Original Article

Journal of Cardiovascular Medicine and Surgery
Volume 7 Number 1, January to March 2021
DOI: http://dx.doi.org/10.21088/jcms.2454.7123.7121.1

Clinical and Angiographic Predictors of in Hospital Mortality in Patients with ventricular Tachycardia in St-Elevation Myocardial Infarction amongst Asian Indians: Clairvoyance Study

Mandip Tilara[1], Vishal Sharma[2], Kamal Sharma[3], Zeeshan Mansuri[4], Jit Brahmbhatt[5], Dinesh Joshi[6], Roopesh Singhal[7], Sharad Jain[8], Krutika Patel[9]

How to cite this article:
Mandip Tilara, Vishal Sharma, Kamal Sharma et al./Clinical and Angiographic Predictors in Hospital Mortality in Patients with ventricular Tachycardia in St-Elevation Myocardial Infarction amongst Asian Indians : Clairvoyance Study/J Cardiovasc Med Surg.2021;7(1): 9-13.

Author's Affiliation: [1]Interventional Cardiologist, Sterling Hospital, Rajkot, Gujarat 360007, India. [2,4,5,6,7]Assistant Professor, [3]Associate Professor, [8]Professor, [9]Research fellow Research Department, Department of Cardiology, U. N. Mehta Institute of Cardiology and Research Centre, B. J. Medical College, Ahmedabad, Gujarat 380016, India.

Corresponding Author: Vishal Sharma, Assistant Professor, Department of Cardiology, U. N. Mehta Institute of Cardiology and Research Centre, B. J. Medical College, Ahmedabad, Gujarat 380016, India.

E-mail: dr.vishal88@gmail.com

Abstract

Objective: The study aimed to evaluate clinical and angiographic profile of Asian Indians presenting withsustained ventricular tachycardia (VT) in STEMI to derive predictors of in hospital mortality and outcomes.

Methods: This was a prospective, open label, all comersstudy of 200 consecutive patients who presented with sustained VT in the setting of STEMI in a tertiary care center of western India from January 2016 to December 2018.Clinical and the angiographic profile of all patients were analyzed and correlated with outcomes especially with in hospital mortality.

Results: Of 200 patients, 156(78%) were male and 44(22%) were female. Mean age of patients was 55.63±11.68years.Among the traditional risk factors, smoking and hypertension (63% and 63.5%) was the most prevalent and had the highest odds ratio of 1.41(95% CI 0.61 to 3.26; P 0.42 and 2.67 (95% CI 1.04 to 6.87; P0.04) consecutively. 48.5% of the patients had LAD as culprit artery, 38.5% of the patients had RCA as culprit artery. Hence Non- LCX culprit vessel had an OR of 1.41(95% CI 0.40 to 5.02; P 0.6).79% patients were hemodynamically unstable1.51(95% CI 0.62 to 3.7; P 0.37)at the time of VT, 21% patients were hemodynamically stable. In hospital mortality was 15% (30/200) and all these patients hadhemodynamically unstable at VT (p value< 0.0001).Prolonged QTc interval was significantly (p value <0.001) higher in mortality patients (470.13±36.76 msec) ascompared to the discharged patients(444.53±18.58 msec) with OR of 2.16(95% CI 0.83 to 0.98; P <0.0001)

Conclusion: The predictors of in hospital mortality due to VT in STEMI amongst Asian Indians were smoking and hypertension with lowest OR 0.69 and 0.37.Hemodynamically unstable VT, non-LCX culprit vessel and prolonged QTc with highest OR 2.16 for prolonged QTc.

Key words: Mortality in Patients; Angiographic Predictors; St-Elevation Myocardial Infarction.

Introduction

Ventricular arrhythmias occur commonly in clinical practice and range from benign asymptomatic premature ventricular complexes (PVCs) to ventricular fibrillation (VF) resulting in sudden death.[1] Recurrent self-terminating ventricular tachycardia can cause the clinical syndrome of recurrent pre-syncope and syncope.[2]

Reperfusion is the key strategy in acute STEMI care and it is time dependent. Shortening the time from symptom to reperfusion and choosing the optimal reperfusion strategy for STEMI patients are great challenges in practice.[3] Data from

the Global Registry of Acute Coronary Events (GRACE) Registry also showed a higher hospital mortality rate when VA complicated ACS and allowed identification of variables associated with the occurrence of VA.[4] Although the mainstay of antiarrhythmic therapy used to rely on antiarrhythmic drugs (AADs), particularly sodium channel blockers and amiodarone, their use has now declined, since clinical evidence to support such treatment has never been convincing. Therapy for acute coronary syndrome and arrhythmia management are now based increasingly on invasive approaches.There is inconclusive data regarding outcome of ventriculartachycardia in set up of STEMI, we want to conduct the study in our centre to evaluate clinical profile of ventricular tachycardia in patients of STEMI in Indian context to derive predictors of in hospital mortality and outcomes.

