Original Article

HYPOTENSION AFTER STREPTOKINASE THERAPY IN PATIENTS PRESENTING WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

INTRODUCTION: Streptokinase is the most often used fibrinolytic agent in Pakistan for patients with acute mocardial infarction. However, many side effects including hypotension have been reported. The aim of this study was to determine the frequency of hypotension after intravenous streptokinase in patients presenting with acute ST Elevation myocardial infarction (STEMI).

MATERIAL AND METHODS: This was a Descriptive case series study which was done in Emergency Department of Cardiology Ward, Punjab Institute of Cardiology, Lahore from January 2017 to July 2017. Two hundred patients with STEMI were enrolled and were given streptokinase as 1.5 mega-units diluted in 100mls of Normal Saline infused over 60 minutes. After 60 minutes of infusion, patients were assessed for hypotension.

RESULTS: The mean age of patients was 52.86±10.07years. There were 135 (67.5%) males and 65 (32.5%) females. The mean duration of chest pain was 5.64±3.40hours. In this study,114 (57.0%) patients developed hypotension.

CONCLUSION: The frequency of hypotension is high in patients with acute ST Elevation myocardial infarction given streptokinase (SK). So, special attention should be given to patients given SK after AMI to prevent hypotension.

KEY WORDS: Hypotension, Acute Myocardial Infarction (AMI), Streptokinase(SK).

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INTRODUCTION

Acute myocardial infarction (AMI) is one of the leading causes of death, especially, in the elderly. However, clinical data reveals a disproportionately lower use of thrombolytic agents because of fear of complications like intracranial haemorrhage.[1] Streptokinase (SK) is one of the commonly used fibrinolytic agents and is widely used in thrombo-embolic conditions. It is cost-effective when compared with other thrombolytic drugs and is associated with shorter hospital stay.[2]

This medicine improves survival rate through clot resolution and reperfusion of jeopardized cardiac tissue. However, many side effects such as nausea, vomiting, hypotension, hypertension, phlebitis, localized tenderness, bleeding, arrhythmias and fever have been reported. Retroperitoneal hematoma has also been reported.[3]

Most cases of AMI are caused by coronary artery plaque rupture with subsequent thrombus formation. When thrombosis leads to total occlusion of blood flow, acute ST-elevation myocardial infarction (STEMI) is often the clinical outcome. Patients with acute STEMI should receive early reperfusion therapy and thrombolysis is one way. Reperfusion improves clinical outcomes in nearly all groups of patients with STEMI who present within 12 hours of symptom onset.[4-6]

Hypotension has been reported with use of streptokinase ranging from 1.6% to about 10%.[7,8] One study reported that the frequency of hypotension was 44% in patients with AMI after SK infusion.[9] But another study reported the frequency of hypotension was 62.9% in patients with AMI after SK infusion.[10]

The dissolution of thrombus and restoration of the patency of an infarct related artery results in improved blood supply of the heart besides preventing infarct expansion, ventricular remodeling, dilatation and malignant ventricular arrhythmias and high mortality.[11-13] Benefits of drug therapy

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with antianginal agents , Beta blockers, ACE inhibitors and anti-platelets have good impact on the prognosis along with streptokinase therapy.[14] We conducted this study to determine the frequency of hypotension after intra-venous streptokinase in patients presenting with acute ST elevation myocardial infarction.

MATERIAL AND METHODS:

This descriptive case series was conducted in Emergency Department of Punjab Institute of Cardiology, Lahore from January 2017 to July 2017. A sample size of 200 cases was calculated with 95% confidence level, 7% margin of error and taking expected percentage of hypotension as 44% after SK in patients presenting with AMI. Non-Probability, Consecutive Sampling technique was used. Patients of age ranging from 35 to 70 years from either gender presenting with Acute ST Elevation MI in emergency department within 12 hours of onset of symptoms were included in the study. Patients who were hypotensive on presentation, who had undergone previous CABG or PCI and those with cardiogenic shock were excluded from the study. Informed consent was obtained from all patients. Their demographic information (age, gender, duration of AMI) was also noted. Then patients were given SK as 1.5 mega-units diluted in l00 milliliters of Normal Saline infused over 60 minutes. After 60 minutes of infusion, patients were assessed for hypotension. Hypotension was defined as blood pressure lower than 90/60 mmHg.

