Open Access

ISSN: 2663-9491 e-ISSN: 2789-6897

ORIGINAL ARTICLE

Echocardiographic Complications Following ST-Elevation and Non-ST-Elevation Myocardial Infarction: A Comparative Study

Faruk Hossen[1*], Abid Md Alef Meem Prodhan[2], Mehedi Hasan[3], Najmus Saadat[4], Mizanur Rahman Prodhan[5], Azizul Haque[6], Fakhrul Islam Juwel[7]

Received: 14 October 2026
Accepted: 04 November 2026
Published Online: 15 November 2026

Published by:
Gopalganj Medical College, Gopalganj, Bangladesh

*Corresponding Author

DOI: 10.5281/zenodo.24238353

Copyright © 2026 The Insight

This article is licensed under a Creative Commons Attribution 4.0 International License.s

ABSTRACT

Background: *Echocardiography provides rapid assessment of left ventricular function, regional myocardial involvement, intracardiac thrombus and mechanical complications after acute myocardial infarction (AMI). This study compared echocardiographic findings following ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI).* ***Methods & Materials:*** *This descriptive cross-sectional study included 100 patients with AMI admitted to the Department of Cardiology, Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh, between April and September 2013. Fifty patients had STEMI and 50 had NSTEMI. Demographic characteristics, cardiovascular risk factors, troponin I and echocardiographic findings were assessed.* ***Results****: The mean age was 54±12.5 years and 76% of patients were male. Dyslipidaemia, diabetes and hypertension were present in 84%, 30% and 28% of STEMI patients and 74%, 20% and 24% of NSTEMI patients, respectively, with no statistically significant between-group differences. Severe LV systolic dysfunction (LVEF ≤30%) was present in 10% of STEMI and 6% of NSTEMI patients, whereas LVEF ≥60% was observed in 24% and 34%, respectively. Anterior MI was the most frequent infarct location. Based on the dissertation's result tables, mitral regurgitation was recorded in 10 STEMI and 5 NSTEMI patients, LV thrombus in 3 and 1 patients, and post-MI ventricular septal defect (VSD) in 3 and 1 patients, respectively.* ***Conclusion:*** *STEMI was associated with a greater burden of reduced LV systolic function and selected echocardiographic complications in this hospital-based sample. Echocardiography provides clinically relevant information beyond electrocardiographic classification and can help identify high-risk post-MI patients.*

Keywords: *Acute myocardial infarction, STEMI, NSTEMI, echocardiography, ejection fraction, mitral regurgitation, left ventricular thrombus, ventricular septal defect.*

(The Insight 2026; 9(3): 927-931)

1. *Assistant Professor, Department of Medicine, Shaheed Ziaur Rahman medical College and Hospital, Bogura, Bangladesh (ORCID: 0009-0002-2074-0551)*
2. *Assistant Professor, Department of Medicine, Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh (ORCID: 0009-0003-2911-9670)*
3. *Assistant Professor, Department of Respiratory Medicine, Shaheed Ziaur Rahman medical College and Hospital, Bogura, Bangladesh (ORCID: 0009-0003-9073-2220)*
4. *Assistant Professor, Department of Medicine, Shaheed Ziaur Rahman medical College and Hospital, Bogura, Bangladesh (ORCID: 0009-0003-7059-5150)*
5. *Assistant Professor, Department of Medicine, Shaheed Ziaur Rahman Medical Collage Hospital, Bogura, Bangladesh (ORCID: 0009-0005-1020-9654)*
6. *Assistant Professor, Department of Neurology, Shaheed Ziaur Rahman medical College and Hospital, Bogura, Bangladesh (ORCID: 0009-0009-5789-343X)*
7. *Assistant Professor, Department of Medicine, Shaheed Ziaur Rahman medical College and Hospital, Bogura, Bangladesh (ORCID: 0009-0001-9588-3402)*

INTRODUCTION

Acute coronary syndrome includes STEMI, NSTEMI and unstable angina [1–3]. STEMI and NSTEMI are differentiated primarily by electrocardiographic findings in the context of myocardial injury, but this classification alone does not fully describe the extent of ventricular damage. Infarct size and location, previous myocardial injury, age and other clinical factors also influence ventricular function and prognosis [4–6].

Echocardiography is a widely available, non-invasive technique for evaluating cardiac chamber size, global and regional LV function and post-infarction structural complications. LVEF and LV volumes have long been recognized as important prognostic indicators after AMI [7–10]. Echocardiography can additionally detect mitral regurgitation, LV mural thrombus, ventricular septal rupture/defect and other mechanical complications that may substantially influence management and outcome [11,12].

