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Original Research Article

THE FREQUENCY OF VSR (VENTRICULAR SEPTAL RUPTURE) AFTER ACUTE STEMI ST-ELEVATION MYOCARDIAL INFARCTION IN TERTIARY CARE HOSPITAL

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Abstract: *The purpose of the study was to find out how frequently ventricular septal rupture occurred in patients who had an acute ST-elevation myocardial infarction and then visited the cardiology department of Lady Reading Hospital in Peshawar. The cross-sectional design was employed in the investigation, which took place between April 6, 2018, and April 12, 2018. A thorough history and standard physical examination were performed on 346 patients while under observation. Baseline tests such as transthoracic echocardiography and electrocardiography were carried out to evaluate ventricular septal rupture. Records included age, gender, type of STEMI, diabetes mellitus, smoking, history of CAD, and prodromal angina. The study's findings indicated that the patients' mean age was 53, with a standard deviation of ±11.23. Of the patients, 32% were female and 68% were male. Furthermore, ventricular septal rupture was present in 5% of the patients but not 95%. Thus, the study concludes that 5% of cases of ventricular septal rupture followed an acute ST-elevation myocardial infarction.*

Keywords: Ventricular Septal Rupture, Acute ST-Elevation Myocardial Infarction

Introduction

Acute myocardial infarction (AMI) is a severe health issue that affects both wealthy and underdeveloped nations. At the moment, it impacts over 3,000,000 individuals annually. Hospital mortality for AMI has decreased from 25–30% in the 1960s to 6% in the present, thanks to advancements in preventive measures, diagnostic, and treatment approaches. Cardiogenic shock and mechanical difficulties leading to arrhythmias in the heart are the main causes of death in individuals with AMI. Even with the proper care, the latter results in a serious hemodynamic compromise and a high death rate in patients with AMI. Acute mitral regurgitation and ventricular free wall rupture are the other two significant mechanical consequences of acute myocardial infarction (AMI), along with acquired ventricular septal defect (VSD). When thrombolysis was developed, VSD was a common AMI consequence that affected 1–3% of patients (Crenshaw et al., 2000; Gale et al., 2014; Nichols et al., 2013; Puymirat et al., 2012). Since the development of early reperfusion techniques and additional medication, this problem has become less common, occurring in less than 1% of cases (0.2 percent in the Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries-I [GUSTO-I] trial) (Kristensen et al., 2014) but is nevertheless linked to a high rate of morbidity and death. The occurrence of VSD is not well studied. However, research by Yip et al. involving 1,321 patients indicated that PPCI had a substantial effect on the complication's incidence (0.23 percent with PPCI vs. 3 percent with no acute reperfusion therapy; P=.0001) (Pedersen et al., 2014). The development of a VSD is associated with a more extended hospital stay following the infarction (> 24 hours), and it can be brought on by recurrent ischemia and excessive physical activity during the early postinfarction (PI) phase (Fokkema et al., 2013). However, the death rate from VSR remains exceptionally high, ranging from 45 to 80 percent, despite advancements in the early detection and treatment of both AMI and VSR (Águila et al., 2013). However, other factors, including nearly ubiquitous access to echocardiography and changes in tissue pathology due to reperfusion injury paired with fibrinolysis, may also contribute to the increased early diagnosis of VSR (Lopez-Sendon et al., 2010). Although surgical methods have advanced, patients requiring shunt repair are typically older, which makes the procedure more difficult. An alluring early substitute would be percutaneous device closure. Acceptable results of percutaneous VSD device closure were recently reported (Moreyra et al., 2010).

In our population, being among the developing countries, most patients present late, i.e., SDT(symptoms to door time) as well as DNT(door to needle time), i.e., time to start treatment and reperfusion is much more due to logistics reasons and lacking certain recent advances as compared to other developed countries in which PCI (percutaneous coronary intervention) is the first line of management, but in our setup, we use streptokinase for thrombolysis and reperfusion so there are lesser chances of reperfusion and high chances of complications i.e. high chances of ventricular septal rupture. Local/national data regarding the frequency of post-STEMI (acute ST-elevation myocardial infarction) VSR (ventricular septal rupture is unavailable. Hence, the magnitude and recent burden of the problem are known. Recommendations/suggestions would be made to prevent the dreadful complications of ventricular septal

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rupture for early transfer and management of patients with STEMI (acute ST-elevation myocardial infarction) and, if a complication occurs, early management, i.e., percutaneous device closure or surgical repair, depending on the situation. Results will be shared with local cardiologists, and recommendations will be made.

