

Original article:

Morphological study of myocardial bridge on the coronary arteries in human cadavers

***Dr Natasha Gohain , **Dr Rubi Saikia**

*Demonstrator , Department of Anatomy , Assam Medical College& Hospital, Dibrugarh

**Associate Professor , Department of Anatomy , Assam Medical College& Hospital, Dibrugarh

Corresponding Author: Dr Natasha Gohain

Abstract:

Context: With ever increasing load of coronary heart disease particularly with left coronary dominant people with greater number of myocardial bridge is at disadvantage with increased risk of ischemia.

Materials& Methods: The present study undertaken in the Department of Anatomy, Assam Medical College included 35 perinatal and 15 adult cadaveric human hearts. After simple dissecting procedure myocardial bridges over coronary arteries were noted.

Results: Out of 15 myocardial bridges five bridges were found over right and ten over left coronary arteries. Out of total of 5 (33.33%) myocardial bridges found over right coronary artery, 2 bridges (40%) were found over proximal segment of the right coronary artery and 3 bridges (60%) over the posterior interventricular branch. Of the total 10 cases (66.67%) of the myocardial bridges found over left coronary artery, 3 bridges (30%) were found over left anterior descending artery, 2 over diagonal branch (20%) and 5 bridges (50%) over the posterior interventricular artery. The study revealed that most of the myocardial bridges were found over the posterior interventricular artery over both coronary arteries. Statistically, there was no significant myocardial bridge gender difference.

Conclusion: Thus the precise knowledge of coronary arterial anatomy may provide valuable information for the angiographers and cardiothoracic surgeons for an efficient management of coronary disease and other cardiac ailments.

Key words: myocardial bridge, coronary arteries, coronary heart disease

Introduction:

Coronary artery disease, with its potential sequelae of angina pectoris and myocardial ischemia is the most common form of acquired heart disease in developed countries. In India, coronary artery disease rates have increased during last 30 years and a disparity between the supply of coronary blood flow and the metabolic demands of the myocardium is the prime factor.

During its course a segment of the epicardial coronary arteries may dip into the myocardium for varying lengths, the segment termed as tunneled or mural artery and the overlying myocardium as myocardial bridge². Though it was recognized at

autopsy by Reyman (1737)⁹ but they were first described as myocardial bridges in 1951 by Geiringer³. Later Portmann and Iwig in 1960 described it angiographically⁸. Dominant left system with greater number of myocardial bridge is at disadvantage with increased risk of ischemia. Also myocardial bridges have been reported in association with sudden death during exercise, but they are also an incidental finding at autopsy in upto 25% of patients dying of other causes. Hence knowledge about the number, length and depth of myocardial can help in identifying the people at risk. With the above background,

the present study has been undertaken to study the prevalence of myocardial bridges in the coronary arteries.

Materials and methods

The study was undertaken in the department of Anatomy in collaboration with department of Obstetrics and Gynaecology and Forensic Medicine, Assam Medical College and Hospital, Dibrugarh. This was a cadaver dissection based study where perinates and adult cadavers were dissected to observe the presence of myocardial bridges. Ethical clearance for the study was obtained from the Institutional ethical committee (human). Perinates cadavers were obtained from the department of Obstetrics and Gynaecology after taking informed consents from the parents of the deceased. The consent was obtained on a written consent form after proper explanation of the study procedure and objectives. The adult specimens were collected from the bodies provided for dissection to the undergraduate students. Total 50 human hearts of different age groups and of either sex were studied. Of these, 35 were from perinatal age group and 15 were adults. Fetuses less than 28 weeks of gestation and with gross congenital malformations were excluded from the study. Cardiac specimens were dissected out from the cadavers after giving two longitudinal incisions in the right and left parasternal region extending up to sternoclavicular joints and joining them with two transverse incisions above and below the suprasternal notch and xiphisternum respectively. Special care was taken to preserve the pericardium and the vessels attached to the heart. The specimens were properly washed and preserved in 10% formalin for dissection at a convenient time. Both the coronary arteries and their branches were exposed, examined and the data recorded.

Results

In 50 examined hearts of either age group, total

myocardial bridges were found to be 15 numbers (Figures 1-5). Myocardial bridges were observed to be more in left coronary artery in males whereas left and right coronary arteries had equal proportion of myocardial bridges in females (Table-1). Posterior interventricular branch in both coronary arteries had maximum number of myocardial bridges (Table 2 and 3).

No myocardial bridges were found over **co-dominant** arteries of perinates and adults of both sexes.

Discussion

Myocardial infarction has become the major killer for human race in modern times. Social factors, change of food habits, and sedentary life style has already increased the load on heart muscles addition of anatomical factors makes the heart more susceptible to ischaemia. Factors such as myocardial bridge are known for increasing cardiac load^{2,7,11}. Hence present study was undertaken.