The data thus collected was analysed statistically by using SPSS version 21. Quantitative variables like age, and duration of symptoms were presented in the form of mean ± S.D. Qualitative variables like gender and hypotension were presented in the form of frequency and percentage. Data was stratified for age, gender, and history of diabetes. Post-stratification, chi-square was applied to compare frequency of hypotension in stratified groups. 'P' < 0.05 was taken as significant.

RESULTS:

Two hundred patients were studied. Mean age of the patients was 52.86±10.07years. There were 135 (67.5%) males and 65 (32.5%) females. The mean duration of chest pain was 5.64±3.40 hours. There were 89 (44.5%) diabetics. In this study, 114 (57.0%) patients developed hypotension. (Fig-1) Data was stratified for age of patients. In patients aged 35-50years, 54 (64.3%) developed hypotension. In patients aged 51-70years, 60 (51.7%) developed hypotension while 56 (48.3%) had normal blood pressure. Table 2. Among male patients, 77 (57.0%) developed hypotension. Among female patients, 37 (56.9%) developed hypotension. The difference was insignificant (p>0.998). Table 3.

Among diabetics, 49 (55.1%) developed hypotension. Among non-diabetics, 65 (58.6%) developed hypotension. The difference was insignificant (p>0.05). Table 4

Data was stratified for duration of chest pain

Table 1: Descriptive Statistics of age and chest pain duration of patient

	Age (Years)	Duration of Chest Pain (hours)
n	200	200
Mean	52.86	5.64
SD	10.07	3.40
Minimum	35	1
Maximum	70	12

Table 2: Comparison of hypotension in age strata

		Age (years)		Total
		35-50	51-70	
Hypotension	Yes	54 (64.3%)	60 (51.7%)	114 (57.0%)
	No	30 (35.7%)	56 (48.3%)	86 (43.0%)
Total		84 (100%)	116 (100%)	200 (100%)

Chi-Square Test = 3.137, p-value = 0.077 (Insignificant)

Table 3: Comparison of hypotension in both genders

		Gender		Total
		Male	Female	
Hypotension	Yes	77 (57.0%)	37 (56.9%)	114 (57.0%)
	No	58 (43.0%)	28 (43.1%)	86 (43.0%)
Total		135 (100%)	65 (100%)	200 (100%)

Chi-Square Test = 0.000, p-value = 0.998 (Insignificant)

Table 4: Comparison of hypotension in h/o diabetes strata

		Diabetes		Total
		Yes	No	
Hypotension	Yes	49 (55.1%)	65 (58.6%)	114 (57.0%)
	No	40 (44.9%)	46 (41.4%)	86 (43.0%)
Total		89 (100%)	111 (100%)	200 (100%)

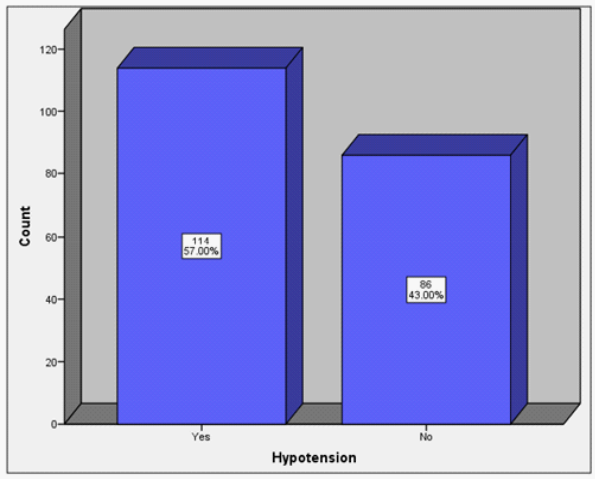
Chi-Square Test = 0.247, p-value = 0.619 (Insignificant)

Table 5: Comparison of hypotension in duration of symptoms

		Duration (hours)		Total
		1-6	7-12	
Hypotension	Yes	69 (53.9%)	45 (62.5%)	114 (57.0%)
	No	59 (46.1%)	27 (37.5%)	86 (43.0%)
Total		128 (100%)	72 (100%)	200 (100%)

Chi-Square Test = 1.388, p-value = 0.239 (Insignificant)

Fig 1: Distribution of hypotension



and frequency of hypotension as shown in Table 5. The difference was insignificant (p>0.619).

