ORIGINAL RESEARCH PAPER

Volume-8 | Issue-6 | June-2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ANGIOGRAPHIC STUDY OF ORIGIN OF SINOATRIAL NODAL AND ATRIOVENTRICULAR NODAL ARTERY IN SOUTH INDIAN POPULATION

Cardiology

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ABSTRACT

BACKGROUND: This study is done to check the arterial supply of the conducting system and to correlate it with the dominance of the coronary arteries and it will be helpful for cardiac surgeons.

MATERIALS & METHODS: This is a prospective observational study done in the Institute of Cardiology, Madras medical college, Rajiv Gandhi Government General Hospital, Chennai over a period of six months from December 2018 - April 2019. A total of 500 consecutive patients who underwent coronary angiogram for angina, myocardial infarction and TMT positive were included in the study. Dominance and origin of SA nodal artery and AV nodal artery were studied.

RESULTS: Origin of SA nodal artery from RCA is seen in 61.2% of patients in our study, LCA in 36.4% of patients and from both RCA and LCA in 2.4% of the patients. Origin of AV nodal artery from RCA is seen in 76.4% of patients in our study and LCA in 23.6% of patients. SA nodal origin in right dominant presentation from RCA in 26% and in left dominant system from RCA in 12.8% patients. Origin of SA and AV nodal artery from RCA is seen in 41.2% patients.

CONCLUSION: Anatomy of vessels are helpful for cardiac surgeons and it varies geographically.

KEYWORDS

Right coronary artery, Left coronary artery, Sinoatrial node, Atrioventricular node, Coronary Angiogram.

INTRODUCTION

SA nodal artery which supplies SA node in 65% people is usually the 2nd of the RCA[1], and the rest 35% is usually supplied by a branch of the left circumflex artery. Sinoatrial node Artery also arises from Kugel's artery (an atrial branch of the circumflex communicates with atrial branch of the right coronary artery, and such an anastomotic branch is called Kugel's artery)[2]. Atrioventricular nodal artery arises in 80% people from the RCA at the posterior atrioventricular sulcus just beyond the origin of the posterior interventricular artery. In rest of the patients (20%), it arises from the terminal part of the left circumflex artery at the crux of the heart. The study of origin of SA nodal artery and AV nodal artery helps surgeon to preserve important during surgeries.

MATERIALS AND METHODS

This is a prospective observational study done in the Institute of Cardiology, Madras medical college, Rajiv Gandhi Government General Hospital, Chennai over a period of six months from December 2018 - April 2019. A total of 500 consecutive patients who underwent coronary angiogram for angina, myocardial infarction and TMT positive were included in the study. Right coronary artery and left coronary artery were visualised in various views, but to visualize the sinoatrial nodal artery and the atrioventricular nodal artery from RCA or LCA, left anterior oblique projection of the right coronary artery and the right anterior oblique projection of the left coronary artery were imaged. The sinoatrial nodal artery arising from the RCA can be seen as 2nd branch after the conus artery that runs dorsally and extends over the upper portion of the atrial septum to terminate in the region of the ostium of the superior vena cava after arching laterally in front of the later. When sinoatrial nodal artery arises from the branch of left circumflex artery, it passes right over the left auricle and encircles the SVC and reaches the SA node.

The Atrioventricular nodal artery is usually branch of 1st posterior interventicular artery which is seen as a branch of the dominant artery. This artery arising from the crux make a inverted U turn when it arises from RCA and a makes a smooth curve when arises from branch of left circumflex artery.

The following parameters were studied.

(i) Dominance by the origin of posterior interventricular artery.
(ii) The origin of sinoatrial nodal artery and atrioventricular nodal artery
(iii) Dominance was correlated with origin of sinoatrial nodal artery and atrioventricular nodal artery

These data were tabulated and analysed by using SPSS 20.0 software.

RESULTS:

Baseline characteristics were tabulated in table 1

Table 1: Baseline characteristics of the study

Total patients	500
Male patients	312(62.4%)
Female patients	188(37. 6%)
Mean age	45±9.7
STEMI patients	228
NSTEMI/ UA patients	214
TMT patients	58

Total patients studied were 500. Out of 500 patients 312 patients were male (62.4%) and 188 patients were female (37. 6%) in table 1.

Table 2: Origin of Sinoatrial nodal and atrioventricular nodal artery

Coronary artery	RCA	LCA	Both RCA And LCA
Origin of sinoatrial nodal artery	306(61.2%)	182(36.4%)	12(2. 4%)
Origin of atrioventricular nodal artery	382(76.4%)	118(23. 6%)	-

Origin of SA nodal artery from RCA is seen in 61.2% of patients in our study, LCA in 36.4% of patients and from both RCA and LCA in 2.4% of the patients in table 2. Origin of AV nodal artery from RCA is seen in 76.4% of patients in our study, LCA in 23.6% of patients.

Table 3: Arterial supply to SA and AV node

Coronary artery	RCA	LCA	Both RCA And LCA
Origin of sinoatrial nodal artery & atrioventricular nodal artery	206(41.2%)	47(9.4%)	247(49. 4%)

SA nodal artery and AV nodal artery arises from RCA in 41.2% of patients, LCA from 9.4% patients and 49.4% of patients in our study in table 3.

Table 4: Relationship between dominance and origin of SA nodal artery

Coronary artery	RCA	LCA	BOTH RCA AND LCA
Right dominance	130(26%)	112(22.4%)	12(2.4%)

Left dominance	64(12.8%)	42(8.4%)	-
Co dominant	56(11.2%)	44(8.8%)	18(3.6%)

Table 4 reveals SA nodal origin in right dominant presentation from RCA in 26% and LCA was 22.4% and 2.4 % both RCA and LCA were involved. In left dominant presentation Origin of SA nodal artery from RCA involvement was 12.8% and LCA was 8.4%. In Co dominance, SA nodal involvement in RCA was 11.2 % and LCA was 8.8% and both coronaries in 3.6%.

Table 5: Relationship between dominance and origin of AV nodal artery

Coronary artery	RCA	LCA
Right dominance	242(48.4%)	12(2.4%)
Left dominance	8(1.6%)	122(24.4%)
Both dominant	86(17.2%)	30(6%)

Table 5 reveals AV nodal origin in right dominant presentation from RCA in 48.4% and LCA was 2.4%. In left dominant presentation Origin of AV nodal artery from RCA involvement was 1.6% and LCA was 24.4%. In Co dominance, AV nodal involvement in RCA was 17.2 % and LCA was 6%.

DISCUSSION:

Hutchinson found that in 50% of the hearts, both the SA and AV nodes were supplied by branches of RCA and in 7%, both were supplied by branches from the LCA. The SA nodal artery is significant artery as it supplies the SA node. Berdajs et al[3] reported that the SA nodal artery crosses the superior posterior border of the interatrial septum in 54% of patients and concluded that during transseptal approach in Mitral valve surgery, damage to SA nodal artery can occur. Berdajs et al[4] studied the AV nodal by coronary angiogram; and found that left AV nodal artery was closely related to the mitral valve attachment, at the area of the left proximal part of the posterior leaflet and so during mitral valve annulus fibrosus manipulation damage can occur. In our study, origin of AV nodal artery from LCA is in 23.6% patients.

CONCLUSION:

In our study, SA nodal artery arises from the RCA in 61.2%, LCA in 36.4% and only in 2.4% by both RCA and LCA. Origin of AV nodal artery from the RCA was seen in 76.2% patients and LCA in 23.4% patients. The results of the present study may help cardiac surgeons during surgical correction of certain valvular disorders and congenital malformations of the coronary arteries.

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