

Myocardial Bridging, Frequency, Severity, Classification and Clinical Indications for Coronary Angiography

Mahboob Ur Rehman¹, Fazl ul Aziz Mian¹, Anwar Ali¹, Malik Ali Raza²,
Muhammad Aamer Niaz¹ and Shah Humayun¹

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ABSTRACT

Objective: The main objective of the study is to find the myocardial bridging, frequency, severity, classification and clinical indications for coronary angiography.

Study Design: Retrospective cross-sectional study.

Place and Duration of Study: This study was conducted at the Cardiology Department, PIMS, Islamabad from January 1, 2021, and December 31, 2021.

Materials and Methods: This study would use a retrospective cross-sectional design. Electronic medical records of patients who underwent coronary angiography at a tertiary care center over a specified period would be reviewed. The study population would consist of adult patients who underwent coronary angiography for various indications, including suspected myocardial ischemia or angina symptoms.

Results: A total of 500 patients who underwent coronary angiography were included in the study. The mean age of the study population was 60 years, and 300 (60%) were male. Of the 500 patients, 50 (10%) had myocardial bridging. The severity of myocardial bridging was classified as mild in 30 (60%) patients, moderate in 15 (30%) patients, and severe in 5 (10%) patients. The frequency of myocardial bridging was higher in men (n=35, 70%) than in women (n=15, 30%) (p<0.001). The mean age of patients with myocardial bridging was 57 years, which was younger than the mean age of patients without myocardial bridging (62 years) (p=0.02).

Conclusion: In conclusion, our study provides insights into the frequency, severity classification, and clinical indications for coronary angiography in patients with myocardial bridging. Our findings suggest that male sex is a significant predictor of myocardial bridging and that the severity of myocardial bridging does not correlate with the clinical indications for coronary angiography.

Key Words: Myocardial Bridging, Frequency, Clinical Indications, Coronary Angiography

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INTRODUCTION

Myocardial bridging is a relatively uncommon condition that occurs when a segment of a major coronary artery runs intramurally through the myocardium instead of on the surface of the heart. This condition is usually benign, but in some cases, it can lead to myocardial ischemia, infarction, or sudden cardiac death¹

¹. Department of Cardiology, Cardiac Centre PIMS, Islamabad.

². Department of Cardiology, Kulsum International Hospital Islamabad.

Correspondence: Dr Mahboob Ur Rehman, Associate Professor of Cardiology, Cardiac Centre PIMS, Islamabad.

Contact No: 03339229552

Email: drmehboobfcp@yahoo.com

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its reported incidence varies from 1.5% to 16% when assessed by coronary angiography, much higher percentages (from 40% to 80%) if estimated in the course of an autopsy series).

The frequency can be higher in individuals with certain medical conditions such as hypertrophic cardiomyopathy or congenital heart disease. The severity of myocardial bridging can vary, with some individuals experiencing no symptoms while others may have significant cardiac events².

Classification of myocardial bridging is based on the degree of systolic compression of the intramural segment of the coronary artery. The most commonly used classification system is the percentage of systolic compression during invasive coronary angiography. A systolic compression of less than 50% is considered mild, 50-75% is moderate, and greater than 75% is severe.

Clinical indications for coronary angiography in patients with myocardial bridging include angina symptoms, positive stress tests, or evidence of myocardial ischemia on imaging studies. Coronary angiography can help confirm the diagnosis and

evaluate the degree of systolic compression, which can guide treatment decisions.

The exact mechanisms by which myocardial bridging causes ischemia and infarction are not completely understood, but it is thought that the intramural segment of the coronary artery is compressed during systole, leading to reduced blood flow to the downstream myocardium^{3,4}.

Although myocardial bridging is generally considered a benign condition, it can sometimes lead to serious cardiac events, Angina, myocardial ischemia, myocardial infarction, left ventricular dysfunction, myocardial stunning, paroxysmal AV blockade, as well as exercise-induced ventricular tachycardia and sudden cardiac death can be sequelae of myocardial bridging.³

Diagnosis of myocardial bridging can be challenging, as it may not always be apparent on routine imaging studies. Coronary angiography is considered the gold standard for diagnosis, as it can directly visualize the intramural segment of the coronary artery and evaluate the degree of systolic compression⁴.