Methodology

The study was conducted with permission from the hospital's ethical and scientific committee. Patients were scheduled to see the emergency department of cardiology at Lady Reading Hospital in Peshawar between June 4 and December 4, 2018.

This study included both male and female patients with acute myocardial infarction who were between the ages of 31 and 60. This study did not include any patients with congenital VSD, rheumatic heart disease, or connective tissue abnormalities that could cause myocardial infarction. Patients were admitted to the cardiology department after providing their informed permission. The ventral septal rupture was assessed using a comprehensive history, clinical examination, and standard investigations such as transthoracic echocardiography (Siemens' Accuson CV-70) and electrocardiogram (cardiofax). These tests show an abnormal opening in the interventricular septum that permits communication between the left and suitable ventricular cavities in two- and three-dimensional images. Pre-design proformas were used to record all the data, including age, gender, type of stem cell, hypertension, diabetes mellitus, smoking, prior CAD, and prodromal angina. Strict exclusion standards were adhered to to prevent bias in the data. SPSS 22 was used to analyze the gathered data. The mean and standard deviation, such as age, were determined for continuous data. Frequencies and percentages were used to represent categorical characteristics such as gender, type of STEMI, ventricular septal rupture, smoking, hypertension, diabetes, and prior history of CAD. To see the effect modifiers, ventriculi ventricular septal rupture was stratified by age, gender, prodromal angina, diabetes, hypertension, smoking, and type of STEMI. A post-stratification chi-square test was used, and a P value of ≤ 0.05 was deemed significant.

Results

The study examined the age distribution of 346 patients, finding that 86 (or 25%) were between the ages of 31 and 40, 104 (30%) were between the ages of 41 and 50, and 156 (or 45%) were between the ages of 51 and 60. With a standard deviation of 11.23, the mean age was 53 years. Table 1 shows the gender distribution of the 346 patients, 235 (68 percent) male and 111 (32 percent) female.

A review of 346 individuals' STEMI status revealed that 225 (68 percent) had anterior STEMI, 76 (22 percent) had inferior STEMI, and 35 (10 percent) had lateral STEMI—Table II.

After analyzing the hypertension status of 346 individuals, it was found that 311 (90%) of them had hypertension and 35 (10%) did not.

After 346 patients' diabetes mellitus status was examined, it was found that 242 (or 70%) had the disease and 104 (30%) did not. After 346 patients' status regarding prior CAD history was examined, it was found that 228 (66%) had a positive history and 118 (34%) had a negative one. A smoking status analysis was conducted on 346 patients, of whom 225 (or 65 percent) were smokers, and 121 (or 35 percent) were not. After analyzing the prodromal angina status of 346 patients, it was found that 235 (68 percent) of the patients had prodromal angina, and 111 (32%) did not. An analysis of the 346 patients revealed that 329 individuals (or 95% of the total) did not have ventricular septal rupture, while 17 patients (or 5%) did. Table 4 presents the stratification of ventricular septal rupture according to age, gender, prodromal angina, smoking, diabetes, hypertension, and previous history of CAD.

