Study of Prevalence, Risk Factors and Angiographic Profile of Patients with Myocardial Bridges in a Tertiary Care Hospital, Dhaka, Bangladesh

Solaiman Hossain1,*, Moeen Uddin Ahmed1, Md. Abdul Mannan2, Md. Shahimur Parvez1, Debasish Debnath1, Md. Mahidur Rahman1, Anup Kumar Das1

1Department of Cardiology, Enam Medical College and Hospital, Savar, Dhaka, Bangladesh
2Department of Cardiology, Shaheed M. Monsur Ali Medical College, Sirajgonj, Bangladesh

Email address:
*Corresponding author

To cite this article:
Solaiman Hossain, Moeen Uddin Ahmed, Md. Abdul Mannan, Md. Shahimur Parvez, Debasish Debnath, Md. Mahidur Rahman, Anup Kumar Das. Study of Prevalence, Risk Factors and Angiographic Profile of Patients with Myocardial Bridges in a Tertiary Care Hospital, Dhaka, Bangladesh. Cardiology and Cardiovascular Research. Vol. 4, No. 2, 2020, pp. 67-70. doi: 10.11648/j.ccr.20200402.16

Received: March 28, 2020; Accepted: April 23, 2020; Published: May 15, 2020

Abstract: Background: Band of Myocardial tissue overlying a segment of an epicardial coronary artery is termed myocardial bridge (MB). The aim of this study was to identify the prevalence, risk factors and angiographic profile of patients with myocardial bridge in a tertiary care hospital, Dhaka, Bangladesh. Materials and Methods: This retrospective observational study included a total of 1480 patients with suspected coronary artery disease admitted to Enam Medical College and Hospital, Savar, Dhaka, Bangladesh for coronary angiography between April 2016 to June 2019 of them 43 cases were found to have myocardial bridge. Coronary compression was defined as a maximum systolic luminal compression ≥50%. In this population, 43 patients had systolic luminal compression ≥50%, and all 43 patients were selected for the study to determine the prevalence and risk factors of MB and recorded coronary angiogram was reviewed to see the angiographic location of MB, length of MB and number of vessels involved. Results: In this study incidence of MB was 2.9%. The risk factors associated with MB hypertension were 33 (76.74%), diabetes mellitus 28 (65.11%), hyperlipidaemia 18 (41.86%), family history of CAD 15 (34.88%), smoking history 22 (51.16%). Located of MB in LAD were 34 (79.06%), LCX 07 (16.27%) and RCA 02 (4.65%). The MB were in single vessel 38 (88.37%) and double vessels 05 (11.62%). MBs with atherosclerotic stenosis in LAD were 18 (41.86%), LCX 02 (4.65%), RCA 01 (2.32%) and severity of MB stenosis were in LAD 50 -70% were 27 (62.79%), >70% were 07 (16.27%), LCX 50-70% were 06 (13.95%) and >70% was 01 (2.32%) and RCA 50-70% was 02 (4.65%). The length of MBs segment <10 mm were 06 (13.95%), 10-20 mm were 25 (58.19%) and >20 mm were 12 (27.90%). Conclusion: In this study the prevalence of MB was 2.91%, commonly presented with chronic stable angina. The most risk factors of myocardial bridges were hypertension, diabetes mellitus, hyperlipidaemia, family history and smoking history. In coronary angiography most of the patient of MB was present in association of acute coronary syndrome with documented coronary artery disease and was mainly located in LAD mid segment and the length of MB was mostly 10-20 mm. Further large numbers of case are needed to validate the result of the study.

Keywords: Coronary Angiogram, Chronic Stable Angina, Coronary Artery Disease

1. Introduction

Myocardial bridge (MB) is an anatomical entity in which a segment of an epicardial coronary artery becomes overly by myocardial fibers. This term is also an angiographic entity that means any degree of systolic narrowing of an epicardial coronary artery observed in at least one angiographic projection. Muscle overlying the intra-myocardial segment of an epicardial coronary artery, first mentioned in 1737 and described angio-graphically in 1960 is termed a myocardial bridge [1]. This situation is characterized by the decrease in the coronary blood flow during systole due to the
3. Results