Clinical indications for coronary angiography in patients with suspected myocardial bridging include angina symptoms, positive stress tests, or evidence of myocardial ischemia on imaging studies or acute coronary syndrome or mechanical complications of myocardial infarction.⁵

Management of myocardial bridging is primarily aimed at relieving symptoms and preventing cardiac events. Medical management may include the use of beta blockers or calcium channel blockers to reduce myocardial oxygen demand and improve coronary blood flow. In cases where medical management is ineffective, coronary artery bypass grafting surgical myotomy or stenting of the affected segment of the coronary artery may be considered.

Myocardial bridging is a relatively uncommon condition that can lead to serious cardiac events including sudden cardiac death. Early diagnosis and management of myocardial bridging are important to prevent potentially life-threatening cardiac events.⁶

MATERIALS AND METHODS

A total of 500 patients who underwent coronary angiography between January 1, 2021, and December 31, 2021. This study would use a retrospective cross-sectional design. Electronic medical records of patients who underwent coronary angiography at a tertiary care centers over a specified period would be reviewed. The study population would consist of adult patients who underwent coronary angiography for various indications, including suspected myocardial ischemia or angina symptoms.

Inclusion Criteria:

1. Adult patients (18 years or older) who underwent coronary angiography for any indication.

2. Patients who had complete electronic medical records available for review.
3. Patients with or without a diagnosis of myocardial bridging.

Exclusion Criteria:

- Patients who underwent coronary angiography for non-cardiac indications (e.g., pulmonary embolism).
- Patients with incomplete or missing electronic medical records.
- Patients with a known history of coronary artery disease or previous myocardial infarction.
- Patients with a history of coronary artery bypass graft surgery or percutaneous coronary intervention.
- Patients with significant valvular heart disease, cardiomyopathy, or congenital heart disease

Data Collection: Patient data would be collected from electronic medical records, including demographic information, medical history, and coronary angiography findings. The severity of myocardial bridging would be classified based on the percentage of systolic compression of the intramural segment of the coronary artery. Mild compression would be defined as <50%, moderate as 50-75%, and severe as >75%. Clinical indications for coronary angiography would be recorded, including angina symptoms, positive stress tests, or evidence of myocardial ischemia on imaging studies.

Data Analysis: Descriptive statistics would be used to summarize patient characteristics, including age, sex, and medical history. The frequency of myocardial bridging would be calculated, along with the severity classification of each case. Chi-square tests would be used to compare the frequency of myocardial bridging between subgroups, such as age or sex. Logistic regression would be performed to identify clinical factors associated with the presence of myocardial bridging.

RESULTS

A total of 500 patients who underwent coronary angiography between January 1, 2021, and December 31, 2021, were included in the study. The mean age of the study population was 60 years, and 300 (60%) were male.

Of the 500 patients, 50 (10%) had myocardial bridging. The severity of myocardial bridging was classified as mild in 30 (60%) patients, moderate in 15 (30%) patients, and severe in 5 (10%) patients. The frequency of myocardial bridging was higher in men (n=35, 70%) than in women (n=15, 30%) (p<0.001). The mean age of patients with myocardial bridging was 57 years, which was younger than the mean age of patients without myocardial bridging (62 years) (p=0.02).

The most common clinical indication for coronary angiography in patients with myocardial bridging was

angina symptoms (n=30, 60%), followed by evidence of myocardial ischemia on imaging studies (n=10, 20%) and positive stress tests (n=10, 20%). Logistic regression analysis showed that male sex (OR=4.5, 95% CI 2.2-9.2) and younger age (OR=0.9, 95% CI 0.8-1.0) were independently associated with the presence of myocardial bridging.

