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Anatomy

PREVALENCE OF MYOCARDIAL BRIDGES AND CORONARY DOMINANCY OF CADAVERIC HEART

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ABSTRACT **Introduction:** If a band of heart muscle form a bridge around the one of coronary arteries during the foetal stage of development that band called myocardial bridge. Each time the heart squeezes to pump blood the band of heart muscle exerts and constricts the coronary artery reducing blood flow to the heart. Coronary dominance refers to the pattern of blood supply to the heart muscle (myocardium) based on the coronary arteries. **Aim:** To know about coronary dominancy and prevalence of myocardial bridges. **Material & Methods:** After getting ethical approval from research committee of institute, the study started to find out prevalence and morphology of myocardial bridges by anatomical dissection method to identify origins and course of the two coronary arteries were thus cleared to know the coronary dominance of heart specimens. **Results:** A total of 100 heart specimens observed in which 23 hearts (23%) had myocardial bridges. Out of which 20 hearts (86.96%) specimens had single myocardial bridge and 3 hearts (13.04%) had double myocardial bridges. Out of 100 heart specimens 91 hearts had right coronary dominance and 9 hearts had left coronary dominance. **Conclusion:** The results obtained in the present study on cadaveric hearts of Rajasthan, north-west region of India concluded that the Prevalence of myocardial bridges found 23% of total dissected cadaveric hearts specimens included in the study. And right coronary dominancy was found more common (91%).

KEYWORDS : Myocardial bridge, Coronary dominancy, Prevalence.

INTRODUCTION

If a band of heart muscle form a bridge around the one of coronary arteries during the foetal stage of development that band called myocardial bridge. Each time the heart squeezes to pump blood the band of heart muscle exerts and constricts the coronary artery reducing blood flow to the heart. This defect is from birth. It is important to note even a very thin more than 1mm or short than 20 mm myocardial bridge can cause significant symptoms. Myocardial bridges can range from a few mm to 10 mm or more in length.[1] Although bridging don't produce any hemodynamic significance in most of cases. Myocardial bridge was associated with angina, arrhythmia, depressed left ventricular (LV) function and myocardial stunning which can cause sudden death.[2,3] Association of myocardial bridges with dominant left coronary artery pattern should increase the vulnerability of these hearts to more frequent and severe heart problems. Recent studies indicated the clinical significance of myocardial bridges. The prevalence of myocardial bridges reported via angiographic studies was 0.5-8.5% and via anatomical studies was 5.5 – 90%.[4-6]

Coronary dominance refers to the pattern of blood supply to the heart muscle (myocardium) based on the coronary arteries. The heart receives its blood supply primarily from two main coronary arteries: the left coronary artery (LCA) and the right coronary artery (RCA). In about 70-80% of people, the RCA is the dominant artery in this case, the PIA arises from the RCA. In approximately 10-15% of individuals, the LCA is dominant. Here, the PIA arises from the left circumflex artery (LCX). In a smaller percentage of people (about 5-10%), both the RCA and LCA contribute to the blood supply of the PIA called co-dominance. [7,8]

AIM

To know about the relation in between coronary dominancy and prevalence of myocardial bridges to use this knowledge in clinical intervention.

MATERIALAND METHODS

With an objective to find out coronary dominancy and prevalence of myocardial bridge sample size was calculated as 95% confidence level α error of 0.05 expecting 20.6% occurrence of myocardial bridges among the heart specimen as per the reference article at 8% of absolute available error the required sample size was calculated 98.13 in a round figure 100 cadaveric heart specimens were taken for the study.

Inclusion Criteria

Cadaveric heart without any cardiac surgical intervention.

Exclusion Criteria

- The heart with any gross pathology.
- Traumatic damage.
- Unknown history of illness of cadaveric body.

Parameters

- Coronary dominance of heart in relation to myocardial bridges.
- Location of myocardial bridge.
- Numbers of present myocardial bridge.
- Size (length, width, thickness) of myocardial bridge.
- Direction of fibres of myocardial bridge.

After getting ethical approval from research committee of institute, the study started to find out prevalence and morphology of myocardial bridges by anatomical dissection method. The heart was removed from thoracic cavity of cadaver by cutting great vessels, wash with tap water to remove the blood clots, examined by dissection microscope and stored all heart specimens in a glass jar containing 10% formaldehyde solution. The heart specimens dissected right and left coronary artery including their branches. The origins and course of the two coronary arteries were thus cleared to know the coronary dominance of heart specimens. The presence and location of the myocardial bridges were noted along with the part of the coronary artery and its branch. The specimens showing myocardial bridges were photographed.

Material Used:

Magnified hand lens, Scalpel, Small Seizer, Forceps (tooth, blunt, fine).

RESULTS

A total of 100 heart specimens observed in which 23 hearts (23%) had myocardial bridges. Out of which 20 hearts (86.96%) specimens had single myocardial bridge and 3 hearts (13.04%) had double myocardial bridges.

Table 1: Number And Position Of Myocardial Bridges On Coronary Vessels.

Number of bridges	LAD	RCA	LD	PI
Single (20)	12	3	2	3
Double (3)	3	0	1	2

LAD- left anterior descending artery, RCA- right coronary artery, LD- left diagonal, PI- posterior interventricular.

Table 2: Coronary Dominance, Incidence Of Myocardial Bridges On Different Arteries And Direction Of Fibres.