Studies comparing STEMI and NSTEMI have reported differences in ventricular function, infarct characteristics and clinical outcomes [13–17]. However, comparative echocardiographic data from Bangladesh remain limited. This study therefore compared echocardiographic abnormalities in STEMI and NSTEMI, focusing on LVEF, infarct distribution and important post-MI complications.

ISSN: 2663-9491 e-ISSN: 2789-6897

METHODS & MATERIALS

A descriptive cross-sectional study was conducted in the Department of Cardiology, Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh, from 1 April to 30 September 2013.

The study included 100 patients with AMI, comprising 50 STEMI and 50 NSTEMI cases. The dissertation describes purposive sampling of patients fulfilling the inclusion criteria.

Patients fulfilling the diagnostic criteria for AMI were included. Patients with echocardiographic abnormalities attributable to non-coronary cardiac disease, concomitant lung disease affecting the echocardiographic window, or incomplete evaluation/follow-up were excluded.

AMI was identified using compatible ischemic symptoms, troponin I and electrocardiographic findings. STEMI was defined by qualifying ST-segment elevation, whereas NSTEMI was defined by ischemic symptoms and elevated troponin I without ST-segment elevation. Echocardiographic assessment included LVEF and structural/mechanical complications.

Data were analyzed using SPSS version 20 as described in the study. Z tests of proportions were used for selected categorical comparisons and a two-sample Student t test was used for troponin I. A p value <0.05 was considered statistically significant.

RESULTS

A total of 100 patients with AMI were included. The mean age was 54±12.5 years. Seventy-six percent were male and 24% were female. *Table I* shows the baseline demographic and clinical characteristics of the 100 patients. The mean age was 54 ± 12.5 years, with a clear male predominance (76%). Smoking was reported in 68% of patients, dyslipidaemia in 80%, and a family history of myocardial infarction in 12%.

Table I: Baseline demographic and clinical characteristics (*n*=100)

Characteristic	Value,n(%)
Age, mean ± SD (years)	54 ± 12.5
Male	76 (76)
Female	24 (24)
Family history of MI	12 (12)
Smoking	68 (68)
Dyslipidaemia	80 (80)

Table II compares the major cardiovascular risk factors between STEMI and NSTEMI patients. Dyslipidaemia was the most common risk factor in both groups (84% vs 74%), followed by diabetes mellitus (30% vs 20%) and hypertension (28% vs 24%). Although each factor was numerically more frequent in the STEMI group, none of the between-group differences was statistically significant (all p>0.05).

Table II: Cardiovascular risk factors in STEMI and NSTEMI

Risk factor	STEMI (n=50),n(%)	NSTEMI (n=50),n(%)	Z value	p value
Dyslipidaemia	42 (84)	37 (74)	0.6	0.46
Diabetes mellitus	15 (30)	10 (20)	0.8	0.36
Hypertension	14 (28)	12 (24)	0.5	0.52

Table III presents the distribution of left ventricular ejection fraction (LVEF) in the two groups. Severe LV systolic dysfunction (LVEF ≤30%) was observed in 10% of STEMI patients compared with 6% of NSTEMI patients, while LVEF 31–45% occurred in 26% and 14%, respectively. In contrast, preserved or higher LVEF was more frequent among NSTEMI patients, with 34% having LVEF ≥60% compared with 24% of STEMI patients.

Table III: Distribution of left ventricular ejection fraction

LVEF category	STEMI (n=50),n(%)	NSTEMI (n=50),n(%)
≤30%	5 (10)	3 (6)
31–45%	13 (26)	7 (14)
46–60%	20 (40)	23 (46)
≥60%	12 (24)	17 (34)

Figure 1 visually compares the LVEF categories between STEMI and NSTEMI patients. The STEMI group had higher proportions in the lower LVEF categories (≤30% and 31–45%), whereas the NSTEMI group had higher proportions in the 46–60% and ≥60% categories, indicating a greater observed burden of reduced LV systolic function among STEMI patients in this sample