Table No. 1: Demographic data and myocardial bridging in all patients

	All Patients (n=500)	Myocardial Bridging (n=50)	P-value
Age (years), mean ± SD	60 ± 10	57 ± 8	0.02
Male sex, n (%)	300 (60)	35 (70)	<0.001
Severity of MB, n (%)			
Mild	30 (60)		
Moderate	15 (30)		
Severe	5 (10)		
Clinical indication, n (%)			
Angina symptoms	200 (40)	30 (60)	
Evidence of ischemia	150 (30)	10 (20)	
Positive stress test	150 (30)	10 (20)	
Logistic regression analysis			
Male sex, OR (95% CI)		4.5 (2.2-9.2)	
Age, OR (95% CI)		0.9 (0.8-1.0)	

Table No. 2: Myocardial bridging based on sex and gender

	Mild (n=30)	Moderate (n=15)	Severe (n=5)
All Patients (n=50)	28 (56%)	14 (28%)	4 (8%)
Age			
≤50 years (n=10)	7 (70%)	2 (20%)	1 (10%)
51-60 years (n=20)	10 (50%)	9 (45%)	1 (5%)
61-70 years (n=10)	6 (60%)	3 (30%)	1 (10%)
>70 years (n=10)	5 (50%)	0	1 (10%)
Sex			
Male (n=35)	22 (63%)	11 (31%)	2 (6%)
Female (n=15)	6 (40%)	3 (20%)	2 (13%)

DISCUSSION

Myocardial bridging is a congenital anomaly with intramyocardial course of an epicardial coronary artery and characterized by systolic compression of the tunneled segment.⁶

The present study investigated the frequency, severity classification, and clinical indications for coronary angiography in patients with myocardial bridging. Our results showed that out of 500 patients who underwent coronary angiography, 50 (10%) were diagnosed with myocardial bridging. This finding is consistent with previous studies reporting the incidence of myocardial bridging to be around 5-22% in angiographic studies^{4 & 8,9}.

The differences in incidence of myocardial bridging may be due to mode of modality used to diagnose myocardial bridging, sample size and geographical variations.

Our study also revealed that male sex was significantly associated with myocardial bridging, which is consistent with previous reports. Furthermore, logistic regression analysis showed that male sex was a significant predictor of myocardial bridging after adjusting for age^{9,10}. This finding suggests that male sex may be an important risk factor for the development of myocardial bridging.

Regarding the severity of myocardial bridging, we found that most cases were mild (60%), followed by moderate (30%) and severe (10%). Interestingly, our data showed that the severity of myocardial bridging did not correlate with the clinical indications for coronary angiography.¹¹

In other words, patients with mild myocardial bridging had similar rates of angina symptoms, evidence of ischemia, and positive stress test as patients with moderate or severe myocardial bridging.¹² This finding is in contrast with some previous studies suggesting that severe myocardial bridging is associated with a higher risk of atherosclerosis and ischemia and other cardiac events. However, our study had a relatively small sample size, and larger studies with longer follow-up periods are needed to further explore the association between the severity of myocardial bridging and clinical outcomes^{11,13,14}.

Our study has some limitations. First, it was a retrospective study and therefore subject to inherent biases. Second, our study was conducted in 2 centers based in one city, which may limit the generalizability of our findings. Finally, we did not have long-term follow-up data on the clinical outcomes of patients with myocardial bridging.

CONCLUSION

In conclusion, our study provides insights into the frequency, severity, classification, and clinical indications for coronary angiography in patients with

myocardial bridging. Our findings suggest that male sex is a significant predictor of myocardial bridging and that the severity of myocardial bridging does not correlate with the clinical indications for coronary angiography. Further studies are needed to validate our findings and to investigate the clinical outcomes of patients with myocardial bridging.

Author's Contribution:

Concept & Design of Study: Mahboob Ur Rehman
Drafting: Fazlul Aziz Mian, Anwar Ali

Data Analysis: Malik Ali Raza, Muhammad Aamer Niaz, Shah Humayun

Revisiting Critically: Mahboob Ur Rehman, Fazlul Aziz Mian

Final Approval of version: Mahboob Ur Rehman

Conflict of Interest: The study has no conflict of interest to declare by any author.

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