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# CLINICAL SIGNIFICANCE OF PACED QRS DURATION IN PATIENTS WITH PERMANENT PACEMAKERS

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*The clinical significance of paced QRS duration (pQRSd) was investigated in patients with permanent pacemakers. This study included 93 patients in whom pacemakers were implanted because of sick sinus syndrome, atrioventricular or trifasicular block. Forty nine of the patients were female with an average age of 66.8 (26-90). The patients were divided into two groups according to the pQRSd. 30 patients who had pQRSd 180 msec were in group I. Sixty nine patients who had pQRSd 180 msec were in group II. The pQRSd and QRS duration of conducted beats were measured for all patients. Left ventricular end-diastolic dimension (LVDd), left ventricular end-systolic dimension (LVSD), interventricular septum thickness (IVSt), left ventricular posterior wall thickness (LVPWt), left ventricular ejection fraction (LVEF), and stroke volume (SV) were evaluated echocardiographically in all patients. The pQRSd correlated with LVEF (r: 0.35), LVDd (r: 0.30), IVSt (r:0.16), LVPWt (r: 0.18) and SV (r: 0.16). These results resemble that pQRSd could be an indicator of impaired left ventricular systolic function. In these patients echocardiographic evaluation is strongly recommended.*

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**Q**RS complexes during right ventricular pacing in patients with permanent pacemaker usually resembles left bundle branch block. It is currently unclear which factors influence paced QRS duration. This study has been designed to clarify the clinical significance of prolonged QRS interval during ventricular pacing, and to investigate the relationship between paced QRS duration and left ventricular systolic function.

## MATERIALS and METHODS

Ninety three patients with implanted permanent pacemakers were included in this study. Mean age of the patients was 66.8 (26-90) and 