Materials and Methods

This study is an observational; retrospective single centre study carried out in the Department of cardiology at U.N. Mehta Institute of Cardiology and Research centre; situated in Ahmedabad, Gujarat, India. Total of 200 patient's data collected from 2016 to 2018, ventricular tachycardia in ST elevation myocardial infarction fulfilling inclusion and exclusion criteria formed study population. Each patient gave written informed consent. The study was approved by institutional ethics committee.

Patients presenting with primary ventricular tachycardia in STEMI included in study. Patients who had cardiac arrest due to ventricular tachycardia or ventricular fibrillation who failed resuscitation were excluded and patients presenting with ventricular tachycardia after 48 hours of STEMI were excluded.

All patients underwent detailed evaluation including history, clinical examination; laboratory investigations and reperfusion therapy in form either thrombolytic therapy or primary PCI. Clinical, electrocardiogram parameters, angiographic profile and reperfusion strategy were studied for all patients affecting the in hospital outcome of patients with ventricular tachycardia.

Statistical Analysis

All statistical studies were carried out using IBM SPSS program vs 20. Quantitative variables were expressed as the mean ± standard deviation and qualitative variables were expressed as percentage (%). Parametric values between two groups were performed using the independent sample t-test or ANNOVA. Categorical variables were compared using the chi-square test. A nominal significance was taken as a two tailed p value<0.05.

Results

Among 200 patients associated comorbidities and risk factors, smoking (63.5%) was most common of all. Hypertension was associated with 63% patients studied.44.5% patients had Diabetes mellitus, 20.5% patients had history of prior ACS. Ventricular tachycardia pertaining to outcome of the patients shows in table1. 28.5% patients had family history of coronary artery disease.

Table: 1 Ventricular Tachycardia Pertaining to Outcome.

Sr. no	Variables	Expired N=30	Discharge N=170	p-value
1	Age, mean years	62.53±12.38	54.41±11.15	<0.0001*
2	Baseline Heart rate, beats/min	101.13±21.62	83.69±17.75	<0.0001*
3	Clinical history, No (%)			
	Hypertension	24(80)	102(60)	0.04*
	DM-II	23(76.7)	66(38.8)	<0.0001*
	Prior MI	12(40)	29(17.1)	0.004*
	Current smoking	21(70)	106(62.4)	0.43
4	SBP, mean, mm of Hg	95.87±19.32	121.98±21.98	<0.0001*
5	Time to reperfusion, mean, hrs	15.63±6.48	10.39±6.82	<0.0001*
6	Creatinine clearance, mean, mL/min	35.75±22.87	82.49±29.86	<0.0001*
7	IABP, No (%)	28(93.3)	16(9.4)	<0.0001*
8	Beta blocker <24hrs	1(3.3)	107(62.9)	<0.0001*
9	Total baseline ST segment deviation, (mm)	19.50±3.30	16.95±3.36	<0.0001*
10	ST segment resolution>70%	2(6.7)	125(73.5)	<0.0001*
11	QTc, mean (msec)	470.13±36.76	444.53±18.58	<0.0001*

P-value <0.05 statistically significant

156(78%) were male and 44(22%) were female. Among 200 patients 97(48.5%) had AWMI and 103(51.2%) IWMI. Mortality was 19.5% of the

patients who had anterior wall myocardial infarction whereas mortality in patients who had inferior wall myocardial infarction was 10.6%. Mortality in killip class 4 groups was 73.3%, mortality in killip class 2 and killipclass 3 were 10% and 16.7% respectively.