ISSN: 2663-9491 e-ISSN: 2789-6897

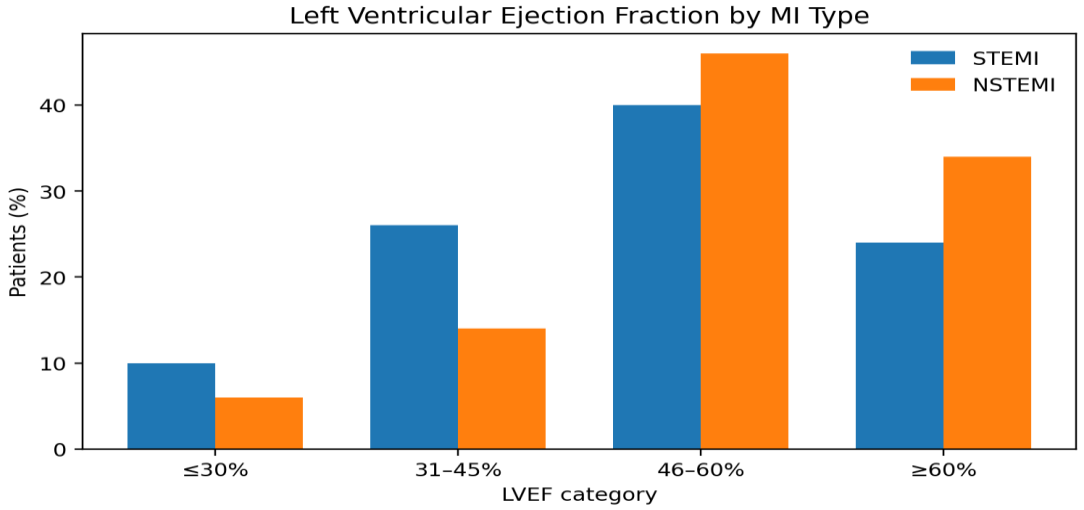


Figure 1: Distribution of LVEF categories in STEMI and NSTEMI

Table IV shows the distribution of myocardial infarction according to anatomical location. Anterior infarction was the most frequent pattern in both STEMI and NSTEMI groups (60% and 50%, respectively). Inferior infarction accounted for 20% of STEMI and 24% of NSTEMI cases, while anteroseptal and lateral infarctions were less common in both groups.

Table IV: Distribution of myocardial infarction by location

Location	STEMI (n=50),n(%)	NSTEMI (n=50),n(%)
Anterior	30 (60)	25 (50)
Inferior	10 (20)	12 (24)
Anteroseptal	8 (16)	10 (20)*
Lateral	2 (4)	3 (6)*

Table V summarizes the selected echocardiographic complications by MI type. Mitral regurgitation was the most frequently recorded complication, occurring in 20% of STEMI patients and 10% of NSTEMI patients. LV thrombus and post-MI VSD were each recorded in 6% of STEMI patients and 2% of NSTEMI patients. These figures are based on the dissertation result tables and require verification against the original patient-level records before submission.

Table V: Overall echocardiographic complications by MI type

Complication	STEMI, n (%)	NSTEMI, n (%)
Mitral regurgitation	10 (20)	5 (10)
LV thrombus	3 (6)	1 (2)
Post-MI VSD	3 (6)	1 (2)

Table VI demonstrates the distribution of echocardiographic complications according to infarct location. Mitral regurgitation was concentrated mainly in inferior infarction, with additional cases in anteroseptal infarction. LV thrombus occurred primarily in anterior and anteroseptal infarctions, while post-MI VSD was also confined to anterior and anteroseptal territories. No selected complications were recorded in lateral infarctions in either group.

Table VI: Echocardiographic complications according to infarct location

Complication / location	STEMI, n (%)	NSTEMI, n (%)
Mitral regurgitation: anterior	0 (0)	0 (0)
Mitral regurgitation: inferior	8 (16)	3 (6)
Mitral regurgitation: anteroseptal	2 (4)	2 (4)
Mitral regurgitation: lateral	0 (0)	0 (0)
LV thrombus: anterior	2 (4)	0 (0)
LV thrombus: inferior	0 (0)	0 (0)
LV thrombus: anteroseptal	1 (2)	1 (2)
LV thrombus: lateral	0 (0)	0 (0)
Post-MI VSD: anterior	2 (4)	0 (0)
Post-MI VSD: inferior	0 (0)	0 (0)
Post-MI VSD: anteroseptal	1 (2)	1 (2)
Post-MI VSD: lateral	0 (0)	0 (0)

ISSN: 2663-9491 e-ISSN: 2789-6897

Figure 2 illustrates the overall frequency of the selected echocardiographic complications. All three complications were more frequently recorded in STEMI than NSTEMI, with the largest absolute difference observed for mitral regurgitation (20% vs 10%). LV thrombus and post-MI VSD each occurred in 6% of STEMI patients compared with 2% of NSTEMI patients.

