CASE REPORT

Myocardial bridge over the left anterior descending coronary artery: A case report and review of the literature

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Myocardial bridging (MB) is considered as a topic of high interest since its occurrence in different studies is statistically significant, and the clinical manifestations of this phenomenon are complicated with cardiovascular diseases. Whether the MB participates in heart diseases and has a decisive effect to life-threatening situations is still under research, and many studies have been conducted to clarify the abovementioned question. A case report with a MB on the left anterior descending coronary artery is presented in the current study, and a review of the literature is provided as well. Cardiologists as well thoracic surgeons and radiologists should bear in their mind the potential presence of such variant during interpretation of angiographies and multidetector-computed tomography.

Key words: Cardiovascular diseases, left descending coronary artery, myocardial bridge

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INTRODUCTION

"Myocardial bridge" (MB) constitutes a portion of the myocardial tissue that bridges a segment of the coronary artery, mostly the left anterior descending coronary artery (LADCA).[1] MB is also known as muscular bridge, intramural coronary artery, mural coronary, tunneled coronary artery, or myocardial loop.[2] MB was firstly described in 1737 by Reyman, and in 1951, a profound research was carried out by Geiringer.[3]

In the current study, a cadaveric MB is presented and takes the opportunity to display the morphological features, the incidence, as well the clinical applications of that variant.

CASE REPORT

During the routine cadaver dissection, we came across a variant myocardial tissue strip, the so-called MB. Specifically, in a 82-year-old male cadaver, fixed by alcohol and formalin solution, whose cause of death was unrelated to heart disease or congenital anomaly; we noticed the presence of a strip of myocardial tissue, bridging the LADCA's middle portion. MB was 1.2 cm in length bridging LADCA just after the origin of the diagonal branch of the LADCA. MB crossed the artery vertically and superficially [Figure 1]. From the medical history of the cadaver, no heart pathologic conditions were encountered and no other abnormalities of the anatomical structures of the heart were present or evidence of previous surgical procedures on the region detected.

DISCUSSION

The detection of the MB is accomplished by angiography, multidetector-computed tomography (MDCT), and autopsy. The detection of MB by angiography is 0.4%–15.8%, by MDCT 3.5%–58%, and by autopsy 4.7%–60.0%.[4] MB's occurrence is derived indirectly from the signs of partial compression of LADCA. It should be mentioned that in all the aforementioned cases, the

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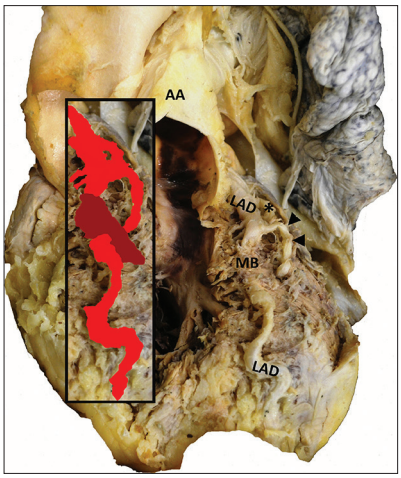

Figure 1: A myocardial bridge is depicted covering the upper middle segment of the left anterior descending coronary artery. LAD = Left Anterior Descending coronary artery, MB = Myocardial Bridge, AA = Aortic Arch, asterisk (*) = Left circumflex artery, arrow heads = diagonal branch. On the left of the picture in a frame is the LAD with the MB magnified and colored

vessel which is compressed is the LADCA.[5] In addition to the abovementioned cases, it does not appear to be a difference in prevalence of bridging by gender or age in accordance to Lee and Chen,[5] whereas Camardella *et al*. supported that bridging affects men more than women (2:1 ratio) and manifests clinically around 40–50 years of age.[6] Micić-Labudović *et al*. found the MB in 8% of the 975 cases of autopsy, where it appeared significantly more frequently in men (9.35%) than in women (4.03%) and the average age in the group with MB was 51.88 ± 2.02 years.[7]

MB's location, length, and thickness have been explored by various methods. As shown by Ishikawa, the location of the MBs is depicted by coronary angiography and MDCT is more often observed in the middle segment (68.1%) of the LADCA (92.6%). Proximal to the middle segment of the LADCA, an incidence of 10.6% was mentioned, while distal only 2.8%; over the trunk of the right coronary artery, 5.1% of the MBs were documented.[8] Loukas *et al*. found by autopsy as the most common MB's location, the site where MB bridges the LADCA in 43.2%, the right coronary artery in 18.5%, the diagonal branch of the left coronary artery in 17.2%, the left marginal branch in 7.4% and the inferior interventricular branch of the left coronary artery in 6.1% and the right marginal branch in 4.9%.[2] In addition, Kosiński and Grzybiak reported the existence of MBs above vessels, such as diagonal branch (5%), the posterior interventricular branch (4%), the left marginal branch (3%), and the right marginal branch (1%), while MBs over the LADCA noticed in a 33% of the examined hearts. Kosiński and Grzybiak detected three main MB's types: in the first, one MB is detected in the same heart, in the second, two MBs are detected, both above the same vessel, and in the third type, two MBs are observed above different vessels.[9] MB's length is estimated by imaging methods and autopsy is 1.5–2.5 cm with an average of <2 cm in most studies.[4] The mean MB's thickness is estimated 2.8 mm by autopsy, 2.0 mm by coronary angiography, and 0.9 mm by other imaging analysis.[8] MB's thickness is generally proportionate to their length.

Morphologically, Ferreira *et al*. described two types of bridging: the "superficial" one (75.6%) where the LADCA runs on the interventricular groove and is crossed by the MB vertically or at an acute angle before diverging to the apex of the heart and the "deep" one (24.4%) in which the LADCA deviates toward the right ventricle and is deeply positioned on the interventricular septum, where it was crossed transversely, obliquely, or spirally by a long bundle arising from the apex of the right ventricle and ending into the interventricular septum.[10]

MB's anatomical properties are of a great interest, especially when related to the incidence of coronary heart diseases.[11,12] The mechanisms through which MBs lead to coronary heart diseases are direct compression of the LADCA by the MB's contraction and induction of coronary atherosclerosis in the LADCA segment proximal to the MB.[4] The hemodynamic impact of MB depends on the MB's thickness and length, orientation of the MB in relation to myocardial fibers, and the presence of loose connective or adipose tissue around the bridged segment.[12] Moreover, a deeply situated intramyocardial LADCA with a thick MB appears to be associated with sudden cardiac death and a longer or thicker MB predispose to myocardial ischemia. Angina, myocardial ischemia, myocardial infarction, left ventricular dysfunction, myocardial stunning, paroxysmal AV blockade, ventricular tachycardia, and sudden death are considered as bridging complications.[3]

CONCLUSION

Heart diseases may be associated to MB. Physicians and especially cardiologists, thoracic surgeons, as well as radiologists should be aware of the potential existence of such anatomic variant since such a knowledge can be a useful asset during the differential diagnosis of cardiovascular diseases.

GP contributed in the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. KK contributed in the conception of the work, drafting, and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. KI contributed in revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

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Conflicts of interest
There are no conflicts of interest.

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