

Case Study

Case Series Study on Recovery of Left Ventricle Systolic Function After Percutaneous Coronary Intervention In ST-Segment Elevation Myocardial Infarction Patients at FMIC Hospital in Kabul, Afghanistan.

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Abstract:

Background

Left ventricle dysfunction is the most recurrent consequence of ST-elevated myocardial infarction, and still, it is a powerful predictor of mortality. The percutaneous coronary intervention of the culprit artery disease in acute coronary syndrome is related to a significant improvement of left ventricle segmental function.

It is a retrospective case series study on a patient population with the diagnosis of ST-elevated myocardial infarction patients who presented to the hospital within 12 hours and underwent percutaneous coronary intervention at the French Medical Institute of Mother and Children Hospital. Data was collected retrospectively from the patient's medical record files and analyzed. We took the patients with Left ventricle dysfunction on echocardiography on the first presentation before percutaneous coronary intervention and saw the left ventricle function after three months of follow-up.

We reviewed the charts of 102 patients (78.4% male and 21.6% female) with a diagnosis of St-elevated myocardial infarction who presented within 12 hours of chest pain. Of 102 patients, 55.9% had hypertension, 21.6% diabetes, 22.5% dyslipidemia, and 19.6% history of smoking, and their mean age was 58.11 ± 11.993 years. We noticed that percutaneous coronary intervention led to significant left ventricle dysfunction improvement in the patient population with ST-elevated myocardial infarction who presented within 12 hours of chest pain.

Key words: Percutaneous coronary intervention, Myocardial infarction, Left ventricle function, Coronary artery disease, Heart disease.

Introduction

Coronary artery disease and ST-elevated myocardial infarction

Coronary artery disease is characterized by a pathological process, described by the formation of atherosclerotic plaque in the epicardial arteries is a pathological process characterized by atherosclerotic plaque formation in the epicardial arteries, even if obstructive or non-obstructive. This progress can be customized by lifestyle adjustment, pharmacological therapies, and invasive interventions, which are considered to stabilize or regress the disease (1).

ST-elevated myocardial infarction clinically is defined as a syndrome characterized by symptoms related to myocardial ischemia with constant electrocardiographic ST-segment elevation followed by the release of biomarkers of myocardial necrosis (2). Classic electrocardiographic changes for myocardial infarction require ST-segment elevation of 1mm or more in two or more adjacent leads, often seen with reciprocal ST depression in the contralateral leads, and in V2-V3 leads, ST-elevation of at least 2mm for men ≥ 40 years, 2.5 mm for men <40 years, and 1.5 mm in women (3).

Left ventricle dysfunction is the most recurrent complication of ST-elevated myocardial infarction, and it is considered a high predictor of mortality; clinically dysfunctional left ventricles

could be silent or can cause heart failure (4). Left ventricle dysfunction is caused by myocardial loss or ischemia; in various cases, left ventricle function is worsened by arrhythmia and valvular dysfunction (4). Left ventricular remodeling after acute myocardial infarction is a potential precursor for the development of heart failure (4). The benefits of percutaneous coronary intervention entail an early blood flow increase, myocardial muscle recovery, and improved survival compared to thrombolysis (5).

Even though study results indicated no significant differences in prognosis between primary percutaneous coronary intervention and conservative treatment therapy for low-risk patients, compared to moderate-risk patients, in high-risk patients, there is a significant correlation between primary percutaneous coronary intervention and the long-term cardiac mortality rate (6, 7).

Epidemiology of Coronary Artery Disease

Globally, in 2012, cardiovascular disease was a leading cause of premature death. Cardiovascular disease also led to around 17.9 million expiries and 37.5 million disability-adjusted life years (DALYs) in 2015 (8, 9). Left ventricle dysfunction is the most recurrent consequence of ST-elevated myocardial infarction and is still a powerful predictor of mortality; left ventricle dysfunction could be clinically silent or can cause heart failure. Left ventricle dysfunction is caused by myocardial loss or ischemia (stunning); in some cases, left ventricle function is worsened by arrhythmia and valvular dysfunction (4). In Afghanistan, ischemic heart disease was the primary cause of death among females between 15 and 49 years old, followed by tuberculosis and cerebrovascular diseases. Ischemic heart disease was the principal cause of mortality in males and females between 50 and 69 years old, as well as those whose Age is more than 70 years old (10).