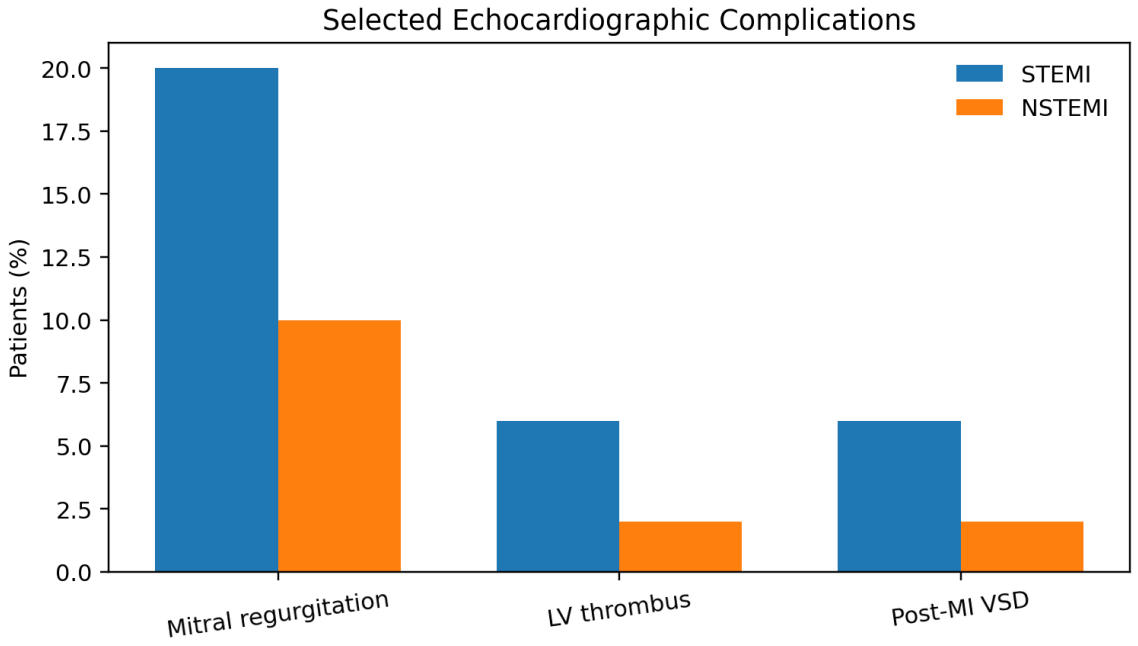


Figure 2: Selected echocardiographic complications calculated from the study

DISCUSSION

This study demonstrates clinically relevant differences in post-MI echocardiographic findings between STEMI and NSTEMI. Severe LV systolic dysfunction (LVEF ≤30%) was more frequent in STEMI (10%) than NSTEMI (6%), whereas LVEF ≥60% was more common in NSTEMI (34% versus 24%). These findings are directionally consistent with previous evidence that the extent of LV systolic dysfunction after AMI is an important determinant of subsequent morbidity and mortality [7–10].

Anterior infarction was the most frequent location in both groups, occurring in 60% of STEMI and 50% of NSTEMI patients. The original dissertation contained two clear arithmetic errors in the NSTEMI location percentages: 10 of 50 anteroseptal cases were printed as 46% and 3 of 50 lateral cases as 34%. In this article these have been corrected to 20% and 6%, respectively, without altering the source counts. Infarct territory remains clinically important because the amount and location of injured myocardium influence regional wall motion, ventricular remodeling and prognosis [6,11].

Mitral regurgitation in the source tables was concentrated in inferior and anteroseptal infarction. Summing the tabulated counts gives 10 STEMI cases (20%) and 5 NSTEMI cases (10%). Post-infarction mitral regurgitation may arise from papillary muscle ischemia or dysfunction, altered LV geometry, or structural disruption, and echocardiography is central to its recognition [11,12].

LV thrombus was recorded mainly in anterior and anteroseptal infarction. The result tables contain three STEMI cases (6%) and one NSTEMI case (2%). The predominance in anterior territories is physiologically plausible because severe regional akinesia or dyskinesia promotes blood stasis and thrombus formation. Echocardiographic surveillance is therefore particularly relevant when anterior infarction is accompanied by impaired LV function.

For post-MI VSD, the source result table contains three STEMI cases and one NSTEMI case, but the dissertation Discussion states that one case occurred in each group. The same type of narrative-table disagreement occurs for mitral regurgitation and LV thrombus. Because the dissertation does not provide the individual patient-level dataset needed to determine which version is correct, this manuscript reports the result-table counts and explicitly flags the discrepancy. These complication totals should be verified from the original case records before publication.

