ORIGINAL ARTICLE

COMPARISON OF VAGAL MANEUVERS VS VERAPAMIL FOR CARDIOVERSION OF ATRIOVENTRICULAR NODAL REENTRANT TACHYCARDIA

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Background: Vagal Maneuver is an underutilized strategy for Cardioversion of Atrioventricular nodal reentrant tachycardia. The present study is an attempt to explore the effectiveness of this strategy. **Methods:** This comparative cross-sectional study was performed at the Department of Cardiology MTI MMC Mardan from the first January 2017 to 31 December 2019. Patients with Palpitations and having documented AVNRT on ECG were selected for this study. Patients were divided into two groups, i.e., Group A and Group B through envelope method. Patients in Group A were subjected to vagal maneuvers like carotid sinus massage, and Valsalva methods. Patients in Group B received injection verapamil 5 mg. **Results:** A sample size of 100 patients were enrolled. The mean age was 31 with 8.6SD. Male were 54% and females were 46%. The success rate of vagal maneuvers in group A was 36% (n=18), while in group B, it was 84% (n=42) for verapamil (36% vs 84%, *p*-value<0.001, highly significant). In group A, time for cardioversion in less than 2 minutes was 68%. While in group B, the time for cardioversion in less than two minutes was 12%. (68% vs 12%, *p*<0.001, highly significant).Cross over in Group A was 64% (n=32) to verapamil. While in group B, this was 6% (n=3) to DC shock and 14% (n=7) to vagal maneuvers (64% vs 18%, *p*<0.001, highly significant.) **Conclusion:** Simple Valsalva Maneuvers and verapamil proved to be effective in cardioversion of SVT/AVNRT. Both are safe. Verapamil is more successful in cardioversion as compared to Valsalva maneuvers.

Keywords: AVNRT; Vagal Maneuvers; Verapamil; Cardioversion

Citation: Hadi N, Asfandyar, Ikramullah, Shah ST, Ahmad F, Rahman A, Ahmad M. Comparison of Vagal maneuvers vs Verapamil for cardioversion of atrioventricular nodal reentrant tachycardia. J Ayub Med Coll Abbottabad 2021;34(1):49–52.

INTRODUCTION

Supraventricular tachycardias are a group of arrhythmias, that involve His bundle and above regions of the conducting system of the heart.[1] These most commonly present as Palpitations. The prevalence is rare about 2.5/1000 with a 2:1 female preponderance.[2,3] With increased recurrence and frequency, it increases the morbidity among all age groups. In a small portion of patients, where there is preexcitation, it can be life-threatening. Atrioventricular nodal re-entrant tachycardia has a narrow QRS Complex and involves the AV node. It is sudden in onset and have usually a rate of 180 to 200/minute. The p-waves are usually buried in QRS Complex, and may occur just before or just after QRS Complex.

Atrioentricular nodal reentrant tachycardia is the most common form of SVT in clinical practice. Electro physiologically, it is characterized by two distinct pathways, i.e., fast and slow pathways within the AV node. Each pathway has a distinct velocity and refractory period.[4,5] Acute management leads to the termination of arrhythmia. A 12 lead ECG is necessary for making a diagnosis and guiding management. In a hemodynamically stable patient, vagal maneuvers are attempted first with a variable success rate. It is also helpful in distinguishing SVT from VT by slowing its rate.[6] its actions are mediated through vagal efferent nerves supplying heart, lung and GIT.[7] Diving reflex can be used for termination of Arrhythmia.[8] But in our busy set up it is too difficult for us to carry out.

REVERT trial showed a success rate of 19–54% of modified Vagal Manoeuvres.[2,5] Vagal maneuvers can be performed by blowing up into a 10ml syringe or carotid massage. It is called modified Valsalva maneuvers. It has a high success rate of 40%.[5] Carotid massage should be avoided in patients with a history of TIA, Stroke, and Bruit.[9] If adenosine is not successful, unavailable, or contraindicated, verapamil is a good choice.[10] In a trial, verapamil has shown comparable results to adenosine.[6] However, it should be avoided in patients with impaired LV function and hypotension. Adenosine is a difficult to tolerate the drug, as it causes transient asystole, and many patients find as impending doom or feel about to die.[11,12]

The goal of the present study is to compare vagal maneuvers to verapamil and determine the success rates of these easily available measures and

drugs. In a resource-limited setup, their importance increases to many folds. Our null hypothesis was that verapamil is less successful than vagal maneuvers.

MATERIAL AND METHOD

This comparative cross-sectional study was performed at the Department of Cardiology MTI MMC Mardan from 1st January 2017 to 31 December 2019. The sample size was calculated, using epiopen software, taking a 95% confidence interval, and a 5 % margin of error. All baseline information was recorded on a proforma. Patients with Palpitations and having documented AVNRT on ECG were selected for this study. They were randomized by the Envelope method. Patients with co-morbidities like HTN, DM, and Ischemic heart disease were excluded. Approval of an ethical committee was sought. Patients were divided into two groups, i.e., Group A and Group B. Patients in Group A were subjected to vagal maneuvers like carotid sinus massage, and Valsalva methods. During this procedure, patients were constantly on a cardiac monitor. If procedure successful, a post cardioversion ECG obtained and the patient kept under observation for 2–3 hours. If the procedure was not successful, after 3 attempts, patients were switched to verapamil arm and the procedure was considered as unsuccessful.