Risk factors of Coronary Artery Disease

Age

The increase in age is an independent risk factor for cardiovascular disease. Conversely, the risk of rising age associated with the burden of cardiovascular disease could be reduced by the modification of traditional coexisting cerebrovascular disease risk factors. On briefing an individual on the cerebrovascular disease risks regardless of age, both short-term (10 years) and long-term (more than ten years) risks, both absolute and relative risks, should be considered, and consequent management of cerebrovascular disease risk factors should be individualized (11).

Gender

Generally, males have a triple risk of ST-elevated myocardial infarction than females, with the highest relative risk in younger adults (12). The ST-segment elevation myocardial infarction incidence rate increases by an estimated 41% per 5-year increase in age (12).

Hypertension

Frequent association has been made between hypertension and coronary artery disease. Some pathophysiologic mechanisms create a link between both diseases (13). Hypertension induces endothelial dysfunction, aggravates the atherosclerotic process, and makes the atherosclerotic plaque unstable. Left ventricle hypertrophy, which is a common complication of hypertension, advances the decrease of coronary reserve and increases myocardial oxygen demand; both mechanisms are causative for myocardial ischemia (13).

Diabetic Mellitus

Diabetes mellitus could increase mortality risk 2 to 4 times more from heart disease (14). Also, it can increase the risk of mortality after myocardial infarction (14).

Smoking

Smoking is a main preventable risk factor for the development of atherosclerosis. The present studies provide a broad summary of published data from clinical and animal studies and results of basic research on the proatherogenic effect of Smoking (15). Comprehensive studies and literature reviews discovered a large amount of data on the influence of cigarette smoke and its components on early atherogenesis, mainly on endothelial cells (15). Vascular dysfunction induced by Smoking due to reduced nitric oxide bioavailability and additionally by the increased appearance of adhesion molecules following the endothelial dysfunction. Smoking provokes the development of a procoagulant and inflammatory setting due to increased adherence of platelets and macrophages (15).

Role of Percutaneous Coronary Intervention

Timely revascularization with percutaneous coronary intervention within 12 hours of chest pain is the treatment of choice in ST elevated myocardial infarction (16). Percutaneous coronary intervention of the culprit coronary artery in acute coronary syndrome is associated with significantly improving the segmental and regional function of the left ventricle (16).

Research Questions

What is the result of the recovery of left ventricle dysfunction after primary percutaneous coronary intervention in ST-elevated myocardial infarction patients at the French Medical Institute of Mother and Children Hospital (FMIC) in Kabul, Afghanistan?

Research Objective

To determine the frequency and pattern of improvement of left ventricular systolic dysfunction after percutaneous coronary intervention in ST-elevated myocardial infarction patients who are admitted to a hospital within the first 12 hours of the onset of chest pain.

Literature Review

Study results indicated that percutaneous coronary intervention improved left ventricle function (17). A study conducted in Alexandria, Egypt, included 80 patients with ST elevated myocardial infarction and non-ST elevated myocardial infarction with a mean age (55.7 ± 9.4) years old. Patients'

segmental and regional Left ventricle function improved significantly with percutaneous coronary intervention of the culprit lesion in acute coronary syndrome assessed by myocardial deformation techniques (18).

Conversely, a prospective study was conducted in Saudi Arabia between January 2016 and January 2018. They included a patient population aged more than 75 years old, and they had Percutaneous coronary intervention for culprit lesions. No survival benefits were revealed with primary or early Percutaneous coronary intervention in the participant presented with acute coronary syndrome (19).

In the Netherlands, a cohort study was conducted on 73 patients who underwent percutaneous coronary intervention for an acute anterior myocardial infarction. Left ventricle function recovery was measured globally and regionally using echocardiography for a 16-segment wall motion index before intervention at first 24 hours, after one week, and after six months (20). After the successful percutaneous coronary intervention, the mean global score index improved from $1.86 (\pm) 0.23$ before percutaneous coronary intervention to $1.54 (\pm) 0.34$ after a six-month follow-up ($p < 0.0001$) and regional wall motion score index from $2.39 (\pm) 0.30$ before percutaneous coronary intervention to $1.87 (\pm) 0.48$ after six-month follow-up (P -value 0.0001). Also, the study results indicated that percutaneous coronary intervention could reduce the infarct size and preserve the left ventricle function in acute myocardial infarction patients (20).

