Original Research Paper

Volume-8 | Issue-5 | May-2018 | PRINT ISSN No 2249-555X

Anatomy

COMPARATIVE STUDY ON OCCURRENCES OF CADAVERIC MYOCARDIAL BRIDGES

Amit Kumar — Assistant Professor, Department of Anatomy, Chhattisgarh Institute of Medical Sciences, Bilaspur, India;

Koushik Saha* — Assistant Professor, Department of Anatomy, Govt. Medical College Hospital Balasore, Odisha, India , *Correspondent Author

Anju Shrivastava — Assistant Professor, Department of Physiology, Chhattisgarh Institute of Medical Sciences, , Bilaspur, India

ABSTRACT

Introduction: Myocardial bridges are frequent congenital anomaly and related with various cardiac diseases. Bundles of muscle fibers overlying the intra myocardial segment of an epicardial coronary artery are termed a myocardial bridge.

Objectives: The aim of study was comparative occurences of myocardial bridges over different branches of Right and Left coronary arteries.

Material & Methods: In the present study total 50 adult cadaveric hearts were included irrespective of sex from embalmed cadavers preserved in 10% formalin. Coronary arteries and their branches were traced with the help of scalpel, scissor, blunt forcep, artery forcep and mosquito forceps.

Observation & Conclusion: Overall occurrence of myocardial bridges was found 28%. Impedance was more common in Left coronary artery (28%) as compared to Right coronary artery (6%) with highest prevalence in middle one third of Anterior inter ventricular artery (14%). Myocardial bridges are associated with various cardiac diseases.

KEYWORDS : Coronary Artery, Cardiac Arrhythmia, Cardiomyopathy, Myocardial Bridge, Myocardial Ischemia.

Introduction

Coronary arteries may dip into the myocardium for varying lengths and then reappear on the surface of hearts. This muscle overlying the intra myocardial segment of the epicardial coronary artery is termed a Myocardial bridge[1]. In 1737, anatomically myocardial bridge was first described by Reyman[2].It is a very common congenital anomaly[3], usually benign but can be associated with chest pain, myocardial infarction, ventricular arrhythmias and sudden cardiac arrest[4]. Myocardial bridge is more common in middle segment of the left anterior descending artery[5]. Ferreira et al distinguished between two types of bridging: superficial bridges (75% of cases) crossing the artery perpendicularly or at an acute angle toward the apex, and Deep bridges (25% of cases) muscle bundles arising from the right ventricular apical trabeculae that cross the LAD transversely, obliquely, or helically before ending in the inter ventricular septum [6].

Prevalence of myocardial bridging in autopsy study from 5%-86% with a mean of 25% [5]. The prevalence varies substantially among studies with a much higher rate at autopsy versus angiography. Variation at autopsy may in part be attributable to the care taken at preparation and the selection of hearts[8]. Coronary cineangiography is the most common procedure for diagnosis myocardial bridge systolic compression or "Milking" of an epicardial artery is visible[7] Polacek who included myocardial loops, reports the highest rate with bridges or loops in 86% of cases. On average, myocardial bridges are present in about one third of adults. The rate of angiographic bridging is <5%, attributable to thin bridges causing little compression. In subjects with angiography normal coronary arteries, the use of provocation tests may enhance systolic myocardial compression and thereby reveal myocardial bridges in ≤40% of cases[9]. A high prevalence has also been reported in heart transplant recipients and in patients with hypertrophic obstructive cardiomyopathy[10]. Coronary atherosclerosis is associated with myocardial bridging has primarily been studied in the LAD. The segment proximal to the bridge frequently shows atherosclerotic plaque formation, although the tunneled segment is typically spared. This is supported by studies on a cellular and ultra structural level[11-12].

Aim of this present study is to analyze and compare the occurrences of myocardial bridges over different branches of Right and Left coronary arteries along with comparative incidence over individual arteries.

Materials & Methods

This study was conducted in department of Anatomy of Pt. J.N.M Medical College, Raipur, Chhattisgarh & Chhattisgarh Institute of Medical Science, Bilaspur , Chhattisgarh. During the time period from 2008 to 2018, total 50 adult cadaveric hearts were included irrespective of sex from embalmed cadavers preserved in 10% formalin. Both coronary arteries and their branches were traced by removing fat piece meal from overlying epicardium with the help of scalpel, scissor, blunt forcep, artery forcep and mosquito forceps. Courses of the coronary arteries were traced carefully. Length of the myocardial bridges, coronary artery and its branches were measured with the help of Vernier Caliper and noted in tabular form. Specimens showing myocardial bridges were photographed from various angles and numbered accordingly.

Observations & Findings

In the present study 14 out of 50 cadaveric hearts shows myocardial bridges, overall prevalence 28%. It was found to be more common over the left coronary artery than the right coronary artery. In left coronary artery, myocardial bridges were more frequently seen over its anterior inter ventricular branch, incidence were more common in the middle 1/3rd segment.

