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N-Terminal Pro Brain Natriuretic Peptide as a Predictor of Short Term Outcomes in Acute Inferior and Anterior St Segment Elevation Myocardial Infarction

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Abstract: Risk stratification and prediction of high risk for mortality in patients with acute myocardial infarction is based on clinical evaluation, electrocardiogram, biochemical markers and various risk assessment scores. Our study aims to assess the level of acute inferior and anterior ST segment elevation myocardial infarction and to assess the short term prognostic value of N-terminal pro-brain natriuretic peptide on admission in acute inferior and anterior myocardial infarction in predicting the short term outcomes in acute inferior and anterior ST elevation myocardial infarction. The NT-pro-BNP level is significantly high in inferior and anterior wall myocardial infarction. Out of 50 patients 18 patients had complications and showed significant rise of NT-pro-BNP levels in both inferior and anterior wall myocardial infarction. Cardiac failure comprised the majority 18% (9 subjects). Arrhythmias comprised 10% (5 subjects). Conduction block comprised 8% (4 subjects). And 3 patients succumbed to death. There was a significant rise of NT-pro-BNP in patients with complication.
Keywords: Acute myocardial infarction, electrocardiogram, biochemical markers.

INTRODUCTION

Coronary artery disease and its end result, Myocardial infarction continues to be a significant cause of mortality and morbidity in the world. Over the past 50 years, it has become clear that cascade of thrombotic events following atherosclerotic plaque rupture causes occlusion of the coronary artery, interrupting blood supply and oxygen to myocardial thus resulting in infarction.

Myocardial necrosis following infarction is followed by heart failure, myocardial rupture or arrhythmias, cardiogenic shock. Early treatment of myocardial ischemia to prevent necrosis with treatments such as fibrinolysis, coronary artery bypass grafting and percutaneous coronary intervention has improved outcome [2].

Optimal risk stratification of patients with acute myocardial infarction of paramount importance to deliver appropriate care. Risk prediction based on clinical, electrocardiography, and biochemical i.e. cardiac troponin, creatinine kinase-MB, however is relatively inaccurate [1].

Brain natriuretic peptide is a circulating cardiac hormone released mainly from the ventricles in response to myocyte stretch. The measurement BNP has been shown to be useful in detecting LV dysfunction, particularly after acute myocardial infarction, and to be related to poor outcome [2]. Elevated levels of BNP and N-terminal pro-BNP may indicate the extent or severity of the ischemic insult correlating with adverse outcomes [1]. Many of the studies have concentrated on the role of NT-Pro-BNP levels in predicting the long term morbidity and mortality of AMI.

This study intends to assess the relationship between NT-Pro-BNP levels and short term complication of acute inferior and anterior ST segment elevation myocardial infarction and the role of NT-pro-BNP in predicting the short term outcomes of acute STEMI. Also the effectiveness of NT-pro-BNP in doing so is to compared with cardiac troponin T.

METHODOLOGY

A total of 50 patients, who presented with acute ST segment elevation myocardial infarction to D Y Patil hospital included in this study.

The patient evaluated as per the history, general physical examination, systemic examination, ECG, cardiac troponin T, urea, creatinine, NT-pro-BNP at the time of admission within 5 days of admission. The included patients were followed up over a period of

5 days for development of various short term complication of acute MI.

RESULTS

Table-1: Age distribution among the study population

Age in years	Frequency	Percentage
<40	2	4%
40 to 60	25	50%
>60	23	46%
Total	50	100%

Average Age in years was 59.28 ± 10.35, range being 30 to 78 years.

Table-2: Complication seen among the study population

Complication	Frequency	Percentage
Cardiac failure	9	18%
Conduction blocks	4	8%
Arrhythmias	5	10%

9 patients had cardiac failure, 4 patients had conduction block, 5 patients had Arrhythmias

Table-3: Association between NT-Pro-BNP and mortality

BNP/ Mortality	Death	Alive	Total
≤4134.8	0	39	39
>4134.8	3	8	11
Total	3	47	50

Applying chi square, p=0.0003, shows statistical significance

Table-4: Mean value of NT-pro-BNP

Parameter	Mean	SD
IWMI	4053.5	1772.2
AWMI	4216.1	1443.4

Applying‘t’ test, p value= 0.32. Shows statistical significance

Table-5: Complication and NT pro BNP levels

Complication	< 4134.8	>4134.8	Total
Absent	23	3	26
Present	16	8	24
Total	39	11	50

