Spectrum of Post Myocardial Infarction Ventricular Septal Rupture and Factors Associated with its Mortality

by Saad Jibran

Submission date: 19-Dec-2017 08:20AM (UTC+0500)
Submission ID: 897875836
File name: 18071-71388-1-RV.docx (246.61K)
Word count: 1726
Character count: 9371

Spectrum of Post Myocardial Infarction Ventricular Septal Rupture and Factors Associated with its Mortality

ABSTRACT;

OBJECTIVE; To determine the incidence of ventricular septal rupture following acute myocardial infarction and to find out an association between cardiovascular risk factors and various clinical parameters with the mortality once this complication occurred.

METHODOLOGY; This is a retrospective study done at Lady Reading Hospital, Pakistan in which three years (January 2014 to December 2016) data of acute myocardial infarction patients were studied. Patients who developed rare complication of VSR following acute myocardial infarction, diagnosed on echocardiography were included. Chi-square test was applied to correlate between CV risk factors and various clinical parameters. P-value of less than or equal to 0.05 was taken as significant.

RESULTS; A data of 6240 patients with AMI was analyzed in which 60 patients were complicated by VSR with the incidence rate of 0.96% of AMI patients. It is 8.5 times greater in first MI and have a delayed onset. The mortality rate was 38.2% which was significantly associated with diabetics, those who presented with tachycardia, shock, higher killip class, renal impairment, and multiple VSR's with the significant P-value of 0.012, 0.021, 0.032, 0.031, 0.036, and 0.016 respectively. Mortality was not significantly associated with other cardiovascular risk factors and history of thrombolytics.

CONCLUSIONS; The incidence rate of VSR after AMI is higher in our region and mortality from this rare complication is increased in diabetics, those who presented with tachycardia, shock, higher killip class, renal impairment, and multiple VSR's. The mortality rate is half that of Western countries.

KEY WORDS; Ventricular Septal Rupture, Acute Myocardial Infarction

INTRODUCTION;

World widely, cardiovascular diseases are ranked first for the morbidity and mortality of people.[1] According to latest figures of World Health Organization in 2012, cardiovascular deaths represent 30 per cent of all global deaths, that makes 7.4 million deaths were due to myocardial infarctions out of 17.5 million cardiovascular deaths globally.[1]

One of the deadly complication of acute myocardial Infarction is ventricular septal rupture, which occurred in 4 – 24% in necropsy patients with fatal MI before the widespread use of cardiac care units, with the mean of eight per cent.[2] Among the survivors of acute myocardial infarctions, 1 – 2% developed this devastating complication in the pre-thrombolytic era.[3-5] This incidence has reduced to a figure of 0.2% in the thrombolytic era as shown by the Global Utilization of Streptokinase and TPA for Occluded Coronary Arteries (GUSTO-I) trial, which studied 41,021 patients at 1081 sites in 15 different countries.[6,7,11] This further reduced to 0.17% in APEX-MI registry, with improvement in pharmaco-invasive therapy being the reason for this drastic reduction.[8]

It usually occurs in the first week after MI, with a mean time from symptom onset of 3 to 5 days.[4,9,10] Crenshaw et al study showed that risk factors most associated with this complication were advanced age, anterior infarction, female sex and no previous smoking.[11]

It has extremely poor outcomes, particularly in untreated cases where mortality is 74 per cent at 30 – days[11], while the in-hospital mortality in surgically treated patients is between 20 and 60%.[12] The trans-catheter closure of post-MI VSR has a success rate of 80 – 90% as reported by the meta-analysis reported by De Puy et al.[13], and two case reports and one small series from India.[14-16]

The aim of this study is to determine the incidence of ventricular septal rupture after acute myocardial infarction, and to correlate different cardiovascular risk factors and clinical parameters with the mortality in these patients once this complication occurred. By determining this information in our region where it is not known till now, we will be able to find out the cases which need early intervention for correction.

METHODOLOGY;

SETTING; This is a retrograde study done at Cardiology department of Lady Reading Hospital, Pakistan. In this study data of 6240 patients with acute MI admitted over a period of three years between January, 2014 and December, 2016 were analyzed.

PATIENT POPULATION; the included patients were from either gender, having AMI complicated by VSR which were confirmed by trans-thoracic echocardiography. Patients were randomized on the basis of their outcomes, whether they survived or died. Those patients who were previously diagnosed as having VSD, cerebro-vascular accident, recent trauma or major surgery, other complications like severe mitral regurgitation, free wall rupture, or heart block were excluded.

