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Study of morphological aspects of coronary artery in cadaver hearts

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Abstract
Introduction: Coronary arteries and their branches travel along the surface of heart under epicardium. However a portion of these arteries may be embedded in the muscle called MB and the submerged coronary artery is called mural coronary artery. The knowledge about the number, length and depth of myocardial can help in identifying the people at risk. Coronary artery disease (CAD), also known as ischemic heart disease (IHD), is a group of diseases that includes: stable angina, unstable angina, myocardial infarction, and sudden cardiac death. With the above background, the present study has been undertaken to study the prevalence of myocardial bridges in the coronary arteries
Method and Material: The study had included the 50 adult human cadavers used for the routine dissection procedure. The coronary arteries were dissected from origin to termination. During their course MB were observed on the branches of coronary arteries. The morphological study of MBs which were found during dissection was done.
Results
1. 20 hearts showed MBs.
2. Out of 20 MBs, 12 were noticed on left coronary artery (LCA) and 8 were found on Right Coronary Artery (RCA
Conclusion
1. MBs are frequently seen in human hearts.
2. Left Anterior Descending Artery (LADA) was the commonest site to show MB

Keywords: mural artery, tunnel artery, right coronary artery, left coronary artery

Introduction

Coronary arteries and their branches travel along the surface of heart under epicardium. However a portion of these arteries may be embedded in the muscle called MB and the submerged coronary artery is called mural coronary artery. A myocardial bridge occurs when one of the coronary arteries tunnels through the myocardium rather than resting on top of it. Typically, the arteries rest on top of the heart muscle and feed blood down into smaller vessels that populate throughout the myocardium. But if the muscle grows around one of the larger arteries, then a myocardial bridge is formed. As the heart squeezes to pump blood, the muscle exerts pressure across the bridge and constricts the artery. This defect is present from birth. It can lead to uncomfortable, powerful heartbeats and angina. The incidence of the condition in the general population is estimated at 5% based on autopsy findings, but significance when found in association with other cardiac conditions is unknown.[1] Detection of MB is essential while investigating cardiac ailments since it had been found to be associated with ischemic heart disease and cardiomyopathy. Wide range of incidence of occurrence of MB (0.5% to 90.4%) is seen in the studies done by angiography and dissection. As only about 2/3rd of MBs exhibit 50% narrowing of vessels, angiographic result may be different from those of morphological one [2] MB rarely causes myocardial ischemia [3] and stable and unstable angina pectoris, acute myocardial infarction, complete a-v block and sudden death associated with MB have been described [4-5] such contradictory statements enhance the doubt about the clinical significance of MB. A Coronary artery disease (CAD), also known as ischemic heart disease (IHD), is a group of diseases that includes: stable angina, unstable angina, myocardial infarction, and sudden cardiac death. It is within the group of cardiovascular diseases of which it is the most common type. A common symptom is chest pain or discomfort which may travel into the shoulder, arm, back, neck, or jaw. The 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

Method and Material

50 human hearts of unknown sex were obtained from dissection bodies from Anatomy department. All the hearts were preserved in 10% formalin of adult human cadavers used for the routine dissection procedure. Total 50 hearts specimens were collected. 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 calliper. The Cunningham's manual of practical Anatomy is referred for the detailed dissection procedure.

Results

The data from the 50 hearts specimen's were collected and presented as below.

Table 1: Myocardial bridges occurrence

Myocardial Bridges	Males	Females	Total
Right Coronary Artery	6	2	8
Left Coronary Artery	8	4	12
Both	0	0	0
Total	14	6	20

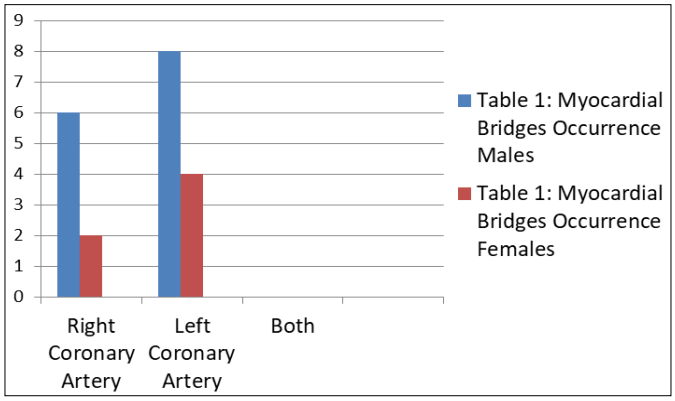

Fig 1

Table 2: Number of single myocardial bridge over right coronary artery branches

	Males	Females	Total
Right Marginal Branch	0	0	0
Proximal segment of RCA	3	1	4
Posterior Interventricular Branch	3	0	3