97(48.5%) of the patients had left anterior descending (LAD) artery as culprit artery, 77(38.5%) of the patients had RCA as culprit artery and 26(13%) of the patients had left circumflex artery (LCX) occlusion. Mortality was highest 19 (19.5%) in left anterior descending artery occlusion, 3(11.5%), 8(10.3%) in LCX and RCA artery group respectively. Angiographic profile of Kilip class shows in table.2. Mean LVEF of patients in study was 35±10.82 %. Patients who had LVEF of <30% had highest mortality of 67.5%. Majority of the patients in our study i.e. 47% (94 patients) had TIMI flow grade 0 22% had TIMI flow grade 1, 20% of the patients had TIMI grade 2. 11% (22 patients) had TIMI grade 3. 14 Out of 22 patients i.e 63.5% had reanalyzed artery Mortality was significantly (p value<0.001) higher in TIMI flow grade 0 (21.2%) compared to TIMI flow grade 3(4.5%).

152(79%) patients in our study were

Table 2: Angiographic profile of Kilip class.

Sr. No	Variables	Kilip class I N=108	Kilip class II N=35	Kilip class III N=16	Kilip class IV N=41	p-value
1	IRA					
	LAD	41(38)	23(65.7)	12(75)	21(51.2)	0.003*
	LCX	14(13)	2(5.7)	4(25)	6(14.6)	0.29
	RCA	53(49.1)	10(28.6)	0	14(34.1)	0.0007*
2	CAD					
	Left main stenosis	2(1.9)	5(14.3)	2(12.5)	5(12.2)	0.02*
	SVD	59(54.6)	16(45.7)	5(31.3)	15(36.6)	0.12
	DVD	33(30.6)	9(25.7)	5(31.3)	11(26.8)	0.93
	TVD	16(14.8)	10(28.6)	6(37.5)	15(36.6)	0.01*
3	Pre TIMI					
	0	45(41.7)	14(40)	10(62.5)	24(58.5)	0.13
	1	17(15.7)	11(31.4)	2(12.5)	14(34.1)	0.03*
	2	28(25.9)	8(22.9)	3(18.8)	1(2.4)	0.01*
	3	18(16.7)	1(2.9)	1(6.3)	2(4.9)	0.05
4	Post TIMI					
	1	1(0.9)	0	0	0	0.84
	2	1(0.9)	2(5.7)	3(18.8)	17(41.5)	<0.0001*
	3	74(68.5)	26(74.3)	10(62.5)	16(39)	0.003*
5	Electrical strom	4(3.7)	6(17.1)	5(31.3)	32(78)	<0.0001*
6	Outcome					
	Discharge	108(100)	32(91.4)	11(68.8)	19(46.3)	<0.0001*
	Expired	0	3(8.6)	5(31.3)	22(53.7)	

hemodynamically unstable at the time of VTevent, whereas 42 (21%) patients were hemodynamically stable. Out of 30 patients who expired in our study, all patients were hemodyanamically unstable at VT episode. Mortality was significantly (p value<0.001) higher in hemodynamically unstable VT 30(18.9%) as compared to stable patient (No mortality). 160(80%) of the patients had successful electrical cardioversion and 40(20%) of the patients had successful pharmacological cardio version. 71.5% of patients had no electrical storm and 23.5% of the patients had electrical storm. 29 patients out of 47 patients i.e 61.7 % who had electric storm expired, and mortality was only 0.7% of those patients who had no electric storm. Patients with ventricular tachycardia before the reperfusion, 72.5% of the patients underwent primary PCI. Higher number (44.5%) of patients had ventricular tachycardia post thrombolysis because of failed thrombolysisas compared to patients of post PCI.

Discussion

The ventricular tachycardia is a one leading cause

of death in patients of ST elevation myocardial infarction. Patients were fully evaluated and guideline directed management of STEMI and primary VT. Patients received reperfusion therapy and coronary angiogram was done in all patients. Clinical and the angiographic profile of all patients were studied and were correlated with various aspects of ventricular tachycardia pertaining to outcome of the patients.

