Original Article

Study of QTc interval of its significant in myocardial infarction

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Abstract

Introduction: QTC prolongations occur in Acute myocardial infarction, cardiomyopathy, acute myocarditis, etc. Acute myocardial infarction is most common condition needs admission ICCU, these patient needs regular monitoring and because of possible complications like patient may develops arrhythmia and QTC prolonged. 50% of death may occur in AMI within 1 hour are attributable to arrhythmia. **Aims and Objectives:** To estimate QTC interval in patients of AMI. prolonged QTC in AMI as a predictor of complications like arrhythmias. **Material and Methods:** This hospital based prospective analytic observational study was performed in parent institute from 2004 to 2005.Total of 50 case of Typical chest pain of MI lasting more than half hour. **Observation and Results:** This was a hospital based observational study which was done with 50 pts of AMI who were admitted in ICCU. The study was conducted out between 2004 to 2005 out of 50 cases studied 35 were males as compare to 15 females.. Majority of cases were between ages of 50- 59 years. Ventricular arrhythmias occurs in 9 patients. The maximum QTC interval prolonged occurred on day 1, in 20 [40%] followed by day 5.Total number patient died were15.Sudden death occurred in 4 patient , all of them having prolonged QTC(>0.44msec), 3 patient died of VT/VF, 3 died of only cardiogenic shock, 5 died of VF /VT with cardiogenic shock. **Conclusion:** Chest pain was the commonest presenting symptom. The commonest age group was 50-59 years with greater male than in females. Development of complications like arrhythmia was common. .QTC is significantly prolonged in patients of AMI with arrhythmias especially ventricular tachycardia. All patient with sudden cardiac death had prolonged QTC interval. Abnormal QTC is responsible in causing arrhythmias and sudden death.

Keywords: QTc interval, myocardial infarction.

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INTRODUCTION

QTC interval represents both electrical activity ventricular systolic depolarization and diastolic repolarization. AMI is the commonest disease, manifested in ICU admission. These patients need regular monitoring to find out possible complications various types and arrhythmia in patients of AMI, preventable and mostly treatable complications. Different mechanism and etiopathogenesis are responsible for it of this patients if not treated in time and promptly these arrhythmias could be causing significant morbidity and mortality in patients AMI. Estimation of QTC interval in patients of AMI in ICU is very simple bedside and correctable entity which required regular estimation of QTc. About 50% of death associated with AMI occur within 1 hr of the event are attributable to arrhythmias. Ventricular arrhythmia is one of the dreaded complication in patients of AMI. Patient with ventricular arrhythmia have got increased mortality soon after infarction. In this study we have tried to assess the changes occurring in QTc interval in AMI and to determine how the QTc interval is related to the incidence of ventricular arrhythmia and sudden death during hospital stay. Study was undertaken an attempt to analyse the feasibility of predicting arrhythmias, as this may be an early step in the prevention of these complications.

MATERIAL AND METHODS

This hospital based perspective analytic observational study was preferred in the parent institute from June 2004 to June 2005.A total of 50 cases of AMI were admitted in medicine ICCU were studied.

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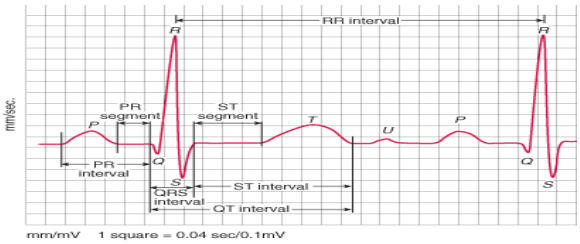

