Original Article

EMERGENCY TREATMENT OF SVT: ADENOSINE VERSUS VERAPAMIL

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ABSTRACT:

Introduction: Supraventricular tachycardia (SVT) is a common arrhythmia seen in critical care settings. After vagal maneuvers, adenosine 6 to 12 mg intravenous bolus is the initial drug of choice. Intravenous Verapamil, 5 to 10 mg can terminate SVT if vagal maneuvers and adenosine are ineffective.
Objective: Comparison of efficacy of adenosine versus verapamil in the emergency treatment of SVT.
Study Design: Randomised control trial.

Setting: Emergency department.

Duration of Study: 6 months.

Subjects: A total number of 210 patients presenting in emergency department with the diagnosis of PSVT on ECG.

Methods: Patients divided into two groups.
Group A patients were given adenosine. If SVT persisted then the patient were shifted to verapamil group. Group B patients were given intravenous verapamil. If SVT persisted then the patient were shifted to adenosine group. Patients were monitored for next 30 minutes.

Results: In Group A, 63 (60%) patients were converted to sinus rhythm with 6 mg bolus. 20 (19.04%) patients converted to sinus rhythm with an additional 12 mg adenosine. Efficacy of adenosine was 79.0%. In Group B, treated with verapamil, 86 (81.90%) patients converted to sinus rhythm with 5 mg dose. 9 (8.57%) patients converted to sinus rhythm with an additional 5 mg verapamil. Efficacy of verapamil was 90.5%. The mean dose of the drug used was 5.89 mg S.D $\pm$ 1.92. Overall, efficacy of verapamil (90.5%) was statistically greater than adenosine (79.0%), p value of 0.021.

Conclusion: Verapamil was more effective than adenosine in the emergency treatment of PSVT.
Key Words: Supraventricular tachycardia, adenosine, verapamil.

INTRODUCTION:

Paroxysmal supraventricular tachycardia's (PSVT) are defined as tachycardia in which driving circuit or focus originates, at least in part, in tissues above the level of ventricles (sinus node, atria, AV node, or His bundle).[1] Paroxysmal supraventricular tachycardia is a common arrhythmia.[1] Atrioventricular nodal re-enterent tachycardia is more common in adults while atrioventricular re-enterent tachycardia is more common type of supraventricular tachycardias in children.[2]

The first-line treatment in hemodynamically stable patients is the Vagal maneuvers which is effective in approximately 20 to 25% of cpatients. However if vagal maneuvers fail, adenosine intravenous bolus is the initial drug

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of choice. Intravenous Verapamil can terminate paroxysmal supraventricular tachycardia if vagal maneuvers and adenosine both are ineffective.[3,11]

Several studies have documented relative effectiveness of two drugs in converting stable spontaneous paroxysmal supraventricular tachycardia to sinus rhythm. A meta-analysis of eight trials with a total of 605 patients, found similarly high rates of termination with both adenosine and verapamil (91% v 90%).[5] Another recent trial, comparing two drugs, has shown statistically higher conversion rate with verapamil (97.9%) as compared to adenosine (86.5%).[6] Additionally lower frequency of side effects, easy availability and low cost favors verapamil over adenosine.[4,6]

This study compares the efficacy of verapamil with adenosine in terminating paroxysmal supraventricular tachycardia in our population. Verapamil has lower cost as compared to adenosine and if it proves more effective then its better choice in developing countries.

OBJECTIVE:

Comparison of efficacy of adenosine versus verapamil in the emergency treatment of SVT.

MATERIALS AND METHODS:

SETTING:

Faisalabad institute of cardiology Faisalabad emergency department.

DURATIONS WITH DATES:

From january 2014 to 20 July 2014.

INCLUSION CRITERIA:

Patients between 11 to 70 years of age including both genders presenting in the emergency department with SVT not converted to sinus rhythm by vagal manoeuvres.