There were 1480 patients who were admitted for coronary angiography with suspected coronary artery disease out of them 43 patients were enrolled in this study. The incidence of MB was 2.9% in this study. The ages of the patients were 50±15 (Mean±SD) years. Out of them 28 (65.11%) were male and 15 (34.88%) were female. Body Mass Index of the patients were 25±6 (Mean±SD). The studies of cardiovascular risk factors of the patients with MB were hypertension 33 (76.74%), hyperlipidaemia 18 (41.86%), family history of CAD 15 (34.88%), smoking history 22 (51.16%). The clinical presentations of the patients were chronic stable angina 28 (65.11%), unstable angina 07 (16.27%), NSTEMI 05 (11.62%) and AMI 03 (6.97%). The study of left ventricular ejection fractions on Echocardiography > 55% were 28 (65.11%), 45%-55% were 10 (23.25%) and 35%-45% were 05 (11.62%). In coronary angiography location of MB was in LAD were 34 (79.06%) of them 08 were proximal segment, mid were 22, distal were 04, in LCX followed 07 (16.27%), of them proximal were 02, mid were 04, and distal were 01 and in RCA were 02 (4.65%), of them only in mid segment. Among the MB were in single vessel 38 (88.37%), double vessels were 05 (11.62%). The MBs with atherosclerotic stenosis of coronary artery in LAD were 18 (41.86%), LCX were 02 (4.65%), and RCA was 01 (2.32%). The severities of luminal narrowing of MB segment were in LAD 50 -70% were 27 (62.79%), >70% were 07 (16.27%), in LCX 50-70% were 06 (13.95%) and >70% was 01 (2.32%) and in RCA 50-70% was 02 (4.65%). The length of segment of MB <10 mm were 06 (13.95%), 10-20 mm were 25 (58.19%) and >20 mm were 12 (27.90%).

Table 1. Demographic characteristics of the studied patients. (n=43).

| Variable                  | (n=43)  | %   |
|---------------------------|---------|-----|
| Age (Mean±SD) years       | 50±15   |     |
| BMI (Mean±SD)             | 25±6    |     |
| Sex                       |         |     |
| Male                      | 28      | 65.11|
| Female                    | 15      | 34.88|

Age of the population was 50±15 (Mean±SD) years. Out of them 28 (65.11%) were male and 15 (34.88%) were female. Body Mass Index of the patients were 25±6 (Mean±SD).

Table 2. Risk factors with MB of studied patients (n=43).

| Variable                  | (n=43)  | %   |
|---------------------------|---------|-----|
| Hypertension              | 33      | 76.74|
| Diabetes Mellitus         | 28      | 65.11|
| Hyperlipidaemia           | 18      | 41.86|
| Family History of CAD     | 15      | 34.88|
| Smoking History           | 22      | 51.16|

Study of risk factors seen hypertension 33 (76.74%), diabetes mellitus 28 (65.11%), hyperlipidaemia 18 (41.86%), family history of CAD 15 (34.88%), smoking history 22 (51.16%).

2. Materials and Methods

This was a retrospective observational study. A total of 1480 patients with suspected coronary artery disease (CAD) was admitted to Enam Medical College and Hospital, Savar, Dhaka, Bangladesh for coronary angiography between April 2016 to June 2019 of them 43 cases were found to have myocardial bridge. Coronary compression was defined as a maximum systolic luminal compression ≥50%. In this population, 43 patients had systolic luminal compression ≥50%, and all 43 patients were selected for the study to determine the prevalence of MB and risk factors for MB are studied from the patients’ recorded demography and coronary angiogram CD of the hospital. Then the data were analyze using simple statistical data analyze tools to perform the results of this study.
Table 3. Clinical presentation of the patients (n=43).

| Variable                  | N   | %   |
|---------------------------|-----|-----|
| Chronic stable angina     | 28  | 65.11|
| Unstable angina           | 07  | 16.27|
| NSTEMI                    | 05  | 11.62|
| AMI                       | 03  | 6.97 |

Clinical presentations CSA 28 (65.11%), UA 07 (16.27%), NSTEMI 05 (11.62%) and AMI 03 (6.97%).

Table 4. Left ventricular ejection fractions on Echocardiography (n=43).

| LVEF          | N   | %   |
|---------------|-----|-----|
| LVEF >55%     | 28  | 65.11|
| LVEF 45%-55%  | 10  | 23.25|
| LVEF 35%-45%  | 05  | 11.62|

LVEF >55% were 28 (65.11%), 45% -55% were 10 (23.25%) and 35%-45% were 05 (11.62%).

