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Original research article

CORONARY DOMINANCE IN SOUTH INDIAN POPULATION

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ABSTRACT

Coronary artery anomalies are considered clinically insignificant and known to be associated with other congenital heart defects, myocardial ischemia and reduced life expectancy. Almost all elderly people have at least some impairment of coronary artery circulation. Therefore normal and pathological physiology of coronary circulation is one of the most important aspects in the entire field of medicine. In our study we dissected 80 human heart specimens to observe the coronary arteries from their origin to termination. We found 69 out of 80 are showing the right predominance (86.25%), 9 specimens with left predominance (11.26%) and remaining 2 of the balanced (2.5%) type of coronary circulation. The results of the study were compared with other literatures and variations are noted. In some cases we observed left predominance in males which indicates the reason for higher incidence of myocardial infarction in males when compared to females.

Keywords: Coronary artery, Right dominant, Left dominant, Balanced or co- dominant

INTRODUCTION

Human heart supplied by two coronary arteries namely right & left coronary arteries, arise from ascending aorta. The left coronary artery divides into left anterior descending artery and circumflex artery, supplies blood to the front of the left side of the heart, lateral side and base of the heart¹. The right coronary artery branches are the posterior descending artery and acute marginal arteries, supplies blood to the right ventricle, right atrium, Sino Atrial node, Atrioventricular node and a variable portion of the left ventricle². Hettler stated the left coronary artery dominance, right coronary artery dominance and co-dominant are the three

types of coronary circulation³. Anomalous origin and distribution of the coronary arteries were shown to be a cause of sudden death in young and adult patients, often in association with physical exertion. Coronary artery anomalies when occur pose difficulty with coronary visualization, identification and present unique problems for surgical treatment. Our study determines the pattern of coronary artery dominance, balanced type of circulation in south Indian population.

MATERIALS AND METHODS

A total (n=80) heart specimens were collected with a portion of ascending aorta from relatively fresh bodies that came for post-mortem at the Forensic Department, SV Medical College, Tirupati. Each specimen thoroughly washed to free it from the blood clots and dissected anatomically and ethical committee of our institute permitted to do the work. The arterial pattern of heart from the origin of the coronary arteries to their termination observed and variations are recorded. And also the arteriograms of types of coronary circulation with labelled photographs are collected from the cardiology department.

RESULTS

In the present study 80 human heart specimens were dissected and observed for the coronary

arteries from their origin to termination. With regards to coronary predominance out of 80 specimens 69 (male-48, female-21) of right predominance (Figure-I), 9 specimens (male-8, female-1) of left predominance (Figure-II) and 2 specimens (male-1, female-1) of balanced or co-dominance (Figure-III) type of coronary circulation was observed. The percentage of incidence 86.25% in right predominance, 11.25% left predominance and balanced 2.55% were tabulated (Table-I). We also photographed the arteriogram of the right predominance and balanced or co – dominance type coronary circulation is labelled and we also observed the course of the posterior interventricular artery from its sulcus to the apex of the heart and noted.

Table: 1. Distribution of specimens with type of Coronary circulation

Dominance	Male	Female	Total	Percentage (%)
Right dominance	48	21	69	86.25
Left dominance	8	1	9	11.25
Balanced	1	1	2	2.5

The termination of right coronary artery reaches the crux and beyond crux in 73.3%, and right to the crux 20% and at the right border in 6.6% of the specimens was observed, whereas left coronary artery terminates at 1/3 of posterior inter ventricular septum 61% of hearts, at the apex 30%

and half of the posterior inter ventricular septum in 9% of hearts were tabulated. The data were analyzed through descriptive statistics to calculate percentages. Qualitative statistics were used to analyze arteriogram. (Table-II)

Table- II: Termination of Coronary arteries (PIVS: Posterior Inter Ventricular Septum)

Termination	Specimens with Right Coronary dominance	Specimens with Left Coronary dominance
Crux & Beyond Crux of Heart	73.3%	-
Right to Crux	20%	-
Right border	6.6%	-
Lower 1/3 of PIVS	-	61%
Apex	-	30%
Half of PIVS	-	9%