ECHOCARDIOGRAPHIC DATA; all cases underwent a comprehensive echocardiography examination that included M-Mode, 2 – Dimensional and Doppler (continuous wave and color) with Toshiba machine by an experienced cardiac sonographer. Number and location of defects, direction and severity of shunt and effect of VSR on cardiac chambers sizes and function were studied in detail.

STATISTICAL ANALYSIS; the data was entered into SPSS version 20 data sheet. Normally distributed continuous variables like age, systolic and diastolic BP, heart rate, creatinine and random blood sugar were expressed as mean ± standard deviation. Frequency and percentages were used for categorical variables like gender, HTN, DM, smoking, previous MI, killip class, number and location of VSR and outcome. Correlation of cardiovascular risk factors and different clinical parameters with the mortality was assessed with the chi-square test.

RESULTS;

A total of 6240 patients with acute myocardial infarction data was analyzed in which 60 patients developed ventricular septal rupture. Twenty six patients were excluded due to presence of other concomitant complications (figure 1). A data of rest 34 patients was studied in detail. Mean age of post-MI VSR patients was 63.21 ± 8.9 years, with 52.9% were male patients. Mean time of development of VSR was 4.1 ± 2.2 days with the minimum of one day and maximum of 10 days. Nineteen patients (55.9%) didn't receive streptokinase (either late for it or there was significant contraindication for it). About 38% of patients died. Rest were either discharged on guideline directed medical therapy or referred for closure. Cardiovascular risk factors and clinical features of these patients are shown in table 1.

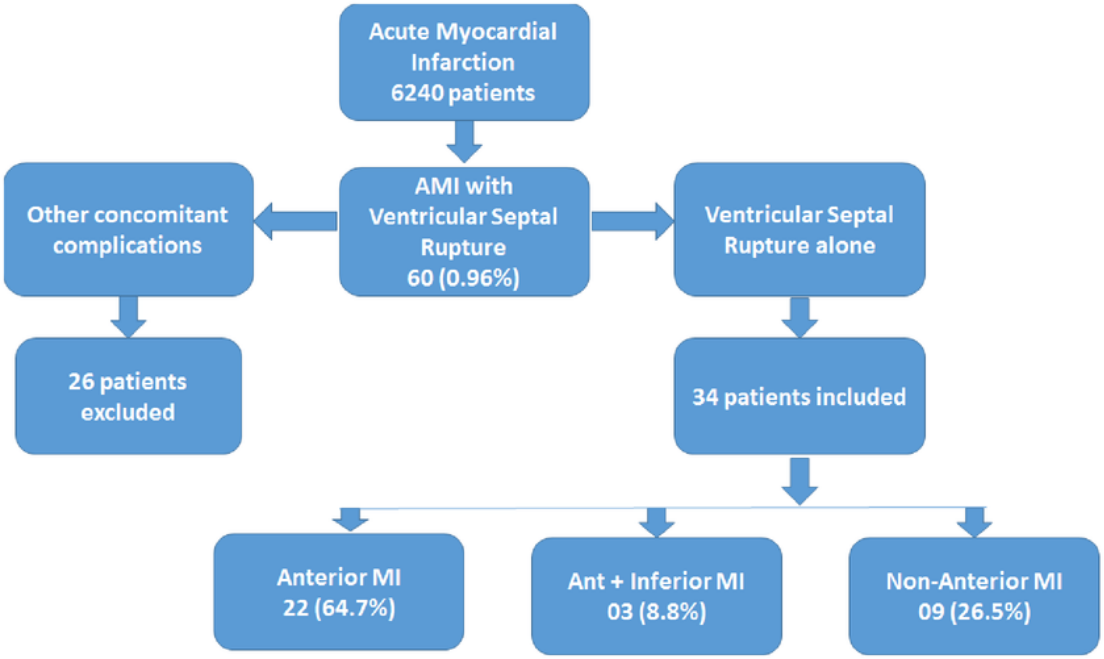

Figure 1. Incidence and spectrum of post-MI ventricular septal rupture.

Table 1. Baseline characteristics of post MI VSR patients.