Table 5. Location of MB in angiography (n=43).

| Vessel | N   | %   | Segment        | N   | %   |
|--------|-----|-----|----------------|-----|-----|
| LAD    | 34  | 79.06| Proximal       | 08  | 23.52|
|        |     |      | Mid            | 22  | 64.70|
|        |     |      | Distal         | 04  | 11.76|
|        |     |      | Proximal       | 02  | 28.57|
| LCX    | 07  | 16.27| Mid            | 04  | 57.14|
|        |     |      | Distal         | 01  | 14.28|
|        |     |      | Proximal       | 00  | 00   |
| RCA    | 02  | 4.65 | Mid            | 02  | 100  |
|        |     |      | Distal         | 00  | 00   |

Location of MB in LAD were 34 (79.06%) of them 08 were proximal, mid 22 and distal were 04, in LCX 07 (16.27%), of them proximal 02, mid 04 and distal 01 and in RCA 02 (4.65%), of in mid segment.

Table 6. Presence of MB in number of vessels (n=43).

| Variable          | N   | %   |
|-------------------|-----|-----|
| Single Vessel     | 38  | 88.37|
| Double Vessels    | 05  | 11.62|
| Triple Vessels    | 00  | 00   |

MB was in single vessel 38 (88.37%), double vessels were 05 (11.62%) and no triple vessels.

Table 7. MB with atherosclerotic stenosis (n=43).

| Vessel | N   | %   |
|--------|-----|-----|
| LAD    | 18  | 41.86|
| LCX    | 02  | 4.65 |
| RCA    | 01  | 2.32 |

MBs with atherosclerotic stenosis LAD were 18 (41.86%), LCX were 02 (4.65%) and RCA was 01 (2.32%).

Table 8. Severity of luminal narrowing by MB segment (n=43).

| Vessel | 50-70% | %   | >70%  | %   |
|--------|--------|-----|-------|-----|
| LAD    | 27     | 62.79| 07    | 16.27|
| LCX    | 06     | 13.95| 01    | 2.32 |
| RCA    | 02     | 4.65 | 00    | 00   |

Luminal narrowing of MB segment LAD 50 -70% were 27 (62.79%), >70% were 07 (16.27%), LCX 50-70% were 06 (13.95%) and >70% was 01 (2.32%) and in RCA 50-70% was 02 (4.65%).

Table 9. Length of MB Segment (n=43).

| Length of Segment | N   | %   |
|-------------------|-----|-----|
| <10 mm            | 06  | 13.95|
| 10-20 mm          | 25  | 58.19|
| >20 mm            | 12  | 27.90|

Length of segment of MB <10 mm were 06 (13.95%), 10-20 mm were 25 (58.19%) and >20 mm were 12 (27.90%).

4. Discussion

Our study is a descriptive report of baseline, clinical and angiographic characteristics in a series of 43 patients who were diagnosed with myocardial bridging. The angiographic appearance of myocardial bridges depends on several factors, including the length of myocardial bridge17. The use of provocation tests may enhance systolic myocardial compression and thereby reveal myocardial bridges in 40% of cases18. In this study, the lengths of myocardial bridges were between 10 mm to above 20 mm, which were within the typical range. Moreover, in our study we got some other risk factors like hypertension, diabetes mellitus, hyperlipidaemia and family history of CAD. Myocardial bridges, though recognized about 200 years ago, were first reported in depth by Gerringer in 1951 and angiographically by Portmann in 1960. Disparity in the incidence of myocardial bridges exists between reports from anatomic (15- 85%) and angiographic (0.5-1.6%) studies'. This is because angiography can detect only MB accompanied by a milking effect. Our study is in agreement with one of the largest studies, the one by Juillièere, where the presence of myocardial bridges was 0.82 percent (out of 7467 consecutive coronary angiograms). In our study incidence of MB is 2.9% and the locations of MBs were in LAD, LCX, and RCA in angiography. MBs are classified in different types. In this study single vessel were 88.37%, Double vessels were 11.62% and 28 (65.11%) patients had chronic stable angina, 07 (16.27%) had unstable angina, 05 (11.62%) had NSTEMI and 03 (6.97%) presented with AMI. Other studies have reported stable or unstable angina as frequent, and myocardial infarction, ventricular tachyarrhythmia, and cardiac death as infrequent clinical presentations19. On the other hand; we only included myocardial bridges with at least >50% severity of stenosis., The segment that was affected was in this study in the LAD, LCX and RCA which were same to some cases that have been found in some other coronary segments11, 12. It has been reported that the compressed segment is frequently spared from atherosclerotic changes2, 3. In our study MB with atherosclerotic stenosis were the highest in LAD (41.86%) and the severity of MB stenosis were also high in LAD and it was 41.86%. The highest MBs were (58.19%) between the length of segment is 10-20 mm. Though this study was a retrospective observational study and all clinical
and angiographic procedures were reviewed carefully to observe the risk factors and angiographic profile of myocardial bridges and it was possible to perform the angiographic evaluation successfully to identify the location of myocardial bridges in proximal, mid and distal part of coronary arteries.

