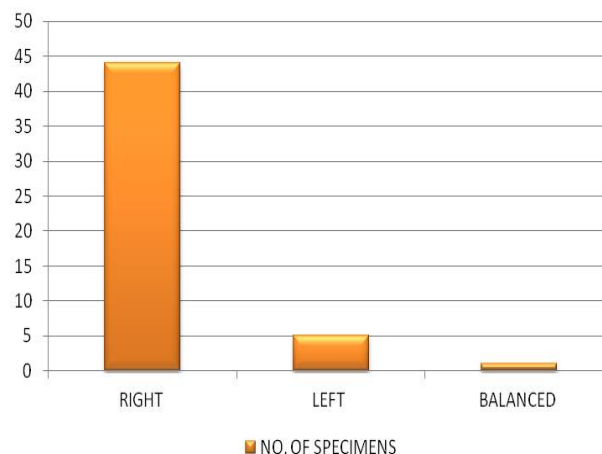


Fig. 1: Showing the Right Dominance

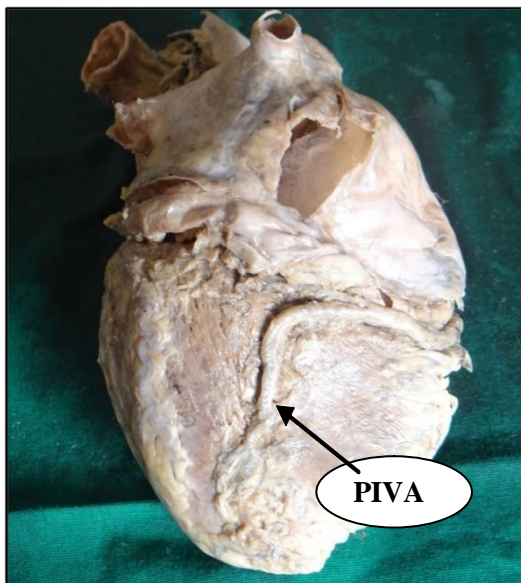


Fig. 2: Showing the Balanced Dominance.

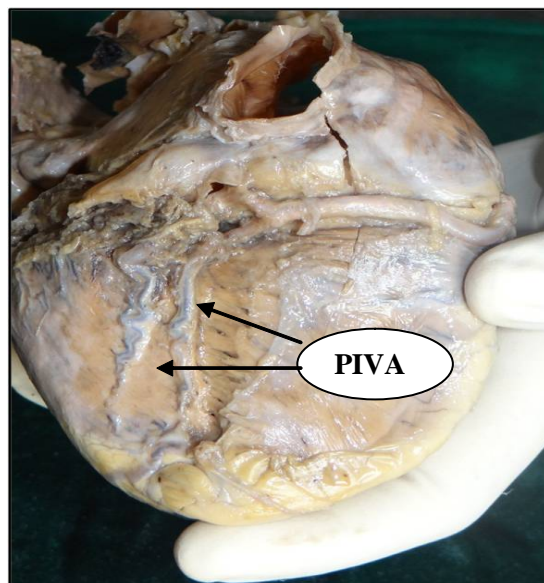


Fig. 3: Showing the Trifurcation of LCA

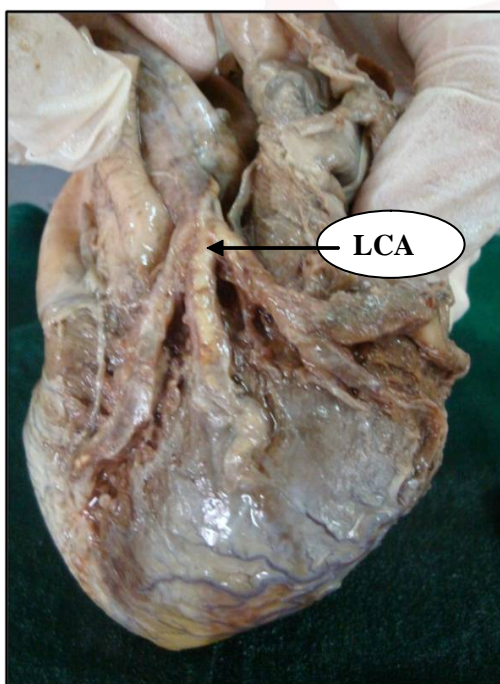
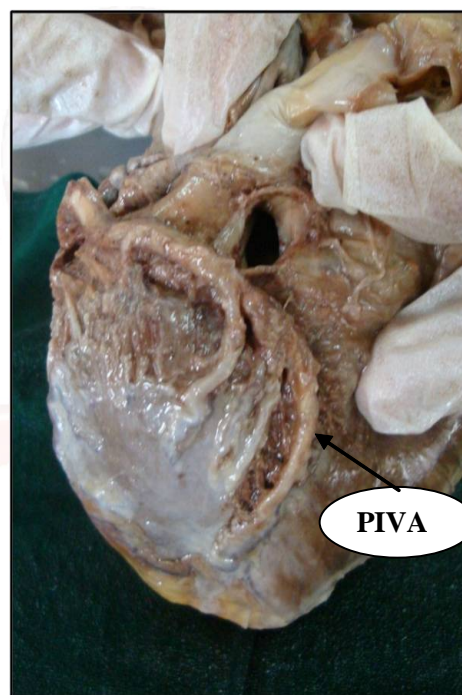


Fig. 4: Showing the Left Dominance.