Higher age and male sex are known risk factor for coronary artery disease. Similarly in APEX AMI trial trial (76.3% male,23.7% female)[5] , GUSTO-I trial (73% male, 27% female) male population was predominant.[6] Mean age of patient's 53.6±15.2 years. APEX AMI trial included patients with mean age 61.3±7.2 years, also comparable in GUSTO-I trial. Mortality was maximum in older age group, which can be due to association of old age with other comorbid conditions and more prevalence of multivessel disease.[7]

20.5% of the patients had prior MI where in GUSTO-I trail it was 26% and in APEX AMI trail 14% of patients had prior MI.[8] 55% of the patients were current smoker whereas APEX AMI trail prevalence of current smoker was 41%.[9] Mortality was 19.5% of the patients who had anterior wall myocardial infarction whereas mortality in patients who had inferior wall myocardial infarction was 10.6%. 48.5% of the patients had left anterior descending artery as culprit artery, 38.5% of the patients had RCA as culprit artery and 13% of the patients had left circumflex artery occlusion. Majority of the patients i.e. 47.5% (95 patients) in our study had single vessel disease and 52.5% (105) patients had multivessel coronary artery disease.7% patients had left main disease.

In APEX AMI trial 50.3% (157) patients had multivessel CAD.[9] In PRAMI trial 38% of the patients had multivesssel coronary artery disease 75% of those with STEMI and cardiogenic shock present with a relevant stenosis in the non-culprit vessel.[10] These patients remain at risk for recurrent ischaemic events even after the acute revascularization procedure and seem to be at increased risk for sustained VA.

14 Out of 22 patients i.e 63.5% had recanalyzed artery. Mortality was significantly (p value<0.001) higher in TIMI flow grade 0 (21.2%) compared to TIMI flow grade 3(4.5%). In GUSTO-III trial, 33% of the patients had TIMI flow 0. In APEX AMI trial all patients underwent primary PCI, there had higher percentage (80.9)of TIMI flow grade 0. Present study shows 47% TIMI flow grade and 11% grade 3 which is lower than GUSTO-III trail.[9, 11]

Of total 89 patients who had received thrombolytic therapy, 47.19% of the patients had VT prior to thrombolysis and 52.8% of the patients had VT after thrombolysis treatment. Post thrombolysis VT in our study had failed thrombolysis, had multivessel coronary artery disease and most patients had TIMI flow grade ≤1. In GUSTO trial, 28.2% of the patients had VT before thrombolysis and only 18.2% of the patients had VT post thrombolysis. In our study patients with ventricular tachycardia before the reperfusion, 72.5% of the patients underwent primary PCI. In GUSTO trial, thrombolytic era trial mortality was 9.2% in VT group however mortality was 25.2% in combined VT/VF group. In GULF RACE registry 2, mortality in VT/VF group was 23.8%.[12,13]

Total 111 patients underwent primary PCI, 99.1 % of the patients had VT prior to PCI and only 1 patient had VT post PCI. In APEX AMI trial 96.1% of the patients had VT pre PCI, 2.2% during PCI and 1.7% of the patients had VT post PCI.[14] Thus incidence of Ventricular tachycardia in significantly(p value<0.001) less patients after primary PCI is less(0.7%) as compared to post thrombolysis(52.8%). Those patients who expired in our study had significantly higher baseline heart rate. Higher baseline heart in our study correlated with the higher killip class on admission and hence related to poor outcome.

Total mean baseline ST segment deviation in expired patients was 19.50±3.30 mm while in discharge patients it was 16.95 mm, which statistically significant (p value<0.0001) Median ST segment deviation in our study was 17(8-24) which comparable with APEX AMI trail 17(11-22.5)mm.[9] Thus higher total ST segment elevation correlates with larger infarct size and are high risk for ventricular arrhythmia. In our study, ST segment resolution was significant (p value<0.0001) in discharge patient group (73.5%) as compared to patients expired (6.7%), compared in APEX AMI trial, ST segment resolution was in 9.2% in mortality group.[15] ST segment resolution correlates well with the success of reperfusion therapy and hence had good outcome. Another major outcome is higher killip class, multi-vessel coronary artery disease, initial TIMI flow grade 0 had poor outcome.

Conclusion

The predictors of in hospital mortality due to VT in STEMI amongst Asian Indians were smoking and hypertension with lowest OR 0.69 and 0.37.

Hemodynamically unstable VT, non-LCX culprit vessel and prolonged QTc with highest OR 2.16 for prolonged QTc. Primary PCI should be the choice of reperfusion therapy is high risk patients as it is the definitive treatment for reducing ischemia by ensuring patency rate of the vessel.