Figure 1: Normal ECG

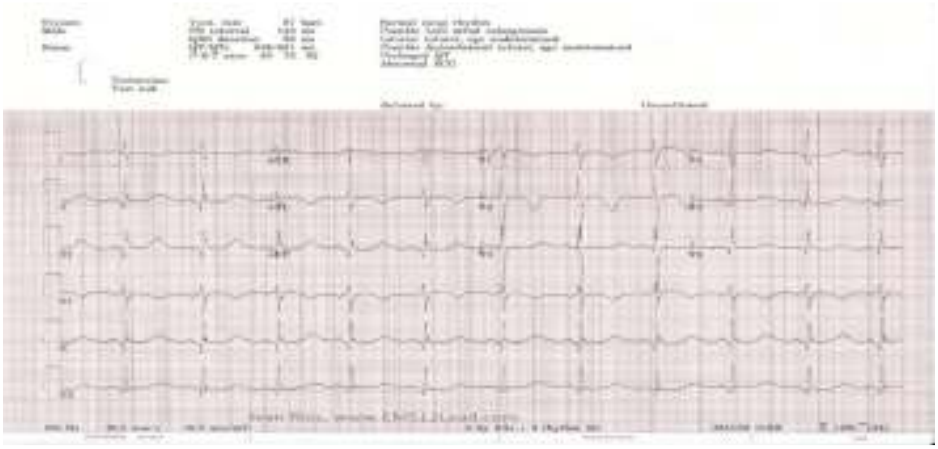

Figure 2: Prolonged QT interval in myocardial infarction

METHODOLOGY

1. Study design: Hospital based prospective analytic observation study
2. Number of study subjects-50
3. Inclusion Criteria: All patients of chest pain with typical myocardial infarction pain with ECG changes in ICCU ward. raised CK-MB and SGOT
4. Exclusion Criteria: 1] Drug administration a] Class I antiarrhythmic agents-Quinidine, procainamide, mexilitine, lignocaine. b] Tricyclic antidepressants c] phenothiazines d] digoxin e] phenytoin f] beta blockers g] diuretics. 2] Electrolyte and biochemical abnormalities- a] hypocalcemia b] hypokalemia c] hypomagnesemia d]head injury e] sleep f] Romano-ward syndrome, Jervell-Lange-Nielsen syndrome.

OBSERVATIONS AND RESULTS

Table 1: Showing Age and Sex distribution in the cases of AMI

Range for years	Male[M] %	Female[F] %	Total	Percentage
30-39	5 [14.3]	2 [13.33]	7	14
40-49	5 [14.3]	4 [26.66]	9	18
50-59	15 [42.85]	2 [13.33]	17	34
60-69	6 [17.14]	3 [20]	9	18
70-above	4 [11.42]	4 [26.66]	8	16
Total	**35 [70]**	**15 [30]**	**50**	**100**

The above table this study included 50 patients of AMI out of which 35 (70%) were males and 15 (30%) were female.

Table 5: Showing the Percentage with Prolonged QTc>0.44 sec. At the Time of Admission and Mean QTc Interval on admission in relation to type of Infarction

Type of Infarction	No. Of patients	No. of patients with prolonged QTc interval	Mean QTc interval on admission [sec.]
Anterior	32	27 (84.37 %)	0.52 ± 0.08
Inferior	9	8 (88.89%)	0.54±0.06
Inferolateral	5	4(80.00%)	0.39±0.02
Global	4	3(75%)	0.43±0.02

From this table it shows that out of 32 (64%) patients of anterior wall AMI, 14 patients (43.75%) QTc>0.44 sec. On admission. In inferior wall AMI out of 9 (18%), 5 (55.55%) are >0.44 sec. QTC. Ininferolateral wall AMI, all 5(2%) are normal QTc, also in Global AMI out of 4 (8%), 1 (25%) are>0.44sec.QTc.

Table 3: Showing the day which QTc Interval was maximum during hospital stay

Day	No. of Patients	Percentage
1	20	40%
2	10	20%
3	15	30%
4	8	16%
5	16	32%

The above table shows maximum QTc interval on day 1

Table 4: showing incidence of complications in relation to increased QTc interval on admission

Sr. No.	Complications	No. of patients	No. Of Patients having QTc interval >0.44 sec. on admission	Percentage (%)
1	LVF	5	1	20
2	RVF	3	2	66.66
3	Cardiogenic shock	8	5	62.50
4	Sudden death	4	4	100

The above table shows the complications more common with prolonged QTC interval

Table 5: Showing the range of QTc interval in patients grouped according to ventricular arrhythmia, cardiogenic shock and sudden death

Range of QTc (sec.)interval	Total	Venticular arrhythmia (VF/VT)	Cardiogenic shock	Sudden death	No arrhythmia/cardiogenic shock/sudden death
<0.44	8	2	0	0	6
0.44 to 0.54	23	5	4	1	13
0.55 to 0.64	16	1	7	2	6
0.65 - above	3	1	1	1	0

The range 0.44 to .54 was associated with more of arrhythmia and sudden death which the range 0.55to 0.64 was associated with more number of patients with cardiogenic shock.

