

AN ANATOMICAL STUDY OF MYOCARDIAL BRIDGES ON THE CORONARY ARTERIES OF HUMAN CADAVERIC HEARTS

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Abstract:

Introduction: Myocardial bridging is a common anatomical anomaly characterized by muscle bridge on the epicardial artery, Myocardial bridges may compress the coronary vessel and compromise myocardial blood supply, it is considered to be associated with myocardial ischaemia, myocardial infarction, arrhythmias and even sudden death. **Materials and methods:** This observational prospective study, conducted in the department of Anatomy, Fathima Institute of Medical Sciences, Kadapa, India, from April 2019 to January 2022. Eighty cadaveric human hearts collected from preserved adult human cadaveric hearts, the epicardium and fat were removed carefully from the surface of the heart. The origin and the course of all the coronary arteries and their important branches were carefully delineated and studied. **Results:** Of the total 80 hearts dissected, 74 showed MB in at least one coronary artery or in one of its significant branches, of which 49(66.21%) were males and 25(33.78%) were females. Myocardial bridging were found to be more common in the major branches of Left Coronary Artery (LCA). Though almost all the major branches were involved left anterior descending artery was significantly more involved. The maximum length of myocardial bridge was 4.7 cm, originated on the left anterior descending artery. **Conclusion:** The

precise knowledge on morphological properties and pathological effects of themyocardial bridging may provide valuable information to the clinicians and cardiothoracic surgeons in efficient management of coronary disease and other cardiac ailments.

Key words:

Myocardial bridging, Myocardial ischaemia, Cadaver, Right coronary artery, Left coronary artery.

Introduction:

Heart is a vital organ that pumps the blood for the tissues in human body. The myocardium is supplied by coronary arteries.¹ Coronary arteries and their branches course beneath the epicardium within the cardiac adipose tissue. 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 bridge.^{2,3}

The presence of myocardial bridges and their relationship to coronary artery dominance supplying the myocardium may be clinically significant. Myocardial bridges may compress the coronary vessel underneath and compromise myocardial blood supply, cases of sudden cardiac death, where myocardial bridging is the only postmortem finding have been reported.¹ The degree of coronary obstruction by the myocardial bridge depends on factors such as location, thickness and length of muscle bridge and degree of cardiac contractility.^{4,5}

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.(Dr Natasha Gohain) The prevalence of MB has been reported to be 15–88.0% in cadavers and 0.5–12% by coronary angiography. MB are commonly seen on the left coronary artery (LCA) trunk and/or on one of its branches, especially on the anterior interventricular artery (AIA), which represents 12–63% of MB, its lateral branch (13%) and its circumflex artery (2.8–6.7%). Also, they are observed on the diagonal artery (DA), marginal arteries,posterior interventricular artery (PIA) and right coronary artery (RCA).^{3,6}

Detection of MBs is essential while investigating cardiac ailments since it had been found to be associated with ischemic heart disease and cardiomyopathy. Knowledge of MB is also essential to determine the mode of investigation as an atherosclerotic plaque within the MB is not detectable by angiography but by intra coronary ultrasound.^{5,6} The present study is undertaken to observe the variations in branching portion of coronary artery.

Materials and methods

This observational prospective study, conducted in the department of Anatomy, Fathima Institute of Medical Sciences, Kadapa, India, from April 2019 to January 2022, after obtaining Institutional ethical approval. This study was conducted on eighty human hearts collected from preserved adult human cadaveric hearts, as per Cunningham's Manual of practical anatomy guidelines.⁷ The epicardium and fat were removed carefully from the surface of the heart. The origin and the course of all the coronary arteries and their important branches were carefully delineated. All were followed carefully to see any bridging myocardium running over the arteries. The specimens were numbered, length of the bridge measured by slide caliper. Collected data was analyzed in Microsoft excel soft ware.

Results:

Of the total 80 hearts dissected, 74 showed MB in at least one coronary artery or in one of its significant branches, the overall prevalence being 92.5%. of which 49(66.21%) were males and 25(33.78%) were females. Most of the hearts studied had the standard branching pattern of coronary arteries. Myocardial bridging were found to be more common in the major branches of Left Coronary Artery (LCA) than that in Right Coronary Artery (RCA),(Table 1). Though almost all the major branches were involved left anterior descending artery was significantly more involved followed by left diagonal and left circumflex. (Table 2) In Right Coronary Artery (RCA) branches posterior inter ventricular artery was highly involved. In 27(36.4%), specimens, there was more than one bridge seen. In 14(18.91%) cases more than one MB seen in different branches of left coronary artery and the remaining showed bridges in the branches of both left & right coronary artery. Five cases showed more than three myocardial bridges and three cases showed four branching Myocardial bridges on the Left Coronary artery branches were found to be longer than that on RCA branches. The maximum length of myocardial bridge was 4.7 cm, originated on the left anterior descending artery (Table:3).

Table -1: Prevalence of involvement of the branches of left and right coronary arteries.

Myocardial bridges (MBs)	Left coronary artery (n=74)	Right coronary artery (n=74)	Together (n=74)
Number	52	15	7
Percentage	70.27%	20.27%	9.45%

Table -2: Distribution of Myocardial bridging on different arteries amongs 80 hearts with bridge.

Myocardial branching	Left Coronary Artery branches				Right Coronary Artery branches		
	LAD	Lt diagonal	Lt marginal	Lt circumflex	Trunk	Post inter ventricular	Right marginal
Number	66	9	12	2	5	17	13
Percentage	82.5%	11.25%	15%	2.5%	6.25%	21.25%	1.25%

Table -3: Length of the bridges in different coronary arteries.

Length	Left coronary artery branches	Right coronary artery branches
Maximum	4.7	2.8
Minimum	1.5	0.9
Mean	3.83	1.76
Standard deviation	0.58	0.65

Discussion:

Myocardial bridging is an important cardiological entity which has led to many controversies. Detection of MB is essential while investigating cardiac ailments since it had been found to be associated with ischemic heart disease and cardiomyopathy.^{6,8} The incidence of MB showed varied in their prevalence rates, 5.50% by Sanjeev Kumar Singla et al.,⁹ 34.5% in a study by Loukas et al.,¹⁰ 73.3% by Arpita Mahajan⁴ and a study done by Manimay Bandyopadhyay et al.,¹¹ documented 90.4%, whereas in our study the rate was 92.5%. Although both the coronary arteries were significantly involved, left anterior descending artery 66 (82.5%), found to be highly involved in our study, whereas Sabinis A.S.,¹² reported 42.5% and 43.2% by Loukas et al.⁹

Conclusion:

The Present study reveals a high percentage of myocardial bridges in the general population in Telangana. The meticulous perception on morphological properties and its pathological effects of the coronary arterial anatomy may provide valuable information to the clinicians and cardiothoracic surgeons in efficient management of coronary disease and other cardiac ailments. Hence the Clinical importance of myocardial bridges is essential to cardiologists in appropriate interpretations.

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Conflicts: No Conflicts