	Mean ± S.D	Frequency (percentage)
CV Risk Factors		
Age (years)	63.21 ± 8.9	---
Gender (male)	---	18 (52.9%)
HTN	---	08 (23.5%)
DM	---	12 (35.5%)
Smokers	---	06 (17.6%)
Previous MI	---	04 (11.8%)
Family Hx of CAD	---	04 (11.8%)
Clinical Parameters		
Shock	---	08 (23.5%)
Systolic BP (mmHg)	92.4 ± 22.7	---
Heart rate (per min)	82.9 ± 24.4	---
Tachycardia	---	08 (23.5%)
Killip class		
Class 1	---	15 (44.1%)
Class 2	---	06 (17.6%)
Class 3	---	09 (26.5%)

Class 4	---	04 (11.8%)
VSR characteristics		
Time of VSR (days)	4.1 ± 2.2	---
Location of MI		
Anterior MI	---	22 (64.7%)
Non-Anterior MI	---	09 (26.5%)
Ant + Inferior MI	---	03 (8.8%)
Number of VSR		
Single	---	14 (41.2%)
multiple	---	20 (58.8%)
Streptokinase		
Given	---	15 (44.1%)
Not given	---	19 (55.9%)
Creatinine (mg/dl)	1.95 ± 1.9	---
Blood sugar (mg/dl)	198.6±123.2	---
Outcomes		
Discharged/referred	---	21 (61.8%)
Death	---	13 (38.2%)

Table 2 shows chi-square correlation of different baseline characteristics with the outcomes in post-MI VSR patients. It shows higher mortality in diabetics, those who presented with tachycardia, shock, higher killip class, renal impairment, and multiple VSR's. Figure 2 shows bar graph representations of these characteristics in terms of mortality.

Table 2. Association of cardiovascular risk factors and various clinical parameters with mortality in patients who were complicated with ventricular septal rupture after acute myocardial infarction.

Characteristics	**X^2**	**P-value**	**Characteristics**	**X^2**	**P-value**
Age Group	0.389	0.533	Shock	6.4	0.032
Gender	0.389	0.533	Tachycardia	6.2	0.021
HTN	0.613	0.434	Killip class	5.3	0.031
DM	6.35	0.012	Location of MI	0.210	0.90
Smoker	0.074	0.785	Multiple lesions	5.78	0.016
Previous MI	0.266	0.606	SK given or not	1.52	0.217
Family Hx	0.266	0.606	Renal impairment	5.1	0.036