Table 1: Distribution of age and gender of the patients

Parameter	Age(years)	Frequency	%
Age	31- 40	86	25%
	41-50	104	30%
	51-60	156	45%
Gender	Male	235	68%
	Female	111	32%

Table II: Distribution of STEMI in patients

Type of STEMI	Frequency	%
Anterior	235	68%
Inferior	76	22%
Lateral	35	10%

Table III: Frequency of different variables in the study sample

Parameter	Yes/No	Frequency	%
Hypertension	Yes	311	90%
	No	35	10%
Diabetes Mellitus	Yes	242	70%
	No	104	30%
Smoking	Yes	225	65%
	No	121	35%
Previous CAD	Yes	228	66%
	No	118	34%
Prodromal Angina	Yes	235	68%
	No	111	32%
Ventricular septal rupture	Yes	17	5%
	No	329	95%

Discussion

Acute myocardial infarction (AMI) is a severe health issue that affects both wealthy and underdeveloped nations. At the moment, it impacts over 3,000,000 individuals annually. Hospital mortality for AMI has decreased from 25–30% in the 1960s to 6% in the present, thanks to advancements in preventive measures, diagnostic, and treatment approaches. Cardiogenic shock and mechanical difficulties leading to arrhythmias in the heart are the main causes of death in individuals with AMI. Even with the proper care, the latter results in a severe hemodynamic compromise and a high death rate in patients with AMI.

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Table IV: Stratification of ventricular septal rupture with age, gender, hypertension, diabetes mellitus, smoking, previous CAD, prodromal angina and type of STEMI

Parameter	Sub-division of parameter	Ventricular septal rupture		P value
		Yes	No	
Age group	31-40 years	4	82	0.9848
	41-50 years	5	99	
	51-60 years	8	148	
Gender	Male	12	223	0.8089
	Female	5	106	
Hypertension	Hypertensive	15	296	0.8171
	Non-hypertensive	2	33	
Diabetes mellitus	Diabetic	12	230	0.9524
	Non-diabetic	5	99	
Smoking	Smoker	11	214	0.9771
	Nonsmoker	6	115	
Previous CAD	Yes	11	217	0.9154
	No	6	112	
Prodromal angina	Yes	12	223	0.8089
	No	5	106	
Type of STEMI	Anterior	11	224	0.9535
	Inferior	4	72	
	Lateral	2	33	

Acute mitral regurgitation and ventricular free wall rupture are the other two significant mechanical consequences of acute myocardial infarction (AMI), along with acquired ventricular septal defect (VSD). When thrombolysis was developed, VSD was a common AMI consequence that affected 1–3% of patients.

According to our survey, the average age was 53, with a standard deviation of 11.23. Thirty-two percent of patients were female, and 68 percent were male. Ninety-five percent of patients did not have ventricular septal rupture, but more than five percent did.

Previous research revealed comparable results, with ventricular septal rupture occurring in 1–3% of patients suffering from acute myocardial infarction and in over 75% of cases within the first week (Goldberger, 1975).

Following fibrinolysis treatment, the incidence of ventricular septal rupture was as low as 0.2 percent, and the median time from the commencement of the infarct was observed to be 1 day (Crenshaw et al., 2000). About 50% of ventricular septal ruptures occur in patients who have inferior infarcts, whereas the other 50% occur in the context of anterior infarcts (Longo and Cohen, 1976; Radford et al., 1981). Early intervention by excellent surgeons appears to increase survival rates in patients with myocardial infarction and ventricular septal rupture, many of whom, like our patients, are older and have cardiogenic shock. At least two-thirds of these patients die (Lemery et al., 1992).

Similar results were seen in another study by Jones BM et al. (Jones et al., 2014), which showed that after primary percutaneous coronary intervention, the incidence of VSR dropped from 1-3 percent following ST-segment elevation MI in the pre-reperfusion era to 0.17–0.31 percent.

Similar results were seen in another study by Moreyra AE et al. (Moreyra et al., 2010), which found that one of the most challenging morbidities that cardiac surgeons currently deal with is VSR aggravating acute MI. In contrast to the pre-thrombolytic era, when it was 1-3 percent, the incidence of VSR has decreased to 0.17–0.31 percent with the introduction of reperfusion therapies, the standard of care in treating AMI. However, over the preceding 20 years, the rate of VSR complicating AMI has remained high and relatively constant, and the mortality associated with VSR has not changed.

Conclusion

Our study concludes that the frequency of ventricular septal rupture was 5% after acute ST-elevation myocardial infarction.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department Concerned.

Consent for publication
Approved

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Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

ABDUR RAHIM
Study Design, Review of Literature
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Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript
Manuscript revisions, critical input.
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