5. Conclusion and Recommendations

In this study the prevalence of MB was 2.91%, commonly presented with chronic stable angina. The most risk factors of myocardial bridges were hypertension, diabetes mellitus, hyperlipidaemia, family history and smoking history. In coronary angiography most of MB was present in association of acute coronary syndrome with documented coronary artery disease and was mainly located in LAD mid segment and the length of MB was mostly 10-20 mm. Further large numbers of case are needed to validate the result of the study.

Limitations of the Study

The limitation of the study is that all of the patients did not receive intracoronary nitroglycerin at the time of angiography in our study. The article was retrospective in nature and a small number of populations were studied.

References

[1] Portmann W and Iwig J. Die intramurale Koronarie im Angiogramm. Fortschr Roentgenstr 1960; 92: 129-132.
[2] Reyman HC. Disertatio de vasis cordis propriis. [Dissertation]. Gottingen: Med Diss Univ Gottingen; 1737; 7: 1–32.
[3] Craniciacu A. Anatomische Studien über die Coronararterien undexperimentelle Untersuchungen über ihre Durchgängigkeit. Virc- hows Arch A Pathol Anat 1922; 238: 1-8.
[4] Schulte MA, Waller BF, Hull MT, Pless JE. Origin of the left anterior descending coronary artery from the right aortic sinus with intra-myocardial tunneling to the left side of the heart via the ventricular septum: A case against clinical and morphologic significance of myocardial bridging. Am Heart J 1985; 110: 499-501.
[5] Visscher DW, Miles BL, Waller BF. Tunneld (bridged) left anterior descending coronary artery in a newborn without clinical or morphologic evidence of myocardial ischemia. Cathet Cardiovasc Diagn 1983; 9: 493-6.
[6] Feldman AM, Baughman KL. Myocardial infarction associated with a myocardial bridge. Am Heart J 1986; 111: 784-7.
[7] Cianpricotti R, El Gamal M. Vasospastic coronary occlusion associated with a myocardial bridge. Cathet Cardiovasc Diag 1988; 14: 118-20.
[8] Den Dulk K, Brugada P, Braat S, Heddle B, Wellens HJ. Myocardial bridging as a cause of paroxysmal A-V block. J Am Coll Cardiol 1983; 1: 965-9.
[9] Feld H, Guadanino V, Hollander G, Greengart A, Lichstein E, Shani J. Exercise-induced ventricular tachycardia in association with a myocardial bridge. Chest 1991; 99: 1295-6.
[10] Cutler D, Wallace JM. Myocardial bridging in a young patient with sudden death. Clin Cardiol 1997; 20: 581-3.
[11] Polácek P, Krallowe H. Relation of myocardial bridges and loops on the coronary arteries to coronary occlusions. Am Heart J 1961; 61: 44-52.
[12] Ferreira AG Jr, Trotter SE, Konig B Jr, Decourt LV, Fox K, Olsen EG. Myocardial bridges: morphological and functional aspects. Br Heart J 1991; 66: 364-7.
[13] Ishimori T. Myocardial bridges: a new horizon in the evaluation of ischemic heart disease. Cath Cardiovasc Diagn 1980; 6: 355-7.
[14] Juillière Y, Berder V, Suty-Selton C, Buffet P, Danchin N, Cherrier F. Isolated myocardial bridges with angiographic milking of left anterior descending coronary artery: a long-term follow-up study. Am He- art J 1995; 129: 663-5.
[15] Channer KS, Bukis E, Hartnell G, Rees JR. Myocardial bridging of the coronary arteries. Clin Radiol 1989; 40: 355-359.
[16] Zoghi M, Duygu H, Nalbantgil S, Kirilmaz B, Turk U, Ozkeran F, Akilli A, Akin M, Turkoglu C. Impaired endothelial function in patients with myocardial bridge. Echocardiography 2006; 23: 577-581.
[17] Angelini P, Trivellato M, Donis J, Leachman RD. Myocardial bridges: a review. Prog Cardiovasc Dis 1983; 26: 75-88.
[18] Iversen S, Hake U, Mayer E, Erbel R, Diefenbach C, Oelert H. Surgical treatment of myocardial bridging causing coronary artery obstruction. Am J Cardiol 1976; 37: 993-9.
[19] Furniss SS, Williams DO, McGregor CG. Systolic coronary occlusion due to myocardial bridging: a rare cause of ischemia. Int J Cardiol 1990; 26: 116-117.