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Research Article

**A COMPARATIVE STUDY TO KNOW THE EFFICACY OF VERAPAMIL
VERSUS ADENOSINE FOR THE SUPRAVENTRICULAR TACHYCARDIA
TREATMENT**¹Dr Muhammad Aslam, ²Dr Imran Ellahi Soomro, ³Dr Abdul Mueed¹MBBS MD Cardiology Intervention Fellow, NICVD Karachi, ²MBBS FCPS Cardiology, Assistant Professor PUMHSW, Nawabshah, ³MBBS FCPS Cardiology, Assistant Professor NICVD Tando Muhammad Khan.**Abstract:**

Objective: To compare the relative effects of intravenous adenosine with verapamil in emergency treatment of supraventricular tachycardia (SVT) and to conclude which one is best suited for the treatment of SVT.

Study Design: A prospective comparative study.

Place and Duration: In the Cardiology Unit, Peoples Medical College and Hospital Nawabshah for one year duration from May 2018 to May 2019.

Methods: In 90 patients of SVT, adenosine was given and also in 90 subject's verapamil was given and comparison was recorded. In the adenosine group, the first bolus of 6 mg was administered for cardiovert and an additional 12 mg of bolus was given if cardioversion was not observed within 2 minutes into sinus rhythm. If SVT continued, that case was transferred to the group receiving Verapamil. On the further, intravenous 5mg verapamil was given in the verapamil group for 2 minutes in the bolus, and if SVT persisted, 5 additional mg was again given after ten mints of the first dose. In the case of cardiovascular insufficiency with verapamil, patients were included in the group of adenosine. The blood pressure and heart rate were continuously monitored while drug infusion and 30 minutes after conversion.

Results: 180 total cases of spontaneous SVT in stable state were analysed. 54 (60%) cases of the adenosine group were changed to sinus rhythm after 6 mg bolus and with additional 12 mg adenosine bolus 17 (18.89%) patients maintained sinus rhythm. 78.9% was the total efficacy of adenosine. The sinus rhythm was maintained in 74 (82.22%) patients of verapamil group with 5 mg dose, and with 5 mg additional verapamil, sinus rhythm was maintained by 8 (8.89%) patients. 91.1% was the total efficacy of verapamil. A correlation test was performed and there was significant variation in the verapamil efficacy paralleled to adenosine ($p = 0.02$).

Conclusion: This analysis demonstrates the verapamil efficacy over adenosine in order to transform spontaneous SVT into sinus rhythm. Thus, alternative of adenosine is verapamil in the immediate management of SVT. It is safe and profitable for health systems where adenosine is limited.

Key words: Adenosine, Supraventricular tachycardia (SVT), efficacy, verapamil.

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INTRODUCTION:

The cases of paroxysmal supraventricular tachycardia usually go to the emergency room of patients show disturbing symptoms such as chest pain and palpitations [1]. For few cases, all the peace, rest and sedation needed to end an attack may be required. Most SVTs are self-limiting and some are benign. However, few cases may have hypotension, intense anxiety and angina [2]. The 1st step in the SVT treatment is to conclude whether the patient is stable hemodynamically. In only few cases, severe hemodynamic instability occurs and they may need immediate electrical cardioversion. Conditions that define instability include below 90 mmHg systolic blood pressure, chest pain, signs of confusion, or heart failure [3]. Vagal maneuvers such as Valsalva and carotid sinus massage are the 1st treatment and if unsuccessful pharmacological treatment may be needed⁴. Verapamil and adenosine are the most usual drugs used. Both are operative and have different mechanism of action and both have side effects profile [5-6]. The aim of pharmacological management is AV nodal conductance reduction or prevention. Controversy continues concerning the relative efficacy of verapamil and adenosine in the SVT treatment. Adenosine is fast-acting, safe and effective drug to terminate SVT [7]. Adenosine is associated with temporary side effects such as face flushing, headache and dizziness at a rate of 8.04%. In 9.1% of patients, hypotension was observed with Intravenous verapamil. Adenosine is much expensive than verapamil. With adenosine, SVT treatment is double as compared with verapamil. In this, for SVT management; both patients and the hospital will get benefit in terms of benefits and cost [8-9].

