STUDY OF HIGH RATE ATRIAL EPISODES IN PATIENTS WITH DUAL CHAMBER PACEMAKER AND ITS CORRELATION WITH THE BURDEN OF RIGHT VENTRICULAR PACING

Tarek Hussein El Badawi, Mohamed Ibrahim Sanhoury, Mohamed Khaled El Feky, Sanjukta Soodhowa

Department of Cardiology and Angiology, Faculty of Medicine, Alexandria University.

INTRODUCTION

High rate atrial episodes (AHREs) are defined as atrial rate more than 180 beats per minute lasting more than 5 minutes as per European society of cardiology for cardiac pacing guidelines in patients with pacemaker. Cardiac pacing is recommended for patients with irreversible causes of sinus node dysfunction (SND) and atrioventricular block (AVB). Cardiac implantable electronic devices such as permanent pacemakers, cardiac resynchronization therapy devices can detect and store AHREs which is often a precursor for atrial fibrillation. Many previous studies have shown that patients implanted with dual chamber pacemaker have an incidence of AHREs of 20 -50%. Right ventricular pacing (VP) is the mainstay in treatment of patients diagnosed with SND or AVB with preserved ejection fraction. Frequent right vp in some cases promote irregular heart rhythms and contribute to high atrial rate episodes. Our study showed that the AHREs duration, number and rate of episodes were correlated with high right VP.

AIM OF THE WORK

The aim of the study was to determine the incidence of high rate atrial episodes (AHRE) in patients who have no known history of atrial fibrillation (AF) before dual chamber pacemaker implantation and its correlation with the percentage of right ventricular pacing.

PATIENTS AND METHODS

The prospective study involved 100 patients, 89 with AVB and 11 with SND following dual chamber implantation from February to November 2024 at electrophysiology unit, Smouha University Hospital. All our patients had no prior history of atrial fibrillation. Patients with SND were excluded from the analysis as they have minimal ventricular pacing.

Patient with preserved left ventricular ejection of more than 50% were included. Patient with moderate to severe valvular heart disease, with history of heart failure and chronic renal failure were excluded from the study. Each patient was followed up for 6 months and device interrogation was done. Intra cardiac electrogram from pacemaker interrogation were verified and noted. Upon Statistical Analysis, demographic data, echocardiographic parameters consisting of ejection fraction, pulmonary hypertension and left atrial diameter were noted for each patient. The duration, number and rate of each episode of each AHREs were noted.

RESULTS

The study showed that 21 patients presented AHREs and 68 without it. The incidence of AHREs noted in our study population was 23.6 % at 6 months follow-up.

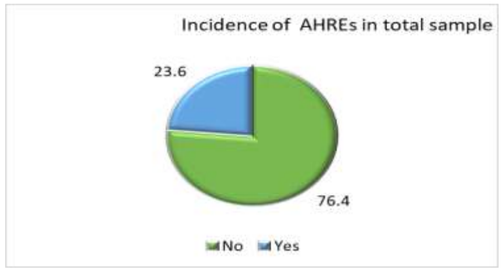

Figure 1:
Representation of incidence of AHREs in total sample.

No significant difference was noted in demographic data (age and gender) and echocardiographic parameters (ejection fraction, left atrial diameter and pulmonary hypertension) between the group of patients with AHREs and without. The mean VP % was higher in group of patients with AHREs and was significant.

Table 1: Comparison of VP percentage in both cohorts

	Total (n = 89)	HRAE (n = 21)	No HRAE (n = 68)	U	p
VP (%)					
Min – Max.	1.0 – 100.0	80.0 – 100.0	1.0 – 100.0		
Mean ± SD.	82.27 ± 22.29	93.33 ± 5.54	78.85 ± 24.35	361.500*	0.001*
Median (IQR)	89.0 (82.0 – 94.0)	93.0 (90.0 – 98.0)	89.0 (77.0 – 90.0)		

AHREs were correlated with right VP, we found that increase of duration (>30 minutes) showed increase in VP of more than 93% and was significant (p value 0.035*). Patients with more than 5 episodes presented with VP of 99 % and it was statistically significant (p value 0.041*). Furthermore, we also correlated the rate of each episode, and found that rate >400 beats per minutes patients presented with VP of 97% and was considered statistically significant (P value 0.041*)

ROC curve analysis was done to determine the cutoff value of Right VP percentage at which the patient will present with AHREs. The curve showed a curpff value of VP >92% at specificity of 72.2 and sensitivity of 79.0, which shows a good analysis of predicting factor.

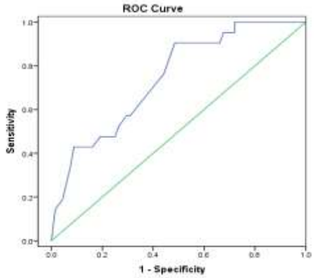

Figure 2:
ROC curve to predict the sensitivity, specificity and accuracy of VP % in predicting the occurrence of AHREs.

CONCLUSION

Patients implanted with dual chamber pacemakers, with no history of atrial fibrillation, frequently experience high-rate atrial episodes (AHREs). The incidence of AHREs in our study was 23.6 % and it showed that there is a correlation of ventricular pacing percentage, with the duration, episodes and atrial rate during AHREs.

No significance were determine between the two groups for demographic data and echocardiographic parameters. Increase in VP percentage were significantly related to increase to duration, rate and number of each episodes.