EXCLUSION CRITERIA:

1. Haemodynamically unstable patients i.e. systolic blood pressure of less than 90 mm of Hg, signs of impaired cerebral perfusion or acute pulmonary edema.
2. Arrhythmias other than PSVT (i.e. sinus tachycardia, atrial flutter, atrial fibrillation or idiopathic ventricular tachycardia) on ECG.
3. Pregnancy by history.

SUBJECTS AND METHODS:

STUDY POPULATION:

A total number of 210 patients presenting in emergency department of the hospital with the diagnosis of SVT were fully informed about the likely side effects and an informed consent was taken. Patients were assigned to two equal groups A and B by lottery method after complete physical examination.

STUDY DESIGN:

Randomised control trial.

METHOD AND DATA COLLECTION:

All patients of PSVT, presenting in emergency room meeting the inclusion criteria were studied. Patients were randomly divided into two groups. Group A intravenous 6 mg bolus of adenosine was infused within 2 second through an 18G intravenous cannula. If it was ineffective then another bolus of 12 mg bolus was administered within 2 minutes. In case, if SVT persisted then shifted to group B. Group B intravenous verapamil as 5 mg bolus over 2 minutes and another 5 mg was repeated after 10 minutes of the initial dose if the SVT persisted. In case, if SVT persisted then patients were shifted to group A. Patients were monitored after successful cardioversion for next 30 minutes. The staff nurse injected the drugs under supervision of duty doctor.

INSTRUMENT OF STUDY:

Data collected using Performa attached.

STATISTICAL ANALYSIS:

Data was analyzed using SPSS version 20. Quantitative variable i.e. age were presented as mean and standard deviation. Qualitative variable i.e. gender were presented as frequency and percentage. Chi-Square test was used for comparison of efficacy. Significant P value was $\leq$ 0.05. Data was stratified for the dose of drug administered.

RESULTS:

In this interventional study 210 patients were included. Mean age of the patients was 38.38 ±12.14 years. Out of 210 patients 94 (44.8%) were male and 116 (55.2%) were female. They were divided into two equal groups A and B by randomization, each group containing 105 patients. In group A the mean age was 36.30 ± 12.85 years. Out of 105 patients 50 (47.6%) were male and 55 (52.4%) were female. In group B the mean age was 40.46 ± 11.06 years. Out of 105 patients 44 (41.9%) were male and 61 (58.1%) were female.

Group A patients were treated with adenosine. 63 (60%) with 6 mg bolus while 20 (19.04%) patients with 12 mg bolus converted to sinus rhythm. The efficacy of adenosine was 79.0% with mean dose of the drug used was 10.80 mg S.D ± 5.91. In 22 patients adenosine remained ineffective and these patients were shifted to Group B.

Group B patients were treated with verapamil. 86 (81.9%) patients with 5mg and 9 (8.57%) patients with additional bolus of another 5 mg was converted to sinus rhythml. The efficacy of verapamil was 95 (90.5%) with mean dose of the drug used was 5.89 mg S.D ± 1.92.

In 10 patients verapamil was ineffective and of these 5 patients with 6 mg of adenosine and 4 patients with 18 mg of adenosine and 1 patient with direct current cardioversion converted to sinus rhythm.

Overall, efficacy of verapamil 95 (90.5%) was statistically greater than adenosine 83 (79.0%), p value of 0.021.

TABLE 1: Baseline Characteristics

Characteristics	n	Minimum	Maximum	Mean	Std. Deviatio
AGE	210	15	67	38.38	12.14
GROUP A AGE	105	15	66	36.30	12.85
GROUP B AGE	105	20	67	40.46	11.06

TABLE: 2 Patient Age Distribution
n=210

		GROUP A	GROUP B	Total
age	15-24	20	13	33
		19.0%	12.4%	15.7%
	25-34	34	19	53
		32.4%	18.1%	25.2%
	35-44	20	33	53
		19.0%	31.4%	25.2%
	45-54	20	31	51
		19.0%	29.5%	24.3%
	55-65	10	7	17
		9.5%	6.7%	8.1%
	>65	1	2	3
		1.0%	1.9%	1.4%
Total		105	105	210