Myocardial bridge and site of its presence:

Geringer (1951)³ presented an in depth analysis of myocardial bridges by dissection method and reported an incidence of 23% with predominance of myocardial bridge on anterior interventricular artery. In a study of 100 specimens, Kosinski & Grzybiak (2001)⁴ reported the anterior interventricular branch, the diagonal branch and inferior interventricular branch as the most common site in the same order.

Bharambe et al (2007)¹ during dissection of 50 hearts observed that myocardial bridges were more common over anterior interventricular branch. Marios L et al (2006)⁵ in the dissection of 200 hearts and anterior interventricular artery branch of left coronary artery was most commonly associated with the myocardial bridge. Posterior interventricular artery irrespective of right and left coronary artery was the most commonly involved with myocardial bridges in the present study which

is just opposite of the other authors. The difference is probably due to less number of bridges observed in the present study (15nos). In the present study myocardial bridges were more common on left coronary artery.

Sex difference and myocardial bridge:

There was no significant myocardial bridge gender difference (female p=0.192, male p=0.295; Luis Ernesto Ballesteros Acuna et al 2009)⁶.

Occurrence of myocardial bridge more on left coronary artery observed in the present study may have been an incidental finding or may have a genetic reason.

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 intervention¹⁰. Association of myocardial bridge with dominant left coronary artery pattern should increase the vulnerability of these hearts to more frequent and severe heart problems.

Table-1: Showing total no. of myocardial bridges

MYOCARDIAL BRIDGES	MALE		FEMALE		TOTAL	
	No.	%	No.	%	No.	%
Right Coronary Artery	4	30.77	1	50.0	5	33.33
Left Coronary Artery	9	69.23	1	50.0	10	66.67
Both (Right & Left) Coronary Artery	0	0.00	0	0.00	0	0.00
Total	13	100.0	2	100.0	15	100.0

Table-2: Showing no. of single myocardial bridge over right coronary artery branches:

Sex	Right Branch	Marginal	Proximal segment of RCA	Posterior interventricular Branch
Male	0		1 (20%)	3 (60%)
Female	0		1 (20%)	0

Table-3: Showing no. of single myocardial bridge over left coronary artery branches:

Sex	Left anterior descending Branch	Diagonal Branch	Left Marginal Branch	Circumflex Branch	Posterior interventricular branch
Male	3 (30%)	2 (20%)	0	0	4 (40%)
Female	0	0	0	0	1(10%)

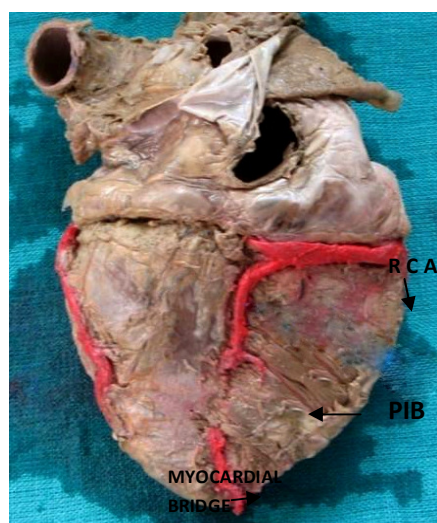


Figure1: Myocardial Bridge over posterior interventricular branch (PIB) of right coronary artery (RCA)

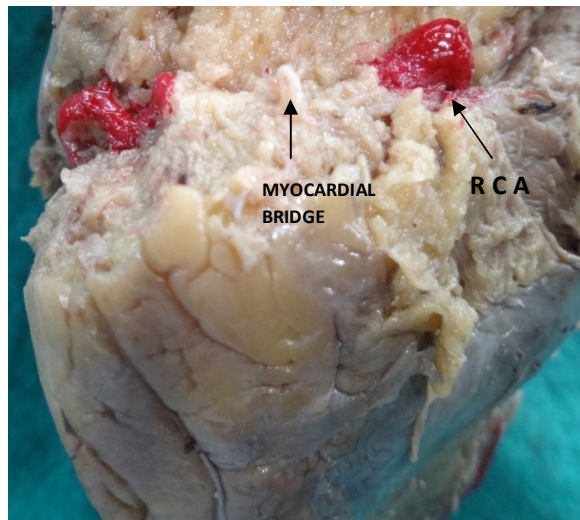


Figure2: Myocardial bridge over proximal segment of right Coronary artery (RCA) (Anterior view)