Furthermore, a study investigated 44 patients of ST-segment elevation myocardial infarction (29 male, 15 female) who were admitted within the first 12 hours of chest pain in Turkey. The patients were divided into groups of anterior myocardial infarction ($n=26$) and inferior myocardial infarction ($n=18$) (21). Twelve of the patients (27.3%) had diabetes mellitus, 30 (68.2%) had hypertension, 25 (56.8%) had cigarette smoking history, 9 (20.5%) had hyperlipidemia, and 7 (15.9%) had a positive family history (21). The study results showed that percutaneous coronary intervention significantly decreased LV dyssynchronization in the acute period in patients with acute ST-segment elevation acute myocardial infarction (21).

A multicenter prospective longitudinal study included 839 patients who underwent elective PCI of chronic total occlusion (22). A baseline LVEF of less than 35% was present in 72 (8.6%) patients (22). In patients with a left ventricle ejection fraction of less than 35%, the left ventricle ejection fraction significantly improved from $29.1 \pm 3.4\%$ to $41.6 \pm 7.9\%$ ($p < 0.001$) after percutaneous coronary intervention (22).

Another prospective observational single-center study investigated 120 patients presenting with acute ST-elevated myocardial infarction at a tertiary care referral center in South India (23). They made two groups, the primary angioplasty arm, and the pharmaco-invasive strategy arm, each arm including 60 patients. The mean age of the study population was $55 (\pm 12)$ years, and 88% of the patients were male (23). The primary result of left ventricle systolic function was assessed by left ventricle ejection fraction by (2D Simpson's biplane method) and global longitudinal strain (2D speckle tracking), and the function was significantly low in the pharmaco-invasive group as compared to the group of primary angioplasty (23).

In a prospective study conducted in Karachi, Pakistan, on 113 patients, 102 (90.3%) were male gender, and their mean age was 51.2 ± 11.7 years (24). A total of 54 (47.8%) patients had hypertension, 28 (24.8%) diabetes, and 44 (38.9%) smoking history. The study results showed significant improvement in short-term and long-term survival (P -value < 0.05), especially in patients presenting without cardiogenic shock (24).

Another descriptive cross-sectional study conducted in Rawalpindi, Pakistan, showed that older age is an independent predictor for cardiovascular morbidity and mortality. The older patient population could experience high rates of complications in acute ST-elevated myocardial infarction (25). The Most favorable reperfusion strategy in the older patient population following ST-elevated myocardial infarction remains under argument due to their elimination from trials evaluating different treatment modalities. Percutaneous coronary intervention has emerged as a treatment of choice in patients presenting with acute ST-elevated myocardial infarction in a specific period (25).

Methodology

Study Design

This case-series study describes the recovery of left ventricle function post-percutaneous intervention in a patient population with ST-elevated myocardial infarction retrospectively.

The study was conducted at the French Medical Institute for Mothers and Children (FMIC) in Kabul, Afghanistan, which is an ISO-certified tertiary care hospital and offers specialized cardiac care in the fields of Adult Cardiology, Pediatric Cardiology, Interventional Cardiology, and Cardiac Surgery for thousands of patients across Afghanistan each year. The Interventional Cardiology unit of FMIC has a catheterization laboratory in the country, performing over a thousand adult and 28 pediatric interventional cardiology cases yearly. It provides round-the-clock services to acute cardiac emergencies, including ST-elevation myocardial infarction. The medical record department of FMIC maintains the medical record files of all the patients, which are accessible for research purposes after attaining permission from the administration.

Study Participants

ST-elevated myocardial infarction patients presented within 12 hours of the onset of chest pain and underwent percutaneous coronary intervention.

Study Duration

The study was conducted from January 2018 to December 2019.

Eligibility Criteria

Inclusion Criteria

ST-elevated myocardial infarction patients who came to FMIC were admitted in less than 12 hours of the onset of chest pain and had undergone percutaneous coronary intervention.

Exclusion Criteria

We excluded patients whose data was incomplete in the file, patients who had stable ischemic heart disease, unstable angina, non-ST elevation myocardial infarction, and patients with preserved Left ventricle ejection fraction.

