

Original Article

ANGIOGRAPHIC STUDY OF ORIGIN OF SINOATRIAL NODAL ARTERY IN NORTHERN INDIAN POPULATION

Priti Sinha* Sanjeev Saxena** Satyam Khare* Shilpi Jain* Rashmi Ghai* AlokTirpathi*

*Department of Anatomy, Subharti Medical College, Meerut

**Cardiologist, Metro Heart Institute, Meerut, UP.

ABSTRACT

Sinoatrial Nodal artery is an artery which supplies the sinoatrial node, the natural pacemaker center of the heart, usually a branch of right coronary artery but also from left coronary artery in variable percentage in different population. In present study we have evaluated 1740 consecutive coronary Angiogram of northern Indian population for the origin of sinoatrial nodal artery. Out of total 1740 cases studied, sinoatrial nodal artery was originating from right coronary artery in 1370 (78.73%) cases while in remaining 370 (21.27%) cases SA nodal artery was arising from left coronary artery. When it is arising from left coronary artery it is a branch of left circumflex artery rather than the main trunk. In present study of northern Indian population SA Nodal artery is originating from right coronary artery in maximum (78.73) percent population comparing with the previous studies done globally. Further studies are needed in northern Indian population in relation to SA Nodal Artery. Study of origin and distribution of sinoatrial nodal artery helps cardiologist and cardiac surgeons to understand the ischemic etiology of sinus node diseases and corrective steps needed.

(**Key words:** sinoatrial nodal artery, right coronary artery, ischemic, coronary angiogram)

INTRODUCTION:

The sinoatrial node, or pacemaker of the heart, is a small mass of histologically distinct myocardial cells. It is sub-epicardially situated in the wall of the right atrium, just below the superior vena cava, at the top of the sulcus terminalis. It has no macroscopic or palpable features that indicate its location [1](fig-1). The artery supplying sinoatrial node mostly arises from the first segment of the right coronary artery, from its initial 1-2 cm. First branch of right coronary artery is Conal artery and second branch of the RCA is Sinoatrial Nodal artery (fig-2 & 3).Sinoatrial Nodal artery also arises from left coronary artery (LCA). When originating from the LCA the artery is most commonly a branch of the left circumflex artery rather than from the trunk of the artery [2],(fig-4). Origin of sinoatrial nodal artery from left main trunk has also been reported in few cases. Gray's anatomy describes the artery of the sinoatrial node as an atrial branch, distributed largely to the myocardium of both atria, mainly the right. Its origin is variable. It comes

from the Right coronary artery in 65%of people and from circumflex branch of the left coronary artery in 35% of people [3]. Coronary angiography is a technique in which a catheter is inserted into the femoral artery in the thigh, or Radial artery or Brachial artery and passed through into the aorta upto the origin of coronary arteries, where the contrast agent is pushed and roentgenography done. Accurate identification of coronary arterial branches is important in the interpretation and description of coronary arteriograms, especially if surgery or angioplasty is considered. The first selective coronary arteriography was done by Dr. F Mason Sones in 1959 [4].

MATERIALS AND METHODS:

The study was carried out in the Department of Anatomy, Subharti Medical College, Meerut, UP in collaboration with Metro Heart Institute Meerut UP. A consecutive series of 1740 adult patients having mean age range between 40-70 years referred to the Cardiac catheterization Lab from Jan 2015 to Dec

Address for Correspondence :

Dr Priti Sinha

Asso. Professor, Department of Anatomy,
Subharti Medical College, Meerut
UP, INDIA. PIN- 250005

Mob: 9837017328

Email: drpritianatomy@yahoo.com

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2015 for coronary angiography were included. Patients with diagnosed anomalous coronary arteries were excluded from the study. Approval from the ethics committee of Hospital was obtained. Angiographic films of the patients were analyzed for the origin of SA nodal artery. For the Right Coronary Artery, Left Anterior Oblique (LAO) view, and for the Left Coronary Artery, Right Anterior Oblique (RAO) view were analyzed.

