

Myocardial bridging, unusual cause of myocardial infarction; case report and review of literature.

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Abstract

Key clinical message

Myocardial bridging is a common coronary anomaly. Although it is considered to be a benign condition, it can rarely be complicated by myocardial infarction.

Myocardial bridging is congenital coronary anomaly in which coronary arteries pass through the heart muscle rather than lying on its surface. It is a benign condition and most patients do not have symptoms. Some patients may have symptoms of angina. Patients may rarely present with myocardial ischemia or infarction. Here, we present a case of 38 years old female patient who presented with chest pain of 2 months duration. Further evaluation with CT- coronary angiography revealed myocardial bridging. Subsequently, she developed myocardial infarction, which is a rare complication of this condition. We discuss rare complication of this common anomaly.

Key words: chest pain, myocardial bridging, coronary anomaly, myocardial ischemia, myocardial infarction.

Introduction

Myocardial bridging (MB) is a harmless congenital coronary anomaly where one or more of the coronary arteries pass through the heart muscle rather than lying on its surface. Exact prevalence of MB is uncertain; however, MB is expected to present in about one-third of adults to some extent. (1)

The amount of myocardial fibers traversing above the artery enables differentiation between superficial (1-2mm of myocardial) and deep (>2mm of myocardium) bridge; this differentiation is significant as the depth

correlates with the amount of compression exerted in systole (1). MB has been linked with angina, arrhythmia, depressed left ventricular function, myocardial stunning, and early death after cardiac transplantation, and sudden death. (2)

Most people don't have myocardial bridge symptoms and generally it is a benign condition but might have symptoms like chest pain during physical activity or emotional stress. Other angina like symptoms may include shortness of breath, palpitation and dizziness. (3, 4)

MB induces myocardial ischemia via various mechanisms, such as supply-demand mismatch, endothelial dysfunction, coronary micro vascular dysfunction and external mechanical compression. (5)

Case History / Examination

In July 2023, 38 years old female patient presented to our cardiac OPD with chest pain of 2 month duration after she visited different hospitals for this complaint. The pain was intermittent, retrosternal and squeezing in type that radiates to left arm, and jaw. The pain is also associated with diaphoresis and it is exacerbated with exertion. She was repeatedly visiting nearby hospital for this complaint and investigated with ECG and troponin, which were all normal. She was also given nitrates but she had no response. Up on further inquiry she told that she has migraine for which she takes analgesics. Otherwise, she doesn't have chronic medical illnesses or comorbidities. She also denies any substance use. She doesn't have family history of cardiac illness or sudden cardiac death.

Up on physical examination, she was healthy looking and her vital sign and the rest of physical examination were unremarkable.

Methods (differential diagnosis, Investigations and treatment)

She was re-investigated with ECG (Fig 1) and Troponin, both was normal. The Echo, CXR and TFT were also normal. After cardiology consultation, the patient undergoes Coronary CT Angiography. The CCTA shows a short segment (8mm) intra-myocardial course of distal LAD confirming the diagnosis of myocardial bridging. (Fig 2A-C and Fig 3)

After the diagnosis of myocardial bridging was confirmed, the patient was counseled on treatment options and she was initiated on Metoprolol 25 mg per oral daily. Subsequently, metoprolol was escalated to 25mg per oral twice daily and amlodipine 10mg per oral daily was added as non-dihydropyridines calcium channel blockers are not available in our setup.

Outcome and follow up

Despite this medical management, the patient continued to have persistent chest pain. During this follow up she developed Non ST- Segment elevation myocardial infarction (STEMI), which is evidenced by elevated troponin of 179 and 156 (elevated 4475 and 3900 times upper limit of normal range) and normal ECG. She was counseled for re-vascularization therapy.

Discussion

The normal course of coronary arteries is between the pericardium and epicardium, the two most outer layers of the heart. However, if a portion of epicardium is encased by myocardial fibers it is called myocardial bridge. It can occur in any coronary artery but the most commonly involved one is the left anterior descending artery (LAD); the least commonly affected coronary arteries are left circumflex and right coronary arteries.(6,7)

It was previously considered as a benign cardiovascular anomaly, but because of increasing evidences of its complications it is no more a benign disease, in at least subset of patients. Although it is benign and most patients are asymptomatic, some are complicated by stable or unstable angina, vasospastic angina, acute coronary syndromes, AV blocks, arrhythmia, and sudden cardiac death. (8- 11)

It is not uncommon for the diagnosis of MB to be delayed. This could be because of the varied clinical presentations, and lack of advanced imaging modality in poor settings. Our patient visited several health

facilities before she was referred to our hospital, where the diagnosis was made. This could be as a result of lack of awareness about the MB, and unavailability of advanced imaging modalities.

Although there are cases reports of MB complications in young female patients (12), most of these complications were observed in young male patients. Our patient is a 38 years young female patient; this makes our patient a unique.

MB induces acute coronary syndromes via several mechanisms including coronary spasm, thrombosis, coronary dissection, or development of focal atherosclerosis proximal to the myocardial bridging. (13)

Diagnosis of MB can differ significantly depending on the imaging modality employed to identify these variants. The prevalent methods frequently examined to ascertain prevalence in the general population comprise coronary angiography (CA), coronary computed tomography angiography (CCTA), and autopsy studies. (14). our patient was examined with CT- coronary angiography, which confirmed the diagnosis.

Currently, there are no universal guidelines for the treatment of MB. Most experts agree that the first line treatment for individuals experiencing symptoms of myocardial bridge typically should be medications like beta-blockers or non-dihydropyridine calcium channel blockers. It is advisable to steer clear of nitrates as they could exacerbate symptoms. It is also advised that surgical interventions should be pursued for patients who don't respond to medical therapy. Surgical interventions, such as myotomy, intracoronary stenting and coronary artery bypass graft surgery have been employed for persistent symptoms, yet the long-term prognosis remain uncertain. Another treatment option include stent placement. (15, 16). Our patient was treated with beta blocker, and calcium channel blockers without symptomatic response. She was counseled on surgical intervention options.

Conclusion

In conclusion, myocardial bridging is a common coronary anomaly. Our case illustrates that it is not always benign, as it can rarely be complicated by myocardial infarction. Physicians evaluating patients with chest pain should consider myocardial bridging in young patients with no atherosclerosis risk factors.

Author contribution

Merga Daba: Conceptualization, Writing – original draft ,Writing – review & editing. **Dawit Bineyam:** Writing – original draft. **Ibraist Yohannes:** Writing – original draft. **Beniam Yohannes:** Writing – original draft & Investigation. **Rabirra Waktola:** Investigation. **Eshetu Bedada:** supervision and validation

Data sharing statement

Patient's history, physical findings, laboratory investigations, and imaging findings used to support the finding of this study is included in the article.

Ethical approval

The author's institution does not require ethical approval for the publication of single case report.

Consent for publication

The patient has provided written informed consent for publication of the case.

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Disclosure

Authors report no conflict of interest.

Data availability statement

The data that support the findings of this case report are available from the corresponding author upon reasonable request

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