Reference

1. Ahn MS. Current concepts of premature ventricular contractions. J Lifestyle Med. 2013 Mar;3(1):26.
2. Bhar-Amato J, Davies W, Agarwal S. Ventricular arrhythmia after acute myocardial infarction:'The Perfect Storm'. ArrhythmElectrophysiol Rev. 2017 Aug;6(3):134.
3. Zhang Y, Huo Y. Early reperfusion strategy for acute myocardial infarction: a need for clinical implementation. J Zhejiang UnivSci B. 2011 Aug;12(8):629-32.
4. Avezum Á, Piegas LS, Goldberg RJ, Brieger D, Stiles MK, Paolini R, Huang W, Gore JM, GRACE investigators. Magnitude and prognosis associated with ventricular arrhythmias in patients hospitalized with acute coronary syndromes (from the GRACE Registry). Am J Cardiol. 2008 Dec 15;102(12):1577-82.
5. Mehta RH, Starr AZ, Lopes RD, Hochman JS, Widimsky P, Pieper KS, Armstrong PW, Granger CB, APEX AMI Investigators. Incidence of and outcomes associated with ventricular tachycardia or fibrillation in patients undergoing primary percutaneous coronary intervention. JAMA. 2009 May 6;301(17):1779-89.
6. Rieves D, Wright G, Gupta G, Shacter E. Clinical trial (GUSTO-1 and INJECT) evidence of earlier death for men than women after acute myocardial infarction. Am J Cardiol. 2000 Jan 15;85(2):147-53.
7. Alexander JH, Granger CB, Sadowski Z, Aylward PE, White HD, Thompson TD, Califf RM, Topol EJ, the GUSTO F, GUSTO-IIb Investigators. Prophylactic lidocaine use in acute myocardial infarction: incidence and outcomes from two international trials. Am Heart J. 1999 May 1;137(5):799-805.
8. Brieger DB, Mak KH, Kleiman NS, Miller DP, Vahanian A, Ross AM, Califf RM, Topol EJ, GUSTO-I Investigators. Benefit of early sustained reperfusion in patients with prior myocardial infarction (the GUSTO-I trial). Am Heart J. 1998 Feb 1;81(3):282-7.
9. Armstrong PW, Bett N, Brieger D, Chew D, Dick R, Farshid A, Garrahy P, Gunalingham B, Hendriks R, Horowitz J, Jepson N. Pexelizumab for acute ST-elevation myocardial infarction in patients undergoing primary percutaneous coronary intervention: a randomized controlled trial. JAMA. 2007 Jan 3;297(1):43-51.
10. Wald DS, Morris JK, Wald NJ, Chase AJ, Edwards RJ, Hughes LO, Berry C, Oldroyd KG. Randomized trial of preventive angioplasty in myocardial infarction. N Engl J Med. 2013 Sep 19;369:1115-23.
11. Stringer KA. TIMI grade flow, mortality, and the GUSTO III trial. Pharmacotherapy: The J. of Human Pharmacology and Drug Therapy. 1998 Jul 8;18(4):699-705.
12. Simoons M, Ellis S. A clinical trial comparing primary coronary angioplasty with tissue plasminogen activator for acute myocardial infarction. New Engl. J. Med. 1997 Jun 14;336(23):1621-8.
13. AlHabib KF, Sulaiman K, Al-Motarreb A, Almahmeed W, Asaad N, Amin H, Hersi A, Al-Saif S, AlNemer K, Al-Lawati J, Al-Sagheer NQ. Baseline characteristics, management practices, and long-term outcomes of Middle Eastern patients in the Second Gulf Registry of Acute Coronary Events (Gulf RACE-2). Ann Saudi Med. 2012 Jan;32(1):9-18.
14. Mehta RH, Starr AZ, Lopes RD, Hochman JS, Widimsky P, Pieper KS, Armstrong PW, Granger CB, APEX AMI Investigators. Incidence of and outcomes associated with ventricular tachycardia or fibrillation in patients undergoing primary percutaneous coronary intervention. JAMA. 2009 May 6;301(17):1779-89.
15. Toma M, Buller CE, Westerhout CM, Fu Y, O'Neill WW, Holmes Jr DR, Hamm CW, Granger CB, Armstrong PW, Apex-Ami Investigators. Non-culprit coronary artery percutaneous coronary intervention during acute ST-segment elevation