OBSERVATIONS

Out of the 1740 cases studied, in 1370 (78.73%) cases sinoatrial nodal artery was originating from

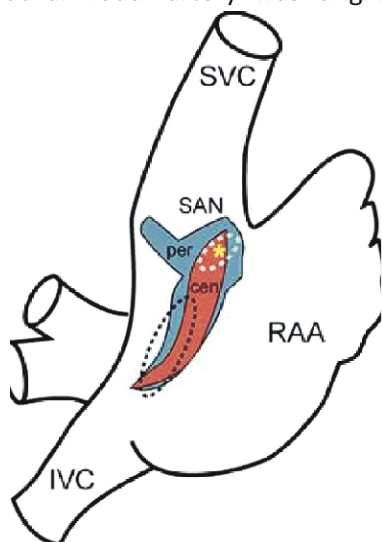


Fig-1, Location of SA Node (SAN), (RAA-Rt .atrial appendage, IVC-Inf. vaina cava, SVC- sup. Vaina cava)

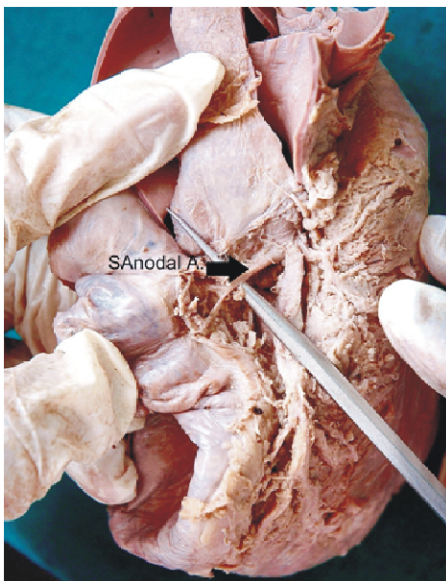


Fig-2, Sinoatrial Nodal Artery origin from Right coronary artery

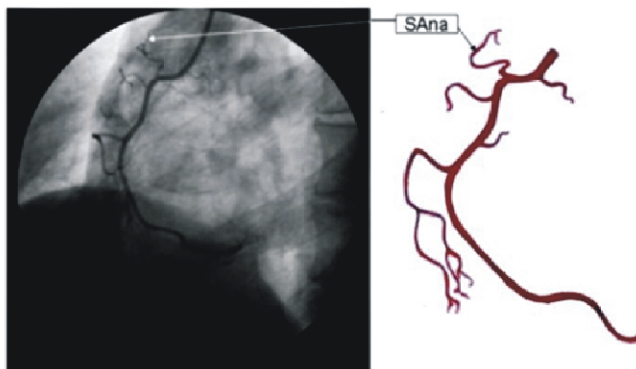


FIG-3, Coronary Angiogram- Origin of Sinoatrial Nodal Artery (SAAna) from proximal right coronary artery

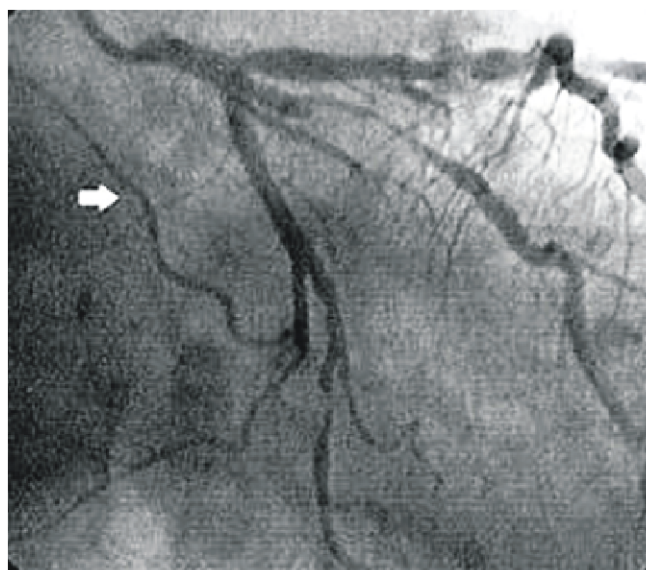


Fig-4, Coronary Angiogram showing origin of Sinoatrial Nodal Artery from left circumflex artery