Patients in Group B received injection verapamil 5 mg iv, while the patient was continuously monitored on a cardiac monitor. The drug was repeated at 5 minutes interval, up to a dose of 15 mg, as needed. If no response is seen, then the patient switched to Cardrone or DC shock, depending on the choice of operator and hemodynamic stability.

SPSS version 20 was used for data analysis. Mean±SD were calculated for continuous variables like age, pulse, and blood pressures. Chi-square test was used to compare categorical variables like gender, treatment outcomes and time to success

RESULTS

A total of 100 patients was studied. The mean age was 31 with±8.6SD. Male were 54% and females were 46%. Group A received Vagal maneuvers, and Group B received verapamil injection. The success rate of vagal maneuvers in group A was 36% (n=18), while in group B, it was 84% (n=42) for verapamil (36% vs 84%, p value<0.001, highly significant). In group A, time for cardioversion in less than 2 minutes was 68%. While in group B, the time for cardioversion in less than two minutes was 12%. (68% vs 12%, p<0.001, highly significant).Cross over in Group A was 64% (n=32) to verapamil. While in group B, this was 6% (n=3) to DC shock and 14% (n=7) to vagal maneuvers (64% vs 18%, p< 0.001, highly significant.) It is shown in Table-1.

Table-1: Demographics and Outcomes

Characteristics	GroupA (Vagal Manoeuvres)	Group-B (Verapamil group)	*p*-value
Mean Age,	32.6	30	NS
Females	56%	36%	
Males	44%	64%	
Success rate	36%	84%	p<0.001
Mean sBP, mmHg	120	118	
Mean dBP mmHg	75	77	
Mean pulse rate	170	172	
Cardioversion in less than 2 minutes	68%	12%	p<0.001
Cross over to other treatment	64%	18%	p<0.001

DISCUSSION

This study shows that the success rate in the form of cardioversion of AVNRT to normal sinus rhythm by Vagal Maneuvers is 36% as compared to pharmacological agent Verapamil, where it is 84%. (p<0.01). The time required for cardioversion in less than 2 minutes is 64% for vagal maneuvers as compared to verapamil, where it is 12%. The cross over to verapamil from vagal maneuvers is 64%. While the crossover from verapamil to DC shock is 12%. The REVERT trial showed that the Valsalva maneuvers are effective in 17%, while modified Valsalva, the effectiveness increase to 40%.[5] Verapamil shows more success rate than Valsalva maneuvers and its intranasal route showed termination of AVNRT in 65–95% of cases.[6,7] Fewer patients needed further treatment with verapamil as the cross over is only 12%. The hospital stay was usually the same as both treatment arms. As there were no comorbidities, these patients usually don't need hospital admission.

We compared Simple Valsalva Maneuvers to pharmacological agent Verapamil, the most commonly used drug in our setting. Though the drug of choice is Adenosine, due to its cost and unavailability, the preferred drug is verapamil in our setups. tripamil, an intranasally administered, L-type calcium-channel blocker, demonstrated high efficacy for rapid SVT termination and conversion to sinus rhythm .[13] We used common Valsalva maneuvers as

most commonly used in clinical settings. Walker S and Cutting P have successfully proved the efficacy of Valsalva Maneuvers.[14,15] Similarly Gagg J has demonstrated the usefulness of Valsalva Maneuvers in adults.[16] We randomized the patients through the Envelope method, to keep the patient and doctor on duty blind.

The success rate with verapamil is higher than Simple Valsalva maneuvers, but when we compared with observational studies, like the Cochrane Database, the success rate with Valsalva maneuvers was higher.[17] The higher success rate of Valsalva Maneuvers in our study might be due to supine position as supine Valsalva achieves greater vagal tone in healthy patients, as shown by Mahta D and Logga R.[18,19] It may be due to the facts, that our patients were younger and have few comorbidities, and they were able to sufficiently generate intrathoracic pressure during Valsalva maneuvers. Though, modification of Valsalva maneuvers may increase its effectiveness.[20–23.]

We did not see any adverse events during the Valsalva maneuvers. We concluded that once patients are trained, they can use it at home as an initial treatment before they seek medical consultation.

It was not easy to fulfill inclusion criteria as at times, it was extremely difficult to avoid patients from an atrial flutter to be excluded. Improved methods of detection and exclusion will further improve the success rate in both treatment arms. Future work is needed to explore different ways like modified Valsalva maneuvers to be tested as it will further increase the success rate of this free of cost method.

CONCLUSION

Simple Valsalva Maneuvers and verapamil proved to be effective in cardioversion of SVT/AVNRT. Both are safe. Verapamil is more successful in cardioversion as compared to Valsalva maneuvers.

AUTHORS' CONTRIBUTION

NUH: Leading researcher, supervised all the components of the study. Asfandiyar wrote introduction of the study. IU: Helped in statiscal analysis and results. STS: Helped in discussion. FA and Abdurrahman: Helped in data collection. MA: Provided moral support.

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Submitted: July 20, 2020	*Revised: August 15, 2020*	*Accepted: May 14, 2021*

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