DISCUSSION:

We found that more than half of the patients having acute myocardial infarction and treated with Streptokinase developed hypotension. Thrombolysis with Streptokinase is the most important and minimum standard of care for Acute Myocardial infarction patients.[15,16] The management of Acute Myocardial Infarction has undergone revolutionary changes on account of the advent of latest interventional strategies of Primary PCI and its excellent outcomes during last 20 years. The hypotension caused by thrombolysis with SK is a well-known complication but usually it is well tolerated and easily manageable. The exact pathophysiology of this complication is yet to be elucidated. However, it does not bear any relationship to previous exposure with the drug.[9]

In America approximately 1.5 million cases of AMI occur every year. Contrary to the popular belief, the toll of AMI related deaths has not decreased in spite of emergence of new treatment modalities.[17] Men are at higher risk as compared to women and black population more than Caucasians.[18] Ischemic heart disease is the leading cause of death in Europe while in Russia the cardiovascular disease has remained the same over last two decades.[19] The incidence of Ischemic heart disease and cardiovascular death is high in China due to risk factors like dyslipidemias and smoking.[20] Coronary Artery Disease incidence is likely to rise in Indian Subcontinent and Middle East by the year 2020.[21,22] Canadian-led global study (INTERHEART) conducted in 52 countries across Africa, Asia, Australia, Europe, the Middle East, and North and South America, has defined 9 risk factors (smoking, abnormal blood lipid levels, hypertension, diabetes, obesity, diet, physical activity, alcohol consumption, and psychosocial factors) that account for over 90% of the risk for acute MI.[23] Investigators of this group also say that all forms of tobacco, including filtered and non-filtered cigarettes, pipes and cigars, and chewing tobacco, are dangerous. Moreover abdominal obesity is a higher risk factor than BMI alone and waist-to-hip ratio is a better indicator as compared to BMI for obesity.[22-24]

Occlusion of arterial supply of the heart and oxygen deprivation of the myocardium can damage the cardiac muscle within half an hour to 40 minutes and if this condition persists and not treated swiftly it can lead to irreversible damage to the myocardium.[25] Ventricular remodeling is an irreversible phenomenon but if recommended treatment modalities are instituted timely during management of AMI this process can be slowed down and severity can be reduced significantly.[26] Nitric oxide is a well-known endothelium derived relaxing factor which exerts its action against reperfusion injury by inactivating oxygen free radicals and reducing the process of damage to already overtaxed myocardium.[27]

There is loss of certain metabolic agents needed for normal function and contraction of the myocardium such as Adenosine Triphosphate which can lead to both myocardial stunning and hibernation.[28] An atheromatous plaque which consists of a necrotic central core separated from the arterial lumen by a thin cap of fibrous tissue which is infiltrated with inflammatory cells is vulnerable to rupture and can cause AMI.[29,30] There is a difference in the pathophysiology of AMI in young and elderly patients.[31]

Treatment of AMI with timely mechanical intervention (primary PCI) or pharmacologic reperfusion with SK is mandatory within 12 hours of symptom onset and for those who have persistent ST-segment elevation or new or presumed new left bundle branch block. Thrombolysis is an essential reperfusion therapy especially in non PCI capable centers. The efficacy of thrombolytic therapy with SK in patients with STEMI is well established.[32,33]

Streptokinase therapy may be complicated by hemorrhagic CVA and it is more common in elderly patients, those who are hypertensive at admission, those who are thin framed and among women.[34] Adjuvant anticoagulation treatment with unfractionated heparin and many other available

agents is important for adequate reperfusion therapy irrespective of the treatment modality chosen i.e. Primary PCI or Thrombolysis.[35] The use of Unfractionated heparin or low molecular weight heparin (enoxaparin) is preferred.[36] Those patients who have Heparin induced Thrombocytopenia and need anticoagulation Bivalirudin is the choice.[37] A referral to a tertiary care center with all facilities of post MI rehabilitation and care should be considered in all patients for cardiac rehabilitation and exercise program after AMI. Regular exercise for at 30 minutes for at least three days a week is recommended for Post AMI patients.[38]

Qureshi et al 1 reported post SK fall in blood pressure in 33% patients while in another study this frequency was 44.55%.[39]

CONCLUSION:

We conclude that frequency of hypotension is high in patients of AMI given SK. Special care should be provided to patients given SK for AMI to prevent hypotension. We recommend that all patients who are given SK must be monitored for blood pressure changes so that any significant hypotension can be detected and treated promptly.

Author's Contribution

MAN: Reviewed the article and assisted in study. IW:Conducted the study and wrote the article. HMW: Collected the data and organized tables and figures.

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