It was observed in distribution of myocardial bridges over anterior inter ventricular artery of Left Coronary Artery was highest in middle 1/3rd i.e. 58% as compared to proximal 1/3rd i.e. 25% and distal 1/3rd. Distal 1/3rd of Anterior inter ventricular artery of Left Coronary Artery showed 17% incidence of myocardial bridges reported for the first time in the present study.

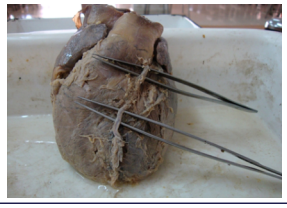
Myocardial bridges were also observed over the left diagonal artery, left marginal artery, 1st segment of right coronary artery and over the posterior inter ventricular branch of right coronary artery.

Table:1

Myocardial Bridge Observed In Different Coronary Arteries

Left Coronary Artery [Total Number=14]					Right Coronary Artery [Total Number=03]	
Anterior Inter Ventricular Artery			Left Diagonal Br.	Left Marginal Circumflex Br	Over I st Segment of RCA	Posterior Inter Ventricular Artery
12			**03**	**02**	**02**	**03**
Proximal	Middle	Distal				
03	**07**	**02**				

MYOCARDIAL BRIDGE IN PROXIMAL 1/3RD LAD



MYOCARDIAL BRIDGE ON MIDDLE 1/3rd SEGMENT OF LAD

Discussion

A segment of an epicardial artery that has an intramural course within the myocardium or a segment of an epicardial artery that is surrounded by muscular fibers or a band of myocardial tissue is variously described as a myocardial bridge. Myocardial bridging is recognized as an anatomical variation of the human coronary circulation in which an epicardial artery lies in the myocardium for part of its course. Thus, the vessel is 'bridged' by myocardium. The anterior inter ventricular branch of the left coronary artery has been reported as the most common site of myocardial bridges but other locations have been reported. Following tabular studies shows myocardial bridges in different studies

Table:2

S. No	Studied by	Studied in	Method of study	Observations on Myocardial Bridges (MB)
1.	Geiringer[8] et al.	1951	Dissection method	Presents 23% on anterior inter ventricular artery.
2.	Polacek[9]	1961	Dissection method	Incidence of 85.7% of 70 examined hearts.
3.	Ferreira[6] et al	1991	Dissection method	90 hearts from stillbirth to 84 years, Myocardial bridges were identified in 50 hearts (55.6%).
4.	Harikrishnan S [17] et al .	1999	Cine Angiograms	Myocardial Bridges found in 21 of 3200 cases i.e. an incidence of 0.6%. All cases had myocardial bridges in the proximal or middle segment of anterior interventricular artery and one case had whole of posterior interventricular artery.
5.	Vanildo[18] et al	2002	Dissecting Method	reported myocardial bridges over the proximal third of the anterior interventricular branch in 13.33% (4/30) and over the middle third of that branch in 86.66% (26/30) of the 30 postmortem hearts.
6.	Singh, Harminder[4] et al	2005	Clinical case study	complete occlusion in the distal segment of left anterior desending artery by a myocardial bridge
7.	Ishikawa[12] et al.	2006		31found the segments proximal to the bridge significantly narrowed, whereas the tunneled segment itself was free of atherosclerotic lesions.

In the present study through dissection method, myocardial bridges have been demonstrated over both coronary arteries and their branches with predominance over anterior inter ventricular artery. The incidence of myocardial bridging in this study corresponds to the incidence reported by Pelech[13] and Loukas[14] though significantly greater than finding by Geiringer,[8 (pp359-368)] and lower than Ferreira,[6 (p364)] and Reig[15] using the dissection method of study.

High incidence of myocardial bridges over anterior inter ventricular artery reported in the present study correlates with the finding of earlier studies. Incidence of myocardial bridges in the anterior inter ventricular artery is 24% whereas in the Geiringer,[8(pp359-368)] Pelech,[13] and Loukas,[14(pp357-365)] it was 23%, 25% and 17.50% respectively. Using Angiography by Angelini[16] and Harikrishnan[17]all the bridges reported were on anterior inter ventricular artery but the incidence was lower than this study .

In this study highest incidence of bridges 14% was observed over the middle 1/3rd of anterior inter ventricular artery. Vanildo[18] also reported a high incidence (88.66%) of bridging over the middle 1/3rd of anterior inter ventricular artery though the percentage of incidence reported is much higher than that reported in the present study.

All the authors have reported myocardial bridges over anterior inter ventricular artery except Loukas,[14(pp357-365)] who found bridges over the anterior inter ventricular artery, diagonal branch of left coronary artery and marginal branch of circumflex artery and posterior inter ventricular branch of right coronary artery and 1st segment of right coronary artery as in the present study but there is no report of myocardial bridges over different segments of anterior inter ventricular artery which has been reported in the present study .