Data Collection Method

All patients who visit FMIC have a unique medical record number. Their medical data is recorded in the medical record and then stored in the medical record department. Patients are told in advance that their medical data can be used for research purposes under the laws set by the Ministry of Public Health Afghanistan and that their anonymity will be maintained strictly. These files can be accessed easily for research purposes after approval from the Medical Director. Cardiac patients also have their data recorded in medical record files, including information about their history, stay progress during hospitalizations, and results of tests carried out at FMIC. Data was collected by the principal investigator in soft and hard copies in designated data collection forms. Data was entered in a double-entry mechanism to minimize errors, and afterward, data was cleaned and edited. Soft copies were kept in a secured database, and hard copies were kept safe by the principal investigator. The patients' names included in data collection forms were replaced by a unique identification number.

Variables of Interest

- ü Age
- ü Sex
- ü Hypertension
- ü Diabetic mellitus
- ü Lipid status
- ü Family history positive for ischemic heart disease
- ü Smoking
- ü First echocardiography (admission) left ventricle ejection fraction ranges (mild, mid-range and severe dysfunction)
- ü Past coronary artery disease
- ü Cardiogenic shock
- ü Complete heart blocks
- ü Past coronary artery disease
- ü Three months later, echocardiography (preserved, mild, mid-range, severe)

Data Management

Data was collected by the principal investigator in soft and hard copies through designated data collection forms. Data was entered in a double-entry mechanism to minimize errors, and afterward, data was cleaned and edited. Soft copies were kept in a secured database, and hard copies were kept safe by the principal investigator. Names of the patients were not included in the data collection forms; instead, a unique identification number was provided.

Analysis Plan

Data was analyzed using the Statistical Package for Social Sciences (SPSS), version 25. Mean and standard deviation (SD) were used to present and describe continuous variables, while frequency and proportions were calculated for categorical

variables. A chi-square test of independence was run to explore the association between two categorical variables.

Ethical Considerations

The data was collected from the files of FMIC Medical Record directory and was used only for this study. The soft and hard copies of the data were kept in a safe place and were only accessible to the principal investigator. The anonymity of the participants was maintained strictly, and their names were not used in any part of this study. Each participant was given a specific unique number during data collection to maintain confidentiality.

Result

Descriptive Statistics

Of 102 patients, 80 (78.4%) were males and 22 (21.6%) were females, and their mean age at the time of presentation was 58.11 ± 11.993 . We found that 22 (21.6%) patients had diabetes, 57(55.9%) hypertension, 23 had dyslipidemia, 20(19.6%) had a smoking history, 13 (12.7%) had a family history of ischemic heart disease, and one patient had a history of ischemic heart disease; see **Table 1**.

Table 1. Demographic and clinical characteristics of the study patients

Characteristics	(N)*	(%) / SD®
Age	58.11	11.993
Male	80	78.4
Female	22	21.6
Diabetic	22	21.6
Hypertension	57	55.9
Dyslipidemia	23	22.5
Smoking	20	19.6
Positive family history of IHD©	13	12.7
History of IHD	1	1.0

*Mean, ® standard deviation, © ischemic heart disease

Statistically significant improvement was noticed in left ventricular dysfunction in patients with various risk factors, but recovery of the left ventricle was better in patients with no risk factors. Also, left ventricular dysfunction was significantly improved in both genders; however, improvement was better in males than in females. Statistically significant improvement was seen in patients with diabetes mellitus (P-value 0.049), smokers (P-value 0.032), dyslipidemia (P-value 0.008), and hypertension (P-value 0.000).

Of 80 male patients, 21 patients had mild left ventricular dysfunction, and after percutaneous coronary intervention, 19 patients had preserved, one patient stayed mild, and one patient had moderate left ventricle dysfunction. Forty-four patients had

moderate left ventricle dysfunction after percutaneous coronary intervention, 13 patients had preserved, 12 patients had mild, 17 patients had moderate, and 2 showed severe left ventricle dysfunction. Fourteen patients had severe left ventricle dysfunction, and after percutaneous coronary intervention, two had preserved, one mild, four moderate, and seven patients remained had severe left ventricle dysfunction.

Of 22 female patients, six had mild left ventricle dysfunction, and after percutaneous coronary intervention, all six patients improved to preserved left ventricle function. Seven patients had moderate left ventricle dysfunction, and after percutaneous coronary intervention, one had preserved, two patients had mild, and four patients' left ventricle dysfunction was not changed. Nine patients had severe left ventricle dysfunction, and after percutaneous coronary intervention, one patient improved to preserved, one to mild, 6 to moderate, and one patient remained at severe left ventricle dysfunction.