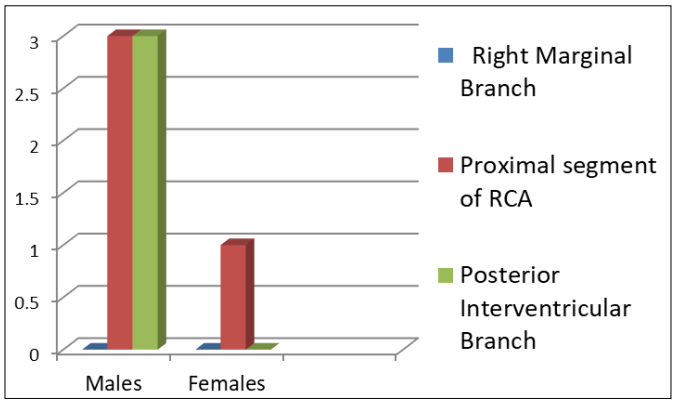

Fig 2

Table 3: Number of single myocardial bridges over left coronary artery branches

	Males	Females	Total
Left anterior descending Branch	5	1	6
Diagonal Branch	2	0	2
Left MarginalBranch	1	0	1
Circumflex Branch	0	0	0
Posteriorinterventricularbranch	4	0	4

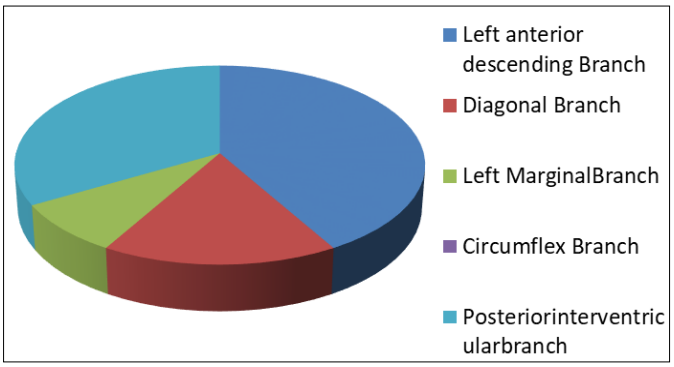

Fig 3

Discussion

Main coronary arteries and their major branches are usually subepicardial but those in atrio-ventricular and interventricular sulci are often deeply sited, occasionally hidden by myocardium or embedded in it. The muscle overlying is myocardial bridge and underlying artery is termed as tunnel or mural artery. These bridges were considered as transitional stages in further development of coronary artery towards the subepicardial course which found at the highest stage of development. Such bridges represent remainders of phylogenesis which are repeated in the ontogenesis of man. Coronary arteries are of Type B arteries in which they are mainly epicardial but exhibit frequent intramyocardial course in short segments [6] MB of coronary arteries was recognized and described by Black in 1796 [7]. Then various authors carried out studies either by dissection or angiography method to learn more about incidence of MB and arteries involved. It was found that LADA is the commonest artery on which MB is often present. We have also found LADA was the commonest site for MB [Fig-4], [Fig-5]. Geringer (1951) 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 [8]. In a study of 100 specimens, Kosinski & Grzybiak (2001) [9] reported the anterior interventricular branch, the diagonal branch and inferior interventricular branch as the most common site in the same order [9]. Bharambe *et al*. (2007) [10] during dissection of 50 hearts observed that myocardial bridges were more common over anterior interventricular branch [10].

Fig 4

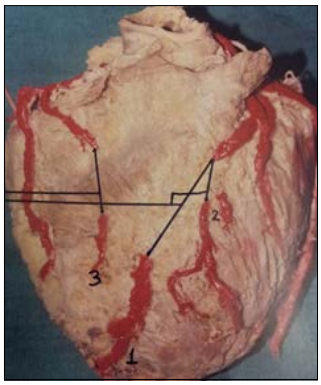

Fig 5

Table 4: Comparison of results of present study with other studies

Name of the author	Method of study	Incidence of MB	Common Site
Manimay Bandipadhyay [2]	Cadaver	90.40%	LADA
Sahni D [11]	Cadaver	72%	LADA
Ferreira [3]	Cadaver	55.60%	LADA
Loukas M [12]	Cadaver	34.50%	LADA
Ballesterosle [13]	Cadaver	70.90%	LADA
Adam Kosinski [14]	Cadaver	31.30%	LADA
Present study	Cadaver	40%	LADA

Conclusion

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 ischemia, circulatory problems, angina, myocardial infarction, sudden cardiac death, systolic compression and other cardiac disturbances that may require surgical intervention. Hence the knowledge of MBs is essential for cardiologists to detect aetiology of different heart related problems, to plan the mode of treatment and to predict their prognosis.

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