DISCUSSION

The present study shows 86.25% of right coronary predominance, 11.25% left predominance and 2.5% of balanced type of coronary circulation were observed. Most of the literatures stated the right predominance is seen in 70% of hearts left dominance in 20% of hearts and 10% of balanced type of coronary circulation.^{1,12} Balanced type of circulation is more common in females.⁴ According to James 1961, the left coronary artery predominance is seen in males.⁵ The incidence of right predominance in 90% of hearts, left predominance in 10% and balanced type in few hearts.⁶ In a study revealed on the basis of 6000 selective arteriogram, the right coronary predominance was present in 60% of persons.⁷

Most common form of coronary circulation was found to be the right dominant.^{8,12} The arterial pattern was found to be right dominance based on crux cordis and the subsinuosal interventricular branch.⁹ In Kenya sum of the population right coronary artery was found to be dominant in 82% of the hearts.¹⁰ The right coronary artery dominance was most prevalent, followed by the balanced type and the left coronary artery dominance in Brazilian population as well.¹¹ However, the data are inadequate to study the coronary predominance in relation to sex in our population. The incidence of right predominance 57%, left dominance 10% and balanced 33% of circulation out of 30 cases.^{12,13}

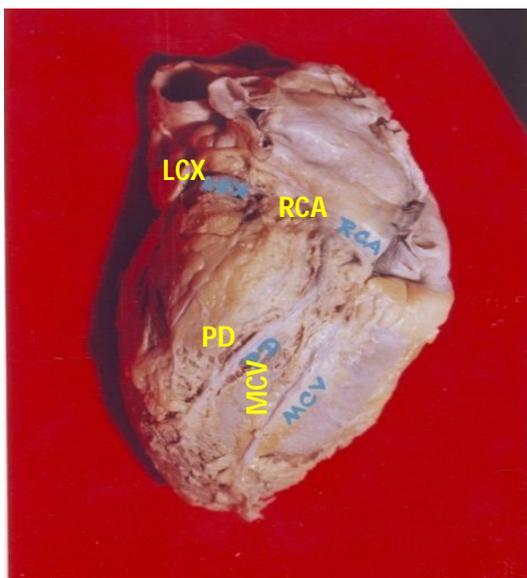


Figure:1. Dissection of human Heart & Antero posterior view of arteriogram showing right coronary dominance

(PD: posterior descending branch, RCA: right coronary artery, MCV: middle cardiac vein, LAD: left anterior descending branch, LCX: left circumflex, D: diagonal, LMA&RMA: right and left marginal branches)

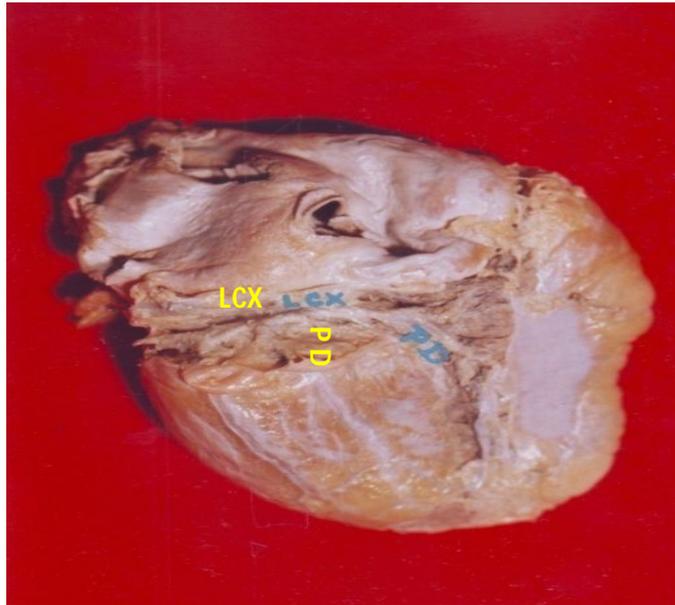


Figure:2. Dissection of human heart showing Left coronary dominance

(PD: posterior descending branch-interventricular artery, LCX:leftcircumflexbranch)