Of 22 patients with diabetes, five patients had mild left ventricle dysfunction. After the percutaneous coronary intervention, four patients' left ventricle function improved to preserved, and one remained with mild left ventricle dysfunction. Eleven patients had moderate left ventricle dysfunction. After the percutaneous coronary intervention,

three became preserved; 2 had mild left ventricle dysfunction, 6 had moderate left ventricle dysfunction, and six patients had severe left ventricle dysfunction. After the percutaneous coronary intervention, one patient became preserved, three improved to moderate severity, while three remained at severe left ventricle dysfunction.

Of 20 patients who were smokers, 7 had mild left ventricle dysfunction, and after percutaneous coronary intervention, all seven improved to preserve left ventricle function. Of the 11 patients with moderate left ventricle dysfunction who underwent percutaneous coronary intervention, three improved to left ventricle preserved functioning, three improved to mild dysfunction, four remained with moderate left ventricle dysfunction, and one deteriorated to severe dysfunction.

Twenty-two patients had dyslipidemia; five patients had mild left ventricle dysfunction; after taking percutaneous coronary intervention, all of them improved left ventricle preserved function, and 12 patients had moderate left ventricle dysfunction and after percutaneous coronary intervention, one improved to preserved left ventricle function, three had mild, six had moderate, and two had severe left ventricle dysfunction; see **Table 2**.

Table 2. LV function improvement with different risk factors

characteristics	Early LV dysfunction (n%)	Total (n%)	LV functions after 3 months Post PCI.				P-value (n%)
			Preserved (n%)	Mild (n%)	Moderate (n%)	Severe (n%)	
Male N=80	Mild	21/26.3	19/55.9	1/7.1	1/4.5	0/0	0.000
	Moderate	44/55	13/38.2	12/85.7	17/77.3	2/20	
	severe	15/18.8	2/5.9	1/7.1	4/18.2	8/80	
Female N=22	Mild	6/27.3	6/75	0/0	0/0	0/0	0.011
	Moderate	7/31.8	1/12.5	2/66.7	4/40	0/0	
	Severe	9/40.9	1/12.5	1/33.3	6/60	1/100	
Diabetic N=22	Mild	5/22.7	4/50	1/33.3	0/0	0/0	0.049
	Moderate	11/50	3/37.5	2/66.7	6/66.7	0/0	
	severe	6/27.3	1/12.5	0/0	3/33.3	2/100	
Non-diabetic N=80	Mild	22/27.5	21/61.8	0/0	1/4.3	0/0	0.000
	Moderate	41/50	11/32.4	12/85.7	15/65.2	2/22.2	
	Severe	5/22.7	4/50	1/33.3	0/0	0/0	
Smoker N=20	Mild	7/35	7/63.6	0/0	0/0	0/0	0.032
	Moderate	11/55	3/27.3	3/100	4/100	1/50	
	severe	2/10	1/9.1	0/0	0/0	1/50	
Non-smoker N=82	Mild	20/24.4	18/58.1	1/7.1	1/3.6	0/0	0.000
	Moderate	40/48.8	11/35.5	11/78.6	17/60.7	1/11.1	
	Severe	22/26.8	2/6.5	2/14.3	10/35.7	8/88.9	
Dyslipidemia N=23	Mild	5/21.7	5/71.4	0/0	0/0	0/0	0.008
	Moderate	12/52.2	1/14.3	3/100	6/66.7	2/50	
	severe	6/26.1	1/14.3	0/0	3/33.3	2/50	
Non-Dyslipidemia N=79	Mild	22/27.8	20/57.1	1/7.1	1/4.3	0/0	0.000
	Moderate	39/49.4	13/37.1	11/78.6	15/65.2	0/0	
	Severe	18/22.8	2/5.7	2/14.3	7/30.4	7/100	
Hypertensive N=57	Mild	14/24.6	12/63.2	1/14.3	1/4.2	0/0	0.000
	Moderate	29/50.9	6/31.6	6/85.7	15/62.5	2/28.6	

	Severe	14/24.6	1/5.3	0/0	8/33.3	5/71.4	
Non-Hypertensive N=45	Mild	13/28.9	13/56.5	0/0	0/0	0/0	0.000
	Moderate	22/48.9	8/34.8	8/80	6/75	0/0	
	Severe	10/22.2	2/8.7	2/20	2/25	4/100	

We found improvement in left ventricular function among 102 patients after percutaneous coronary intervention after three months of follow-up. A total of 27 patients had mild left ventricle dysfunction after undergoing percutaneous coronary intervention; 25 patients' function became preserved; one patient was mild, while one was in moderate condition. Fifty-one patients had moderate LV dysfunction, 14 patients' left ventricle function improved to preserved, 14 patients had mild left ventricle dysfunction, 21 patients had no improvement, and 2 had severe left ventricle dysfunction.

