QT dispersion as a predictor for arrhythmias in patients with acute ST elevation myocardial infarction

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ABSTRACT

Aims and Objectives To study the effect of Heart Rate Variability (HRV) and QT dispersion (QTd) in patients presenting with Acute ST elevation myocardial infarction (STEMI).

Methods This is a retrospective study conducted on patients admitted with the diagnosis of acute ST elevation myocardial infarction. In all 100 patients with acute myocardial infarction in one year were subjected to a complete evaluation in terms of history and examination. Besides routine investigations standard 12 lead ECG was evaluated in all cases on admission, after 4 hrs, 24 hrs, 48 hrs and on discharge.

Results The most common presenting symptoms were chest pain (88%) and dyspnea (50%). Tachycardia was seen in 56% while congestive heart failure was present in 29% patients. Patients who died had a higher QTd in comparison to patients who survived.

Conclusions Markers of autonomic regulation of heart like QTd provides valuable information about the future course of events in a patient following acute STEMI which can be utilized to plan the future course of management in patients especially predisposed to adverse and catastrophic outcomes.

Key Words: acute ST elevation myocardial infarction, QT dispersion


Introduction

Coronary heart disease (CHD) has plagued mankind since time immemorial. With the passage of time contribution of CHD to the global disease burden has been increasing by leaps and bounds (1). Acute Myocardial infarction (AMI) represents one end of the spectrum of CHD. About 50% of deaths due to AMI occurs within 1 hr of the event and are mainly attributable to arrythmias; late causes of death include electromechanical dissociation, cardiac rupture, cardiogenic shock etc. Full understanding and recognition of these changes is still lacking but several investigators suggest that the early and long term prognosis of the patient after AMI is determined by the alterations in the level and kind of autonomic control to the heart (2, 3). Experimental evidence of the association between propensity for lethal arrythmias and either enhanced sympathetic or reduced Vagal activity has led to development of quantitative and qualitative markers of autonomic activity. QT dispersion (QTd) has been suggested as one such marker of automatic tone of the heart. QT dispersion reflects differences in the local myocardial repolarization and hence the electrophysiological environment. Clinical interest in QTd on the surface ECG is based on the observation that regional heterogeneity of action potential in adjacent cardiac muscle tissue can initiate and sustain ventricular arrythmias especially in vulnerable myocardium like that in ischemic heart disease (IHD) (4,5).

Material and methods

This was a retrospective study on the patients admitted with the diagnosis of acute ST elevation myocardial infarction in the last four years. One year records were obtained for the patients of ST segmented elevated acute myocardial infarction. The records of all the patients were subjected to a complete evaluation in terms of history and examination and then for results of further specialized investigations.

Patients were included in the study if they fulfilled all of the following criteria:

• History suggestive of acute coronary syndrome within the preceding 48 hrs of admission.
Patients were excluded from the study if they had any of the following:

- Presentation after 48 hrs.
- Prior ECG showing QRS duration > 120 msec (LBBB or RBBB)

Patients with any arrhythmic event during hospital stay were found to have QT dispersion of 164±10.4 ms at admission. On the other hand, patients without any arrhythmic event were found to have QT dispersion of 119.1±18.6 ms at admission. While comparing these two groups, P value was found to be < 0.001 (Table 2 & Fig. 3). No event occurred after 48 hours.

Discussion

The primary finding of this study is that measurement...
of QTd early in patients with STEMI is a useful prognostic factor; its analysis can predict patients at higher risk of adverse outcomes. The mean age of study subjects was 53.5 ± 10.0 years. The maximum number of cases was ≥ 50 years (72%); within this group the incidence was highest in 51-60 years (36%). An interesting finding was that none of the patients was more than 75 years of age. Females constituted around 30% of patients with the maximum number lying in 51-60 year age group however their ratio with males increased progressively with age to reach a value of 1:1 after 70 years.

The most common complaint in patients diagnosed with STEMI has usually been chest pain. Its incidence was 96% in the study of Richman (6). Other common presentation during various studies had been diaphoresis, nausea, dyspnea, and light-headedness (6,7). In our study the incidence of chest pain was slightly less at 88% followed by dyspnea in 50%. Vomiting was seen in 40% of patients and profuse sweating episode in 38%.

In the present study mean QT dispersion was highest on the day of admission (124.5±22.9 ms) and it declined progressively to 110±22.6 after 24 hrs and to 94.3±16.7 on seventh day of admission. Patients of anterior wall MI had significantly greater QTd than non-anterior wall MI (on admission 137.3±16.6 versus 101.8±13.1 p<0.001). This difference was maintained throughout the course of hospital stay of the patients. Similar results had been obtained by other authors in their studies (8,9,10), though these studies evaluated QT dispersion after 12 hours of admission, unlike ours where we evaluated QTd on admission and subsequently at 4 hours, 24 hrs, 48 hrs and on the 7th day of admission.

In conclusion, it can be said that markers of autonomic regulation of heart like QTd provides valuable information about the future course of events in a patient following acute ST elevation MI and it can be utilized to tailor the pace and course of management in patients especially predisposed to adverse and catastrophic outcomes. Moreover a strict regulation of autonomic tone in such patients may improve the prognosis in such patients.

References