The measured prevalence of dyslipidaemia, diabetes and hypertension did not differ significantly between STEMI and NSTEMI. Thus, within this sample, the observed differences in echocardiographic findings were not accompanied by statistically significant differences in these recorded risk factors. Larger studies have likewise shown that STEMI and NSTEMI are overlapping but clinically distinct AMI populations with differences in presentation, ventricular injury and outcome [13–17].

CONCLUSION

In this comparative hospital-based study, STEMI patients had a greater proportion of severe LV systolic dysfunction and a higher tabulated burden of selected echocardiographic complications than NSTEMI patients. Echocardiography adds clinically useful information to ECG-based AMI classification by identifying LV dysfunction, infarct-related regional involvement, mitral regurgitation, intracardiac thrombus and mechanical complications.

ISSN: 2663-9491 e-ISSN: 2789-6897

REFERENCES

1. *Camm AJ, Bunce NH. Cardiovascular disease. In: Kumar P, Clark M, eds. Kumar and Clark's Clinical Medicine. 7th ed. London: Saunders; 2009:752.*
2. *Cannon CP, Braunwald E. Unstable angina and non-ST-segment elevation myocardial infarction. In: Fauci AS, Kasper DL, Longo DL, et al., eds. Harrison's Principles of Internal Medicine. 17th ed. New York: McGraw-Hill; 2008:1527–1528.*
3. *French JK, White HD. Clinical implications of the new definition of myocardial infarction. Heart. 2004;90:99–106.*
4. *Aguirre FV, Younis LT, Chaitman BR, et al. Early and 1-year clinical outcome of patients evolving non-ST-elevation versus ST-elevation myocardial infarction after thrombolysis: results from TIMI II. Circulation. 1995;91:2541–2548.*
5. *Sloan MA. The continuing importance of prior stroke in STEMI patients. Am Heart J. 2004;148:931–936.*
6. *Petrina M, Goodman SG, Eagle KA. The 12-lead electrocardiogram as a predictive tool of mortality after acute myocardial infarction. Am Heart J. 2006;152:11–18.*
7. *Velazquez EJ, Francis GS, Armstrong PW, et al. An international perspective on heart failure and left ventricular systolic dysfunction complicating myocardial infarction: the VALIANT registry. Eur Heart J. 2004;25:1911–1919.*
8. *Nicod P, Gilpin E, Dittrich H, et al. Influence on prognosis and morbidity of left ventricular ejection fraction with and without signs of left ventricular failure after acute myocardial infarction. Am J Cardiol. 1988;61:1165–1171.*
9. *White HD, Norris RM, Brown MA, Brandt PW, Whitlock RM, Wild CJ. Left ventricular end-systolic volume as the major determinant of survival after recovery from myocardial infarction. Circulation. 1987;76:44–51.*
10. *Weir RA, McMurray JJV, Velazquez EJ. Epidemiology of heart failure and left ventricular systolic dysfunction after acute myocardial infarction. Am J Cardiol. 2006;97:13F–25F.*
11. *Lang RM, Bierig M, Devereux RB, et al. Recommendations for chamber quantification. J Am Soc Echocardiogr. 2005;18(12):1440–1463.*
12. *Antman EM, Braunwald E. ST-elevation myocardial infarction: pathology, pathophysiology and clinical features. In: Braunwald's Heart Disease. 7th ed. Saunders; 2005:1141–1165.*
13. *Abbott JD, Ahmed HN, Vlachos HA, Selzer F, Williams DO. Comparison of outcome in patients with ST-elevation versus non-ST-elevation acute myocardial infarction treated with percutaneous coronary intervention. Am J Cardiol. 2007;100:190–195.*
14. *Terkelsen CJ, Lassen JF, Nørgaard BL, et al. Mortality rates in patients with ST-elevation versus non-ST-elevation acute myocardial infarction: observations from an unselected cohort. Eur Heart J. 2005;26:18–26.*
15. *Hirsch A, Windhausen F, Tijssen JGP, de Winter RJ; ICTUS Investigators. Five-year clinical outcomes in the ICTUS trial. J Am Coll Cardiol. 2010;55:858–864.*
16. *Goodman SG, Barr A, Langer A. Development and prognosis of non-ST-elevation myocardial infarction in the thrombolytic era. Am Heart J. 2002;144:243–250.*
17. *Montalescot G, Dallongeville J, Van Belle E, et al. STEMI and NSTEMI: are they so different? One-year outcomes in the OPERA registry. Eur Heart J. 2007;28:1409–1417.*