Table 6: No of data of patient who died with relation to QT prolongation

Range of QTc (sec.)interval	Total N=50	No. of patient who died (n-15)			
		Venticular arrhythmia (VF/VT)	Cardiogenic shock	VF/VT with Cardiogenic shock	Sudden death
<0.44	8	0	0		0
0.44 to 0.54	23	0	0	1	1
0.55 to 0.64	16	2	2	4	2
0.65 - above	3	1	1	0	1

Above table shows 3 patient died of VT/VF, 3 died of only cardiogenic shock, 5 died of of VF /VT with cardiogenic shock and 4 died of sudden death

DISCUSSION

This study was conducted over a period of 18 months in the present institute. The mean age of the study subjects was 53.2 ±15.3 years with majority of the subject between ages of 50-59 years. There was a predominant male sex (70%) with females comprising 30% of the study group. Puddu PE, Jouve R, Torresani J 1979,study done at Amsterstam Excerptamedica page 967 ,1979 mean age for patients 57.8±15.7 years with 60% of being males. In our study of 50 subjects included this study, Day 1 have more prolonged QTc interval in 84% of patients. Amongst those with QTc interval greater than 0.44 sec. Develops complications like ventricular arrhythmia generally, in those cases where QTc on admission was prolonged, subsequent the QTc shortened day 5 follow up.

Comparative study of ventricular arrhythmias

Sr. No.	Study Group	No. Of patients	VT	VF	PVCS > 5 min	Group II
1	Present study	50	8/ (16%)	1/ (2%)	10/ (20%)	20/ (40%)
2	GoswamiNayak *et al* 1992	51	4/(7.8)	4/ (7.8%)	15/ (29.4%)	28/ (54.9%)
3	Taylor *et al* 1981	32	14/ (43%)	0	8/ (25%)	10/ (31.25%)

In the present study frequent PVCS was the commonest arrhythmias (20%) as compared to only 16% of patients developing ventricular tachycardia .The other studies mainly Goswami, Nayak *et al*[7] and Taylor *et al*[18] found that incidence of VT and frequent PVCS was significant our study showed less percentage of VT and PVCS though both other studies were having less number of patients. The most important question of this study is whether lengthening of the QT interval is related to early ventricular tachyarrhythmias. The initial QTc interval i.e. At admission was prolonged greater than 0.44 seconds in 84% of patients. Amongst those with QTc interval greater than 0.44 seconds developed complications like ventricular arrhythmias. Generally, in those cases where QTc on admission was prolonged, subsequently the QTc shortened day 5 follow up. chwartz *et al* in their study concluded that a constant prolongation of the QTc in patients with myocardial infarction may help in defining a sub group at higher risk of sudden death. Puddu P.E.*et al* who studied this topic extensively concluded that an increased sympathetic tone before the onset of primary ventricular fibrillation may explain both higher cardiac rates and prolonged QTc. In the study of Nayak Goswami *et al* the QTc was prolonged who developed ventricular arrhythmias as compared to patients who did not develop ventricular arrhythmias.

CONCLUSION

The chest pain was the commonest presently symptoms. The commonest age group was 50-59 years with the incidence being greater in male than in females. Cardiac failure was not frequent findings on admission, but developed subsequently in a significantly proportion. Development of complications like arrhythmia was common. QTc is significantly prolonged in patients of acute myocardial infarction. QTc is prolonged in inferior type of infarct as compared to anterior type. QTc is prolonged in patients with arrythmias especially ventricular tachycardia. All patients with sudden cardiac death had prolonged QTc interval. QTc interval recording is of important value in predicting incidence of ventricular arrythmia, complications and sudden death during hospital stay in AMI patients. Hence from these study we conclude the significance of major event of QTc interval in patients of myocardial infarction on admission and thereafter on regular daily basis up to the time of discharge. The abnormal QT cinterval was responsible in causing arrhythmias and complications like sudden death. QTc interval also has importance while patients on drug like amiodarone. The electrocardiogram is a bedside noninvasive, reliable, simple tecnique for the diagnosis of AMI and arrhythmias. QTc interval calculated from this ECG as a very simple for diagnosis of prolonged QTc occurrence in case of AMI, arrhythmia and sudden cardiac death.

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