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Study of coronary artery in cadaver hearts: Morphological Aspects

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Abstract
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.
The study had included the 50 adult human cadavers used for the routine dissection procedure. These are routinely used in the Department of Anatomy, in Lord Buddha Koshi Medical College and Hospital, Saharsa, Bihar, Total 50 hearts specimens were collected.
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 is chaemia, 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 etiology of different heart related problems, to plan the mode of treatment and to predict their prognosis.

Keywords: myocardial bridge, coronary arteries, coronary heart disease

Introduction
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. Occasionally it may feel like heartburn. Usually symptoms occur with exercise or emotional stress, last less than a few minutes, and get better with rest. Shortness of breath may also occur and sometimes no symptoms are present. The first sign is occasionally a heart attack. Other complications include heart failure or an irregular heartbeat [1].
Risk factors include: high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, depression, and excessive alcohol. The underlying mechanism involves reduction of blood flow and oxygen due to atherosclerosis of the arteries of the heart. A number of tests may help with diagnoses including: electrocardiogram, cardiac stress testing, coronary computed tomographic angiography, and coronary angiogram, among others [2].
Prevention is by eating a healthy diet, regular exercise, maintaining a healthy weight and not smoking. Sometimes medication for diabetes, high cholesterol, or high blood pressure are also used. There is limited evidence for screening people who are at low risk and do not have symptoms. Treatment involves the same measures as prevention. Additional medications such as antiplatelets including aspirin, beta blockers, or nitroglycerin may be recommended. Procedures such as percutaneous coronary intervention (PCI) or coronary artery bypass surgery (CABG) may be used in severe disease. In those with stable CAD it is unclear if PCI or CABG in addition to the other treatments improve life expectancy or decreases heart attack risk [3].

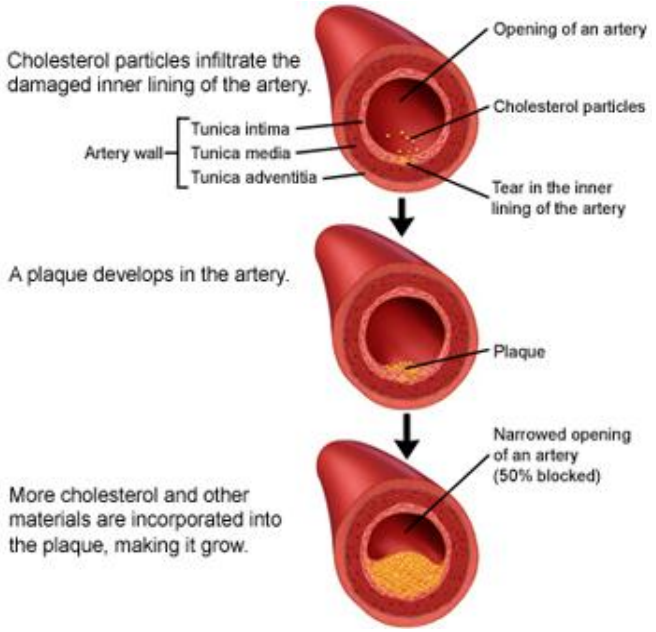

Fig 1

In 2015 CAD affected 110 million people and resulted in 8.9 million deaths. It makes up 15.9% of all deaths making it the most common cause of death globally. The risk of death from CAD for a given age has decreased between 1980 and 2010, especially in developed countries. The number of cases of CAD for a given age has also decreased between 1990 and 2010. In the United States in 2010 about 20% of those over 65 had CAD, while it was present in 7% of those 45 to 64, and 1.3% of those 18 to 45. Rates are higher among men than women of a given age [4].
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 [5].

Detection of MB 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.

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.

Methodology

The study had included the 50 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 caliper. The Cunningham's manual of practical Anatomy is referred for the detailed dissection procedure. The approval of the Institutional Ethics Committee is taken for the present study. The information was collected and discussed in following sections.

Results & Discussion

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	5	3	8
Left Coronary Artery	10	2	12
Both	0	0	0
Total	15	5	20

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	2	2	4
Posterior Interventricular Branch	3	0	3

Table 3: Number of Single Myocardial Bridges over left coronary artery branches

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

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 [6]. In a study of 100 specimens, Kosinski & Grzybiak (2001) reported the anterior interventricular branch, the diagonal branch and inferior interventricular branch as the most common site in the same order [7].

Bharambe *et al*. (2007) during dissection of 50 hearts observed that myocardial bridges were more common over anterior interventricular branch [8].

Beta adrenergic receptor blocker can prolong the diastole and hence can improve coronary perfusion. Hurst *et al*. 2005 had demonstrated by single photon emission computed tomography that with use of beta blockers in a patient of ischemic heart disease with MB, coronary perfusion and hence the symptoms improved [9]. Calcium channel blockers, nitrates and anti platelet agents have also been used to reduce the incidence of angina with MB. Those who do not respond to medical therapy need surgical intervention. Previously surgical myotomy and coronary stenting these days are modalities of choice [10]. As per Rahman *et al*. 2000, unresponsive angina due to MB is completely relieved following surgery [11].

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 ischaemia, 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 etiology of different heart related problems, to plan the mode of treatment and to predict their prognosis.

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