In the present study 24% incidence of myocardial bridges in the anterior inter ventricular artery is higher than the Loukas,[14(pp357-365)] study which was 17.50% ; incidence of myocardial bridges in diagonal branch of the left coronary artery is 6% is quite similar to the Loukas,[14(pp357-365)] study which was 7% ; incidence of myocardial bridge in marginal branch of circumflex artery is 4%, in posterior inter ventricular branch of right coronary artery is 6%, which is quite similar to the study of Loukas,[14(pp357-365)] where incidence of myocardial bridge in marginal branch of circumflex artery was 2.5% and posterior inter ventricular branch of right coronary artery was 4%.

In the present study incidence of myocardial bridge in the 1st segment of right coronary artery is 4% which is lower than the Loukas[14(pp357-365)] study, where it was 7.5%.However total percentage of myocardial bridges seen was lower in the present study 28% in comparison with 34.50% observed by the Loukas.[14(pp357-365)]

Conclusion

Incidence of myocardial bridges over coronary arteries and their branches were studied by dissecting 50 embalmed cadaveric hearts. Overall occurance of myocardial bridges was found 28%. Impedance was more common in Left coronary artery (28%) as compared to Right coronary artery (6%) with highest prevalence in middle one third of Anterior inter ventricular artery (14%). Myocardial bridging is an attractive and intriguing area of research and should remain the focus for future studies. It is hoped that this study will contribute to the existing body of knowledge of myocardial bridges and their role in the various fields of medicine including cardiology.

Acknowledgment

We thank all of our colleagues of Department of Anatomy of Pt.JNM Medical college raipur and CIMS Bilaspur who supported us during preparation of this study.

Conflict of Interests

The authors declare that they have no conflict of interests.

REFERENCES

1. Williams, Peter L, editor. Gray's Anatomy. The Anatomical Basis of Medicine & Surgery. 38th ed. Edinburg: Churchill & Livingstone; 1999. p. 1205-10.
2. Reyman HC. Disertatio de vasis cordis propriis. Med Diss Univ Göttingen.7th Sept 1737;1–32.
3. Kardiologiia. Belov IuV, Bogopol' skaia OM.Myocardial bridge - congenital anomaly of coronary vasculature.2004;44(12):89-94.
4. Singh Harminder, Singh Charanjit, Kumar A, Agrawal N, A Banerji. Acute myocardial infarction secondry to myocardial bridge treated with drug- eluting stunt; Indian Heart J 2005;57:734-737.
5. Mohlenkamp, Waldemar hort, Jumbo ge, Raimund Erbel. Update on myocardial bridging. Circulation. 2002;106(20):6-11.
6. Ferreira AG Jr, Trotter SE, Konig B Jr, Decourt LV, Fox K and Olsen EG. Myocardial bridges: morphological and functional aspects. British Heart Journal 1991; 66:364.
7. Tobias SL, Videlefsky S W, Misra VK. Physiological significance of a proximal coronary artery on a distal intramyocardial bridge. Cathet cardiovas Diagn. 1995;35:127-130.
8 Geiringer E. The mural coronary. Am Heart J. 1951;41: 359–368.
9. Polacek P, Kralove H. Relation of myocardial bridges and loops on the coronary arteries to coronary occlusions.Am Heart J 1961;61:44-52.
10. Achrafi H. Hypertrophic cardiomyopathy and myocardial bridging. Int J Cardiol. 1992; 37:111–112.
11. Ishii T, Asuwa N, Masuda S, et al. The effects of a myocardial bridge on coronary atherosclerosis and ischemia. J Pathol.1998;185:4–9.
12. Ishikawa Y, Ishii T, Asuwa N, et al. Absence of atherosclerosis evolution in the coronary arterial segment covered by myocardial tissue in cholesterol-fed rabbits. Virchows Arch.

1997;430:163–171.
13. Pelech A N. Coronary artery anomalies.[Online]. 2004 Jun 12 [cited 2006 Aug 18];[10 screens]. Available from:URL:http://www.emedicine.com/ ped/topic2506.htm.
14. Loukas M, Hullett J, Wagner T. The clinical anatomy of the inferior phrenic artery. Clin Anat. 2005; 18:357–365.
15. Reig J, Petit M. Main Trunk of the Left Coronary Artery: Anatomic Study of the Parameters of Clinical Interest.Clinical Anatomy 2004;17:6-13
16. Angelini P,Trivellato m,Donis J and Leachman RD.Myocardial Bridges :a review.Prog Cardiovasc Dis 1983;36:75-88.
17. Harikrishnan S.Sunder KR,ThakaranJ,Titus T,Bhat A,Sivasankaran S,et al.Clinical and angiographic profile and followup of myocardial bridges:a study of 21 cases.Indian Heart J.1999 Sep;51(5):503-7
18. Vanildo Junior de Melo Lima,Jennecy Sales Cavalcanti,Tetsuo Tashiro.Myocardial bridges and their relationship to the anterior interventricular branch of the left coronary artery.Arq.Bras.Cardiol.2002 Sep;79(3):219-222