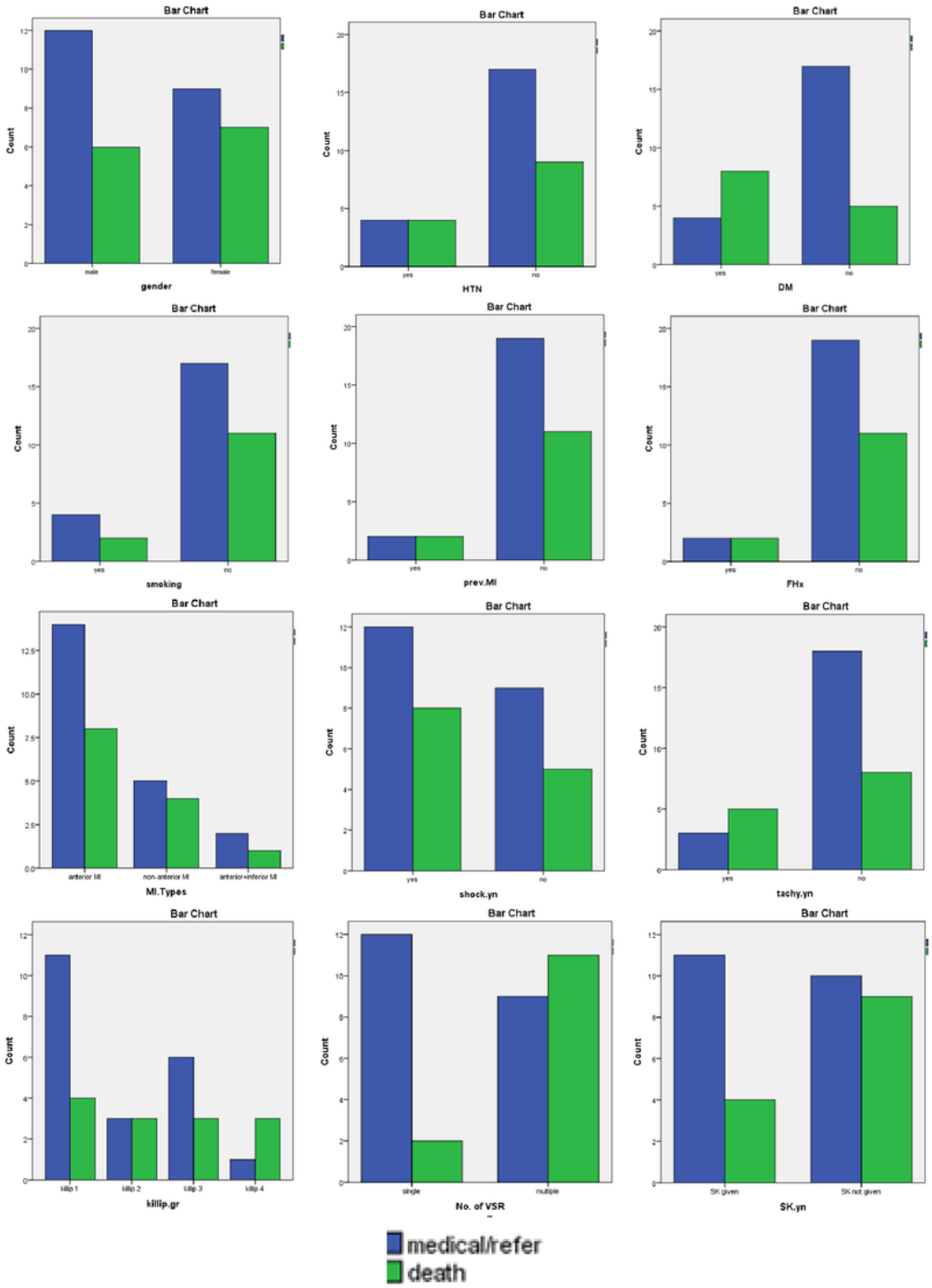

Figure 2. Graphical representation of outcomes in various risk factors and clinical parameter

DISCUSION;

Ventricular septal rupture is one of the rare complication of acute myocardial infarction but carries a very high mortality rate. Its incidence in our region is 0.96% which is quite lower than pre-thrombolytic era.[4,9,10] However, it is higher than GUSTO-1 trial where it was 0.2%. This may be explain by two factors. First, all patients in GUSTO-1 trial receive thrombolytics and second, they were thrombolyzed within 6 hours.[17] The mean time of development of VSR after AMI is 4.1 ± 2.2 days which is longer than Becker et al. study.[18,19]

The mortality in our study was 38.2%, which is almost half of Crenshaw BS et al. study i.e. 74%.[11] The reason for this may be that the patients who were discharged or referred were not followed. Second, the VSR patients may had died before echo. Lastly, the sample size was small. Unlike Crenshaw et al. study where inferior MI and advanced age were most significantly correlated with mortality after development of VSR, diabetes, multiple VSR's, tachycardia, shock, higher killip class, and renal impairment was positively correlated with mortality in our study.[11]

Seventy five per cent of patients with killip class 4 in our study died as compared to 100% in other study.[11] Similarly, Reddy SG and Robert WC study suggested 3 times greater development of VSR in first MI compared to those with a previous infarct that healed, But this figure increased to 8.5 times in our study.[2]

It is certainly true that thrombolytics reduced the incidence of VSR development. However, once this complication occur, then history of streptokinase taken is no more significant in determining the outcome of these patients.

The limitations of the study are that it is a retrospective study in which data from software were retrieved which may have some missing data. Secondly, number of patients with VSR was very small. Third, follow up data of these patients was not available as many survivors of it were referred to other units. Lastly, patients with concomitant presence of other complications like severe mitral regurgitation and heart block patients were also excluded which would have definitely reduced the true mortality from VSR.

CONCLUSIONS;

The incidence of VSR after acute MI in our region is 0.96% with 8.5 times greater in first MI and have a delayed onset. After development of VSR, diabetes mellitus, number of lesions, presence of shock, tachycardia, renal impairment, and killip class 4 are associated with high mortality. The mortality rate of this rare complication is half that of Western countries in our region.

REFERENCES;

Spectrum of Post Myocardial Infarction Ventricular Septal Rupture and Factors Associated with its Mortality

ORIGINALITY REPORT

8%	5%	7%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	circ.ahajournals.org Internet Source	3%
2	Gregory Janis. "Acute Complications of Myocardial Infarction", Echocardiography in Acute Coronary Syndrome, 2009 Publication	1%
3	Yochai Birnbaum. "Ventricular Septal Rupture after Acute Myocardial Infarction", New England Journal of Medicine, 10/31/2002 Publication	1%
4	"Abstracts", European Heart Journal, 08/02/2002 Publication	1%
5	www.biomedcentral.com Internet Source	1%
6	A. Murday. "Optimal management of acute ventricular septal rupture", Heart, 12/1/2003 Publication	<1%

7	"13th European Congress of Clinical Microbiology and Infectious Diseases", Clinical Microbiology and Infection, 2003 Publication	<1%
8	C. J. Ellis. "Good long-term outcome following surgical repair of post-infarction ventricular septal defect", Internal Medicine Journal, 8/1995 Publication	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		