proximal segment of the right coronary artery and in 370 (21.27%) cases sinoatrial nodal artery was originating from the left coronary artery. The sinoatrialnodal branch of the right coronary artery originating from the proximal segment of the artery as second branch. In cases where sinoatrial nodal artery was seen to be arising from the left coronary, it was a branch of the circumflex artery rather than from the main trunk. (Table-1)

Table 1: Origin of Sinoatrial Nodal Artery

origin of SA nodal artery	CORONARY ANGIOGRAM	
	Total Number (1740)	%
Right coronary artery	1370	78.73
Left coronary artery	370	21.27

DISCUSSION:

The present study of sinoatrial nodal artery in northern Indian population, 1370 out of 1740 cases (78.73 %) received SA nodal artery from the proximal segment of right coronary artery and 370 out of 1740 cases (21.27 %) from the left coronary artery. when SA nodal artery was a branch of the left coronary, it arised most commonly from the circumflex branch of the left coronary artery and not from the main trunk of the artery. Few cases of sinoatrial nodal artery origin from left main trunk has also been reported [2]. Thus a constant pattern of blood supply to the SA node comparable with that given in literature and other published reports was observed. In present study of northern Indian population SA Nodal artery is originating from right coronary artery in maximum (78.73) percent population comparing with the previous studies done globaly. Gray’s anatomy states that the artery of the sino atrial node is an atrial branch, distributed largely to the myocardium of both atria, mainly the right. Its origin is variable; it come from the circumflex branch of the left coronary in 35% and from right coronary artery in 65% cases [3]. Snell’s anatomy has a similar view, stating that the artery of the sino atrial node supplies the node and the right and left atria and in 35% of individuals it arises from the left coronary artery [5]. The second branch of first segment of right coronary artery, the sinoatrial nodal artery according to Uemura (1999), as mentioned by Kalpana, arises from RCA in more than 60% and from LCA in less than 44% of specimens [6]. The SA nodal artery originated more frequently from the right coronary artery (58%) than from the left and also in specimens in which the SA nodal artery originated from the left coronary, it was a branch of the circumflex artery (30%) than from the main trunk of the artery [2]. (Table-2)

Table 2: Comparison of percentage wise arterial distribution pattern of Sinoatrial Nodal Artery origin

Sr. No.	Study done by	Artery to SA node	
		RCA %	LCA %
1.	Caetano and Lopes (1995) [2]	58	42
2.	Kalpana (2003) [6]	56	35
3.	N HimaBindu (2006) [7]	66	28

4.	Onciu M (2006) [8]	74	16
5.	Sirl A M (2008) [9]	77.5	22.5
6.	Lakshmi Ramanathan (2009) [10]	53	42.66
7.	ArdaSanhOkmen (2009) [11]	85	14
8.	Present study (2015)	78.73	21.27

CONCLUSION:

The SA node is the pacemaker of the heart situated at the junction of the superior vena cava and the right atrium. The present study in northern Indian population the blood supply to SA node was from the sinoatrialnodal branch of the right coronary artery in 78.73 % of cases and from the left coronary artery in 21.73 % of cases. In cases in which the SA node is supplied by the left coronary artery it is most often a branch of the circumflex artery rather than from the main trunk. The analysed data about the blood supply of the SA node is similar to that reported in the literature, but in present study of northern Indian population SA Nodal artery is originating from right coronary artery in maximum (78.73) percent population comparing with the previous studies done globally. Further studies are needed in northern Indian population in relation to SA Nodal Artery.

Thus knowing the variations in the blood supply of SA node and study of origin and distribution of sinoatrial nodal artery helps cardiologist and cardiac surgeons to understand the ischemic etiology of sinus node diseases and corrective steps needed.

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