DISCUSSION

Considering clinical significance of coronary arterial dominance, number of studies has been conducted all across the world till date. Different methods have been employed for the same. Dissection method is one of them and is considered to be better as compared with other methods by many of the Anatomists. In 1938, Schlesinger [4] considered the reference point indicating dominance consisted of determining which coronary artery supplied the posterior interventricular branch and which branches went beyond the crux cordis. Other criteria's like

lengths [5] of right coronary artery and left marginal artery, layout [6] of arteries at the apex of heart, length [7] of paraconal interventricular artery, number [8] of branches to ventricles are also stated in the literature.

In majority of the previous studies, percentage of right dominance exceeds over that of left dominance. The incidence of right dominance ranges from 48% to 90%. In the present study, right dominance was noted in 88% of the specimens studied which is resembling closely with result of studies of James [6] and Kalpana R. et al [10]. Incidence of left dominance ranges from 10% to 23% in various previous studies. In

present study, it was noted in 10% of specimens which is closely resembling with result of studies of Cavalcanti et al, Kalpana R. et al and James. Balanced dominance was less commonly noted in all previous studies except that of Schlesinger [4]. Balanced dominance was noted in 2% of specimens in present study.

In almost all the studies, the right dominance is noted in majority of cases. Only Schlesinger remains the exception for this observation. In his study, right dominance was noted only in 46% of cases. The reason for this great discrepancy should be sought out.

On application of test of significance, it is noted that right as well as balanced dominance is significantly more in Kolhapur region as compared to Karnataka region where Bhimalli et al¹¹ conducted her study. Similarly right dominance is significantly more as compared to that in population of Assam as per study conducted by Hirak Das et al. From all this, we can come to a conclusion that every region carries its own proportions of dominance and detailed studies should be conducted in each region for betterment of human being [9].

It is observed in left dominant hearts that left anterior descending artery wraps around apex of heart and supplies majority of inferior surface of heart. In right dominance, the posterior interventricular branch of right coronary artery supplies it, reducing the territory supplied by left anterior descending artery. So left anterior descending artery lesions would be more severe in left dominant systems as compared to that in right dominant ones.

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 dominant 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].

Variations in branching pattern of coronary arteries like trifurcation of LCA are also noted in present study but they are not dealt in detail. Separate studies for branching pattern should

be encouraged. A descriptive postmortem study like the present study can give an overview about the anatomy of the coronary arteries in individuals of Kolhapur region. However, a large sample size is very important in such epidemiological studies. Routine autopsy studies of hospital deaths should be encouraged. Studies on living population, including patients of heart diseases are also important, where various types of investigations like coronary angiogram & CT angiogram may be applied. These findings correlated with postmortem study may result in developing a comprehensive epidemiological data pool. These data may be helpful in planning research. Due to limitation of resources all age groups were not included in the present study. Further studies with large sample size with wider age group using Resin corrosive cast and angiography are recommended.

CONCLUSION

Right and balanced dominance is significantly more in Kolhapur region as compared to its neighboring region like Karnataka. So we can come to a conclusion that every region carries its own proportions of dominance. Each geographical, ethnic, racial group of people has got unique dominance patterns. Considering clinical significance of coronary dominance, detailed studies should be conducted in each region for betterment of human being.

Conflicts of Interests: None

REFERENCES

1. Taylor AJ, Byers JP, Cheitlin MD and Virmani R. Anomalous right or left coronary artery from the contralateral coronary sinus: "high risk" abnormalities in the initial coronary artery course and heterogeneous clinical outcome. *Am. Heart J.* 1997; 133:428-35.
2. Goldberg A, Southern D, Galbraith PD, Traboulsi M, Knudtson ML, Ghali WA. Coronary dominance and prognosis of patients with acute coronary syndrome. *Am. Heart J.* 2007; 154(6):1116-1122.
3. Amin K, Javed M, Mehmood A, Zakria M. Acute inferior wall myocardial infarction: frequency of AV blocks. *The Professional.* 2004;11(1):31-37.
4. Schlesinger MJ. Relation of the anatomic pattern to pathologic conditions of the coronary arteries. *Arch. Pathol.* 1938;30:443.

5. Baroldi G & Scomazzoni G. Coronary circulation in the normal and the pathologic heart. Office of The Surgeon General. Washington D. C., Department of The Army, 1967.
6. James, TN. Anatomy of the coronary arteries. New York, Paul B. Hoeber, 1961.
7. Ilia R, Rosenshtein G, Weinstein J, Cafri C, Abu-Ful A. & Gueron M. Left anterior descending artery length in left and right coronary artery dominance. *Coron. Artery Dis.*, 2001;12(1):77-78.
8. Vieira TH, Moura PC Jr, Vieira SR, Moura PR, Silva NC, Wafae GC, Ruiz CR & Wafae N. Anatomical indicators of dominance between the coronary arteries in swine. *Morphologie*. 2008;92(296):3-6.
9. Hirak Das, Geeta Das, Dipak Chandra Das, Kunjalal Talukdar. A study of coronary dominance in the population of Assam. *J. Anat. Soc. India*, 2010; 59(2) 187-191.
10. Kalpana R. A study on principal branches of coronary arteries in humans. *J Anat. Soc. India*, 2003;52(2):137-140.
11. Shilpa Bhimalli, Daksha Dixit, Mahantesh Siddibhavi and V S Shirol. A study of variations in coronary arterial system in cadaveric human heart. *World Journal of Science and Technology*. 2011;1(5): 30-35.

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