Of 24 patients who had severe left ventricle dysfunction after percutaneous coronary intervention, three recovered to normal LV function, two had mild dysfunction, 10 had moderate dysfunction, and nine patients showed no improvement; see **Table 3**. A total of eight patients had complications, four patients had complete heart blocks, and four patients had a cardiogenic shock.

Table 3. Overall recovery of left ventricle dysfunction after PCI among all participants

All patients	LV Function after 3 months follow-up						Total (n/%)
	Early LV dysfunction (n/%)	Preserved (n/%)	Mild (n/%)	Moderate (n/%)	Severe (n/%)		
Mild		25/59.5	1/5.9	1/3.1	0/0	27/26.5	
Moderate		14/33.3	14/82.4	21/65.6	2/18.2	51/50	
Severe		3/7.1	2/11.8	10/31.3	9/81.8	24/23.5	

Discussion

We noticed that percutaneous coronary intervention within 12 hours of onset is an excellent treatment for ST-elevated myocardial infarction patients, and it is more beneficial to perform percutaneous coronary intervention as soon as possible. Recovery of blood flow to the myocardium could recover the dysfunction of the left ventricle. Our findings are consistent with multiple study results that highlighted the recovery of left ventricle dysfunction after percutaneous coronary intervention in ST-elevated myocardial infarction presented within 12 hours of the onset of chest pain (20,22,23). Moreover, study results suggested that considering the male-to-female ratio, males have a triple higher chance of ST-elevated myocardial infarction than females, with the highest relative risk below the age of 55 years (6). We found that the percentage of ST-elevated myocardial infarction cases in males (74.4%) was higher than in females (21.6%), and the findings are

consistent with study results from India and Pakistan (20,22,23). In India, the sample population consisted of 88% males and 12% females (22), and in Karachi, Pakistan, the percentage of female cases was 9.7% (23).

Furthermore, we noticed risk factors among patients were diabetes, hypertension, past coronary artery disease history, dyslipidemia, smoking history, and family history of coronary artery disease. Among these risk factors, 55.9% of the patients had hypertension. Study results in India and Pakistan also highlighted that hypertension was the most frequent risk factor among other risk factors in the patient population with ST-elevated myocardial infarction (20,23).

In addition, our findings indicated a significant improvement in left ventricle dysfunction with percutaneous coronary intervention in ST-elevated myocardial infarction patients who presented within 12 hours of the onset of first chest pain. Study results in Pakistan, India, and Turkey also indicated significant improvement in left ventricular dysfunction in a patient who presented within or less than 12 hours of onset of chest pain for percutaneous coronary intervention (20, 22, 23). Finally, we found that percutaneous coronary intervention to the culprit coronary artery had a significantly good outcome, and study results highlighted similar findings that percutaneous coronary intervention to the culprit artery led to significant left ventricle dysfunction improvement (17, 26).

Strength of the study

The major strength of this study is that it is the first study in Afghanistan to find the recovery of left ventricle dysfunction after percutaneous coronary intervention in ST-elevation myocardial infarction presented within 12 hours of the first onset of chest pain.

Limitations

The sample size of our study was relatively small, and a study on a larger sample sizes needs to be conducted to validate the results of this study.

Conclusion

Left ventricle dysfunction improved significantly with percutaneous coronary intervention within 12 hours in ST-elevated myocardial infarction in the Afghan patient population who were treated at the French Medical Institute for Mother and Children, Kabul, Afghanistan. Our study recommends that percutaneous coronary intervention can be a better choice for ST-elevated myocardial infarction patients within 12 hours of onset.

ST-elevated myocardial infarction can create a severe threat to the health of patients when it is not appropriately treated. Therefore, knowing the importance of treatment options that

can improve healthcare quality and people's well-being is essential. Further studies on different aspects of ST-elevated myocardial infarction are warranted in Afghanistan to find gaps in managing the disease.

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