PATIENTS AND METHODS:

This prospective comparative study was held in the Cardiology Unit, Peoples Medical College and Hospital Nawabshah for one year duration from May 2018 to May 2019. In this study, 180 patients admitted to the tertiary health service with the SVT diagnosis were included. In 90 patients of SVT, adenosine was

given and also in 90 subject's verapamil was given and comparison was recorded. We exclude patients with hemodynamic imbalance other than SVT, impaired cerebral perfusion and arrhythmia. Intervention: In the adenosine group, the first bolus of 6 mg was administered for cardiovert and an additional 12 mg of bolus was given if cardioversion was not observed within 2 minutes into sinus rhythm. If SVT continued, that case was transferred to the group receiving Verapamil. On the further, intravenous 5mg verapamil was given in the verapamil group for 2 minutes in the bolus, and if SVT persisted, 5 additional mg was again given after ten mints of the first dose. In the case of cardiovascular insufficiency with verapamil, patients were included in the adenosine group. The blood pressure and heart rate were continuously monitored while drug infusion and 30 minutes after conversion.

Evaluation: For transient adenosine side effects, such as chest discomfort, hot flashes, dizziness and shortness of breath, patients were monitored. The hypotension was noted in cases who were given Intravenous verapamil.

Outcome parameters:

The initial outcome measure was the cardio version in sinus rhythm. Statistical analysis: Using SPSS 18.0, the data was analyzed. It is expressed as mean + SD for continuous variables or ranges. Using Student's t test; continuous variables comparison between groups was done. Using Fisher's exact test and x2 test; discrete variables comparison between groups was done. $P \leq 0.05$ was taken significant statistically.

RESULTS:

In verapamil group the mean age was $37.41 + 11.46$ and in adenosine group $41.39 + 11.55$ was the mean age. 54 (60%) cases of the adenosine group were changed to sinus rhythm after 6 mg bolus and with additional 12 mg adenosine bolus 17 (18.89%) patients-maintained sinus rhythm. 78.9% was the total efficacy of adenosine.

Table: Efficacy of Adenosine versus Verapamil

Drugs	Dose(mg)	Successful cardioversion	Unsuccessful cardioversion	Efficacy	P Value
Adenosine (n=90)	6	54(60%)	36(40%)	71 (78.9%)	0.02
	18	17(18.89%)	19(21.11%)		
Verapamil (n=90)	5	74(82.22%)	16(17.78%)	82 (91.1%)	
	10	8(8.89%)	8(8.89%)		

The sinus rhythm was maintained in 74 (82.22%) patients of verapamil group with 5 mg dose, and with 5 mg additional verapamil, sinus rhythm was maintained by 8 (8.89%) patients. 91.1% was the total efficacy of verapamil. 5.89 mg S.D + 1.92 was the average dose. The left over eight cases had not maintained sinus rhythm with verapamil, with 6 mg adenosine, 4 were converted and with 18 mg adenosine remaining 3 had maintained and direct cardioversion was needed in one patient. In general, the verapamil efficacy (91.1%) was higher than that of adenosine (78.9%), a ratio test was performed, and a statistically significant difference was found in verapamil activity compared to adenosine (p-value of 0.02).

DISCUSSION:

Adenosine and verapamil are the commonly used agents in the paroxysmal supraventricular tachycardia (PSVT) treatment¹⁰. Many previous studies have compared the bolus intravenous adenosine with bolus doses of intravenous verapamil either in the electrophysiology laboratory or in the pre-hospital arena, have confirmed the same efficacy of adenosine and verapamil. 59% to 100% was the success rate of adenosine in the SVT management and for verapamil 73% to 98.8%, but some have shown that adenosine is much operative as compare to verapamil [11]. A randomized study conducted by KA Cheng et al. In 2003, there was no major difference in clinical variables among the 2 groups. The adenosine relative efficacy was 86.0% (52/60) and for verapamil 87.1% (54/62). In 2011, Ben Delaney et al. International clinical trial records were searched for randomized controlled trials comparing EMBASE, Medline, verapamil and CINAHL and produced a similar effect in the treatment of PSVT¹¹. Adenosine and verapamil are effective and safe options for the PSVT treatment. Although adenosine has a smaller side effect, hypotension was noted in many cases given verapamil [12]. For institutions in which adenosine and verapamil are available for the stable SVT treatment, agents should be deliberately selected and discussed with the patient, if possible, if information is available about their respective side-effect profiles [13-14]. In Pakistan, there are many places where I.V calcium channel blockers are still given as 1st line therapy for spontaneous stable SVTs and due to non-availability of intravenous adenosine and because of its high cost¹⁵. In these cases, administration of verapamil may be recommended as cost effective and more effective, especially in developing countries such as Pakistan.

CONCLUSION:

This analysis demonstrates the efficacy of adenosine and verapamil to convert stable spontaneous SVT into

sinus rhythm and their comparison was made. Therefore, Verapamil will be affordable and safe for healthcare systems where adenosine accessibility is restricted in Pakistan.

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