Table No.3 Distribution according to Gender

		GROUP A	GROUP B	Total
GENDER	Male	50	44	94
		47.6%	41.9%	44.8%
	Female	55	61	116
		52.4%	58.1%	55.2%
Total		105	105	210

TABLE NO.4 Efficacy in Group A
n= 90

Dose of adenosine (mg)	Successful cardioversion	Unsuccessful cardioversion
6	63 (60%)	42 (40%)
12	20 (19.04%)	22 (20.95%)

TABLE No.5 Efficacy In Group B
n= 90

Dose of verapamil (mg)	Successful cardioversion	Unsuccessful cardioversion
5	86 (81.90%)	19 (18.09%)
10	9 (8.57%)	10 (9.52%)

Table No.6 Efficacy
n=210

		GROUP		
		A	B	Total
PSVT converted to sinus rhythm	Yes	83	95	178
		79.0%	90.5%	84.8%
	No	22	10	32
		21.0%	9.5%	15.2%
Total		105	105	210

P value = 0.021

DISCUSSION:

This study was designed to compare the efficacy of adenosine versus verpamil for the emergency treatment of supraventicular tachycardias. In this study, 210 patients presenting to the emergency department with diagnosis of supraventricular tachycardia with mean age of 38.38 $\pm$12.14 years were included. 94 (44.8%) were male and 116 (55.2%) were female. The efficacy of adenosine was 79.0% and efficacy of verapamil was 90.5%. The results demonstrated that verapamil was more effective than adenosine.

Regarding the comparative efficacy of these drugs a similar study was conducted by Lim et al. in Singapore, which showed that greater efficacy of calcium channel blockers (98%) than the adenosine group (86.5%). However slow infusions of two calcium channel blockers verapamil and diltiazem was given in this study while adenosine was given in bolus. This study also calculated cost of drugs. The average cost of adenosine was more than double the cost with verapamil, with the cost of diltiazem midway between the two.[6]

A local study conducted by Riaz et al. in 2012 proves that verapamil is more effevtive than adenosine in the emergency treatment of supraventricular tachycardia.[4] In another local study, Majeed et al. concluded that adenosine is effective drug but associated with adverse effects like facial flushing in (26%) patients, while dyspnoea chest pressure, bronchospasm and other rhythm disturbances and only 30% patients had no side effects.[8] However our study is in the favor of verapamil than adenosine for emergency treatment of SVT. Regarding the gender, out of 210 patients 94 (44.8%) were male and 116 (55.2%) were female. The results are similar to the previous studies of S H Lim and colleagues. But the study of J F Ferreira et al. demonstrated no difference in the gender of the study population.[9] In the study of athar et al. more patients were males (p value 0.20).[10] However in our study several issues are not addressed like adverse effects of the drugs , the conversion time as well as relapse of SVT. We also did not compare the cost of drugs. Regarding these issues further studies are required.

In Pakistan verapamil is cheaper and easily available drug than adenosine. In these circumstances, verapamil can be recommended. However in cardiac institutions both drugs are available for the treatment of stable SVT. In these circumstances patients should be aware of unpleasant effects of both drugs. Finally, it's the physician choice to select a drug considering the cost and adverse effects of drugs and clinical condition of patient.

CONCLUSION:

Verapamil was more effective than adenosine in the emergency treatment of PSVT and should be preferred because of its affordability and limited availability of adenosine.

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SR #	AUTHOR NAME	CONTRIBUTION
1	Dr. Naeem Asghar	Drafting, Data Collection
2	Dr. Shakeel Ahmad	Data Collection
3	Dr. Awais-ur-Rehman	Statistical Analysis

WHEN IMAM ALI WAS ASKED ABOUT FAITH IN RELIGION, HE REPLIED THAT THE STRUCTURE OF FAITH IS SUPPORTED BY FOUR PILLARS ENDURANCE, CONVICTION, JUSTICE AND JIHAD.

Hazrat Ali (Karmulha Wajhay)