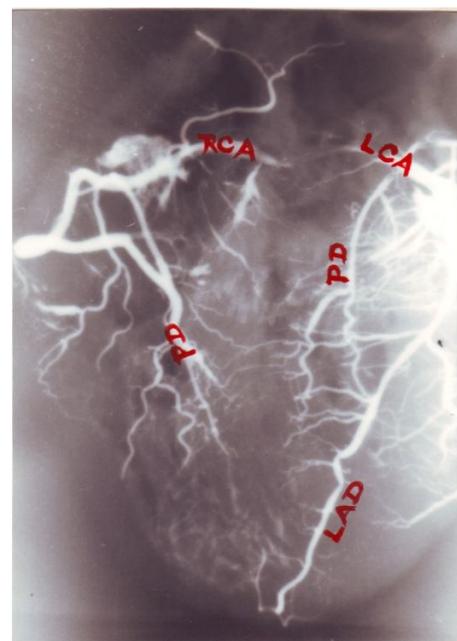
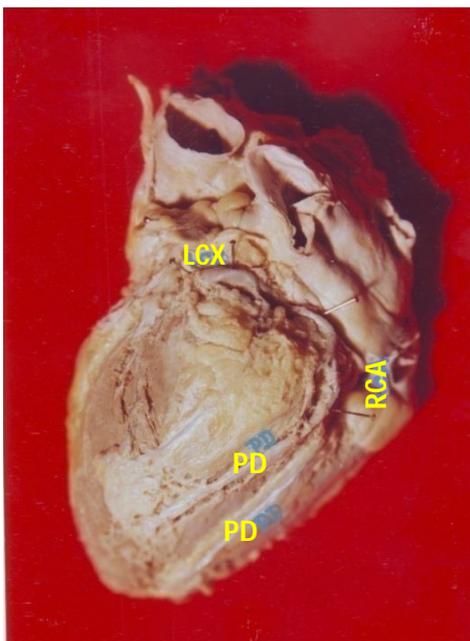


Figure:3. Dissection of human Heart & Antero posterior view of arteriogram showing Balanced circulation

(PD: posterior descending branch-interventricular arteries, RCA: right coronary artery, LCA: left coronary artery, LAD: left anterior descending branch, LCX: left circumflex branch)

CONCLUSION

Our study reveals the majority of the cases observed with right coronary artery dominance compared to left coronary artery dominance and also the incidence of right coronary dominance are higher in males than females. In some cases we observed left predominance in males which indicates the reason for higher incidence of myocardial infarction in males when compared to females.

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REFERENCES

1. Williams PL, Bannister LK, Berry MM, Collins P, Dyson M, Dussek JE, Ferguson MWJ; Grays Anatomy. 2000; 38th Ed., Edinburgh, Churchill Livingstone: 1505-1510.
2. Libby P, Bonow RO, Mann DL, Zipes DP. Braunwald; Heart Diseases a text book of Cardiovascular Medicine. 2008; 8th Ed: 478.
3. Gawlikowska SA, Miklaszewska D, Czerwi  F, Folia O. Analysis of the influence of heart size and gender of coronary circulation. *Folia Morphol.* 2010; 69 (1): 35-41.
4. Schlesinger MJ; Relation of anatomic pattern to pathological conditions of the coronary arteries. *Arch. Path.* 1940; 30:403-415.
5. James TN. Anatomy of the coronary arteries, New York. Paul B Hoeber. 1961; 12-150.
6. Anderson RH, Becker AE; Cardiac anatomy- An integrated text and colour atlas. 1980; 21-23.
7. Effler, Groves DB, Suarez LK, Favdoro EL; Direct coronary artery surgery with end arterotomy and patch - graft reconstruction. *Journal of thoracical cardiovascular surgery.* 1967; 53-93.
8. Abuchaim DC, Spera CA, Faraco DL, Ribas Filho JM, Malafaia O; Coronary dominance patterns in the human heart investigated by corrosion casting. *Rev Bras Cir Cardiovasc.* 2009; 24 (4):514-8.
9. Vieira TH, Moura PC Jr, Vieira SR, Moura PR, Silva NC, Wafae GC et al; Anatomical indicators of dominance between the coronary arteries in swine. *Morphology.* 2008; 92(296):3-6.
10. Side HS, Olumbe AO, Kalebi A; Anatomy and pathology of coronary artery in adult black Kenyans. *East Afr MED J.* 2002; 79(6):323-7.
11. Balci B, Yilmaz O. Atherosclerotic involvement in patients with left or right dominant coronary circulation. *Kardiol Pol.* 2004; 60(6):564-6.
12. Ayer, A Rao YG; A Radiographic investigation of the coronary arterial pattern in human hearts. *Journal of anatomical society of India.* 1957; 6:63-67.
13. Jain.SP, Hazary S; Coronary arterial patterns in man and some other animals. *Journal of Anatomical Society of India.* 1958;7: 1-4.