		Right Coronary Dominance (91%)	Left Coronary Dominance (9%)
Coronary arteries Location of bridges	LAD	13	2
	RCA	2	1

	LD	3	0
	PI	4	1
Direction of fibers	Horizontal	13	3
	Oblique	6	1

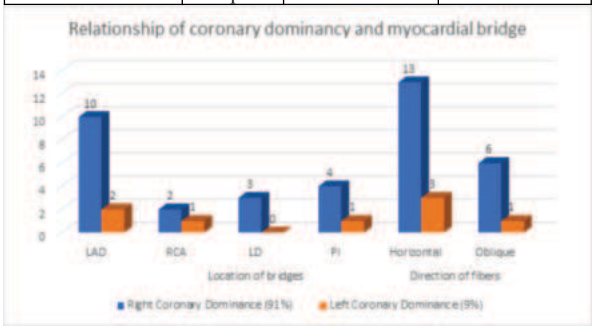

Figure 1: Coronary Dominance, Incidence Of Myocardial Bridges On Different Arteries And Direction Of Fibres.

Table 2 and figure 1 depicts coronary dominance, incidence of myocardial bridges on different arteries and direction of fibres. Out of 100 heart specimens 91 hearts had right coronary dominance and 9 hearts had left coronary dominance. Out of 91 right coronary dominance hearts the incidence of bridges was as LAD - 10, RCA - 2, LD -3 and PI - 4. Out of 9 left coronary dominance hearts the incidence of bridges was as LAD - 2, RCA - 1, LD - 0 and PI - 1. Out of 91 right coronary dominance hearts the direction of bridges was as horizontal - 13 and oblique - 6. Out of 9 left coronary dominance hearts the direction of bridges was as horizontal -3 and oblique – 1.

DISCUSSION

The course of left and right coronary arteries is subepicardial and generally runs deeply into the myocardium at their terminal course. Occasionally a segment of coronary artery or its branch runs an intramural course underneath bridge of myocardium. Wide variations in the percentage incidence of myocardial bridges were reported by different authors in literature.

Table 3: Percentage Incidence Of Myocardial Bridges Reported In Literature

S. No.	Author, Year, Race	Sample size(n)	% of hearts with MB
1	Geringer E et al. 1951	100	23
2	Ferreira Ferreira A et al. 1991, Brazil	90	55.6
3	Kosinski A et al. 2000, Poland	100	41
4	Loukas M et al. 2006, Poland	200	34.5
5	Bhrambe VK et al 2008, Maharashtra, North India	50	56
6	Ernesto L et al. 2009, Colombia	154	40.3
7	Saidi H et al. 2010, Nairobi, Kenya	109	40.4
8	Bandyopadhyay et al. 2010, West Bengal, India	42	90.4
9	Chandrasekhar KT et al. 2015, Mysore, Karnataka, India	50	70
10	Lujinovic A et al. 2013, Cekalusa	30	53.3
11	Prasad R et al. 2013, Kerala, South India	400	5.5
12	Arya D et al. 2013, Surat, North India	50	52
13	Swaroop N et al. 2014, South India	50	70
14	Srivastava M et al. 2014, North India	60	36.7
15	Sujatha M et al. 2015, Andhra Pradesh, South India	150	20.6
16	Present study Rajasthan India	100	23

Percentage incidence of hearts with MB observed in the present study by anatomical dissection method is much lower than any of the reported incidence in literature except that of Rajendra Prasad et al,[9] who reported a lowest incidence of 5.5% in 400 autopsies of North Kerala population of south India and Sujatha M. et al,[10] who reported incidence of 20.6 % in 150 dissected adult heart of Andhra Pradesh population of South India. According to them it is lower in North Keralites than Northwest Indians, Taiwanese, Japanese and Brazilians. Chandrashekhar KT et al.[11] Karnataka India, Swaroop et al.[12] South India and Bandyopadhyay et al.[13] West Bengal India reported highest incidence of 70 and 90.4% respectively. Geringer E reported 23% incidence in 100 autopsies heart in north American population which is similar to the present study. Geringer E[3] observed only single myocardial bridge but we found 3 heart presenting double myocardial bridge also.

Abhilash et al.[14] studied 192 cardiac specimens in Kerala, region of south India. They observed 129 myocardial bridges (67.18%). The myocardial bridges were located on the LAD, diagonal and right coronary arteries. Among 129 myocardial bridges 103(79.8%) were right dominant, 15 (11.6%) patients were left dominant and 11 (8.5%) patients were balanced or codominant. In present study out of 26 myocardial bridge 22(84.60%) were right dominant and 4(13.40%) were left dominant. Our findings are near similar to the findings of Abhilash et al.[14] for the dominance pattern with myocardial bridges.

CONCLUSION

Currently myocardial bridges are an attractive and intriguing area of research. The clinical significance of myocardial bridges is uncertain and in the vast majority of cases, it remains clinically silent or acts a contributing factor in the development of myocardial ischaemia, circulatory problems, angina, myocardial infarction, sudden cardiac death, systolic compression and other cardiac disturbances that may require surgical intervention. The results obtained in the present study on cadaveric hearts of Rajasthan, north-west region of India concluded that the prevalence of myocardial bridges found 23% of total dissected cadaveric hearts specimens included in the study. And right coronary dominancy was found more common (91%).

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