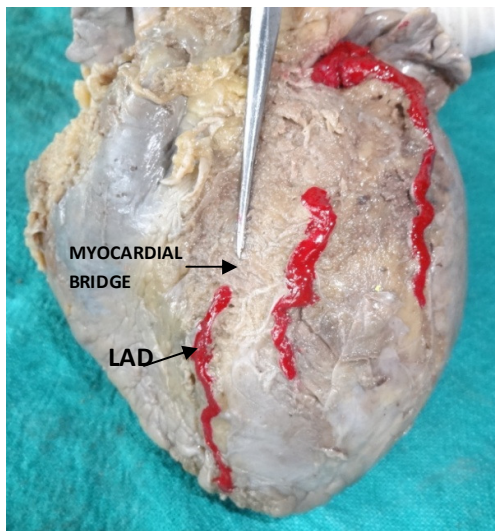


Figure3: Myocardial bridge over left anterior descending artery (LAD)

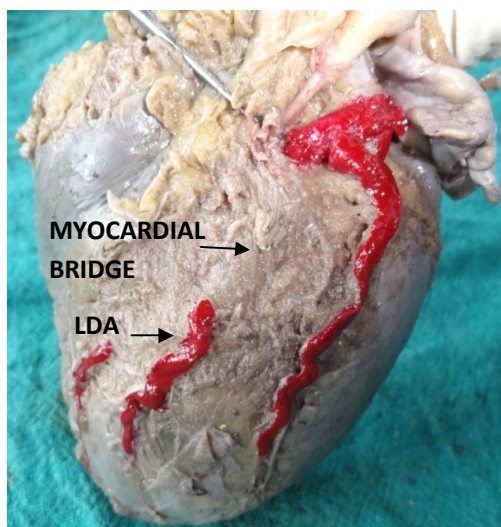


Figure4: Myocardial bridge over left diagonal artery (LDA)

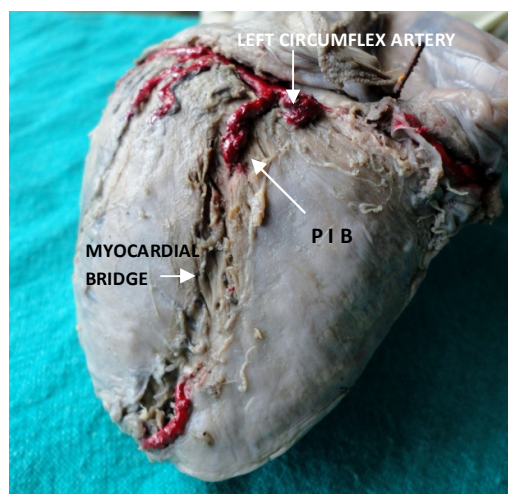


Figure5: Myocardial bridge over posterior interventricular branch (PIB) of left coronary artery

References

- 1) Bharambe VK, Arole VJ (2008). The study of myocardial bridges. J. Anat.Soc India. 2008; 57:14–21.
- 2) Fuster V, Alexander R.W, O'Rourke R.A. Hurst's THE HEART (Vol1), 10th Edition. International Edition, Mc Graw-Hill.P 1168-1169.
- 3) Geiringer E (1951). The mural coronary. Am Heart J41, 359–368.
- 4) Kosinski A, Grzybiak M. Myocardial bridges in the human heart: morphological aspects. Folia Morph. 2001; 60:65–68
- 5) Loukas M, Curry B, Bowers M, Louis RG Jr, Bartczak A, Kiedrowski M .et al. The relationship of myocardial bridges to coronary artery dominance in the adult human heart. Journal of Anatomy 2006 July; 209(1): 43-50.

- 6) Luis Ernesto (2007).Coronary's Dominance Determination in Racially Mixed Colombian Population: A Direct Anatomical Study. *Int. J. Morphol.* 2007, vol.25, pp. 483-491.
- 7) Noble J, Bourassa MG, Dyrda I, Petitclerc R. Hemodynamic significance of myocardial bridging and milking effect of the anterior interventricular artery: a mild variant or source of angina? [French] *Schweiz Med Wochenschr* 1976; 106:1561–1563.
- 8) Portmann W, Iwig J. Intramural coronary vessels in the angiogram. *Fortschr Geb Rontgenstr Nuklearmed.* 1960; 92:129–133.
- 9) Reyman H (1737).*Dissertatio de vasis cordis propriis*, Haller, *Biblioth. Anat.*2:366.
- 10) Visscher DW, Miles BL and Waller BF (1983). Tunnelled ('bridged') left anterior descending coronary artery in a newborn without clinical or morphologic evidence of myocardial ischemia. *Catheterization and Cardiovascular Diagnosis* (9), 493-496.
- 11) Voelker W, Ickratho O, Mauser M, Schick KD and Karsch KR (1988). Anterior wall infarct in an angiographically demonstrated muscle bridge of the ramus interventricularis anterior. *Dtsch Med Wochenschr*, 113: 551-554.