P value=0.03*. Shows statistical significance

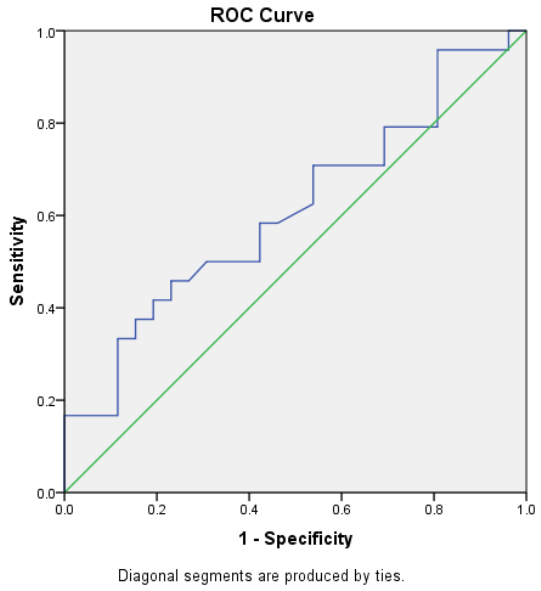

Fig-1: ROC curve for NT-pro-BNP values and the presence of complications

The above figure shows that NT-pro-BNP cut off of 2678.5 pg/ml has 100% sensitivity and 92.2% specificity in predicting complications in both, acute anterior and inferior myocardial infarction.

DISCUSSION

NT-pro-BNP used to provide prognostic information in patients with acute coronary syndromes. Current knowledge indicates that NT-pro-BNP may be a more sensitive and an effective prognostic tool in these patients. In the present study we have demonstrated that NT-pro-BNP is a powerful predictor of adverse outcomes including mortality within one week in the patients presenting with STEMI. NT-pro-BNP levels presumably based on the extent of myocardial damage and functional impairment which directly correlates with adverse outcomes including mortality. Similar scatter has been observed in other studies also [1].

It is challenging to derive any prognostic cut-off value, implying that a single cut-off level cannot be used for NT-pro-BNP in the AMI population. In clinical studies, natriuretic peptide concentration have been reported as mean levels and applying chi square test and ROC curve, thus permitting a dichotomous approach to interpretation of the results.

Present study showed that majority 62% were males and only 38% were females. In present study all 100% patients had chest pain, followed by 58% had sweating and only 42% had breathlessness.

Present study showed that average duration in hours was 6.12 + 1.06, ranging from 5 to 9. Majority 88% had symptoms <7 hours and 12% had >7 hours. In present study majority 66% had DM, 48% were smokers, 46% had HTN, 16% had family history of IHD.

In present study both inferior wall MI and Anterior wall MI were present in 50% of patients each. Present study showed 62% i.e majority were positive for troponin T and 38% showed negative results.

In present study Average levels were 4134.8 + 1601.7, range being 2345 to 10977. The mean level of NT-pro-BNP in anterior wall myocardial infarction is 4216.1 + 1443.4 and mean level of NT-pro BNP in inferior wall myocardial infarction is 4053.5 + 1772 (p - 0.32) showed strong statistical significance.

Based on ROC curves in this series it was observed that, NT-pro-BNP level had area under curve 0.6111, which gave a cut off value of NT-pro-BNP is 2678.5 pg/ml, and it has 100% sensitivity and 92.2% specificity in predicting complications in both, acute anterior and inferior myocardial infarction.

Based on ROC curves in this series it was observed that, NT-pro-BNP level had area under curve 0.400, which gave a cut off value of NT-pro-BNP is 2344 pg/ml, and it has 100% sensitivity and 100% specificity in predicting Inferior wall myocardial infarction.

Based on ROC curves in this series it was observed that, NT-pro-BNP level had area under curve 0.600, which gave a cut off value of NT-pro-BNP is 2678.5 pg/ml, and it has 100% sensitivity and 96% specificity in predicting acute anterior wall myocardial infarction.

CONCLUSIONS

- The study concluded that, NT-pro-BNP is a strong predictor of short term outcome in inferior and anterior wall myocardial infarction, including death.
- NT-pro-BNP is a better short term prognostic indicator than cardiac troponin T.
- NT-pro-BNP can identify high risk patients who might benefit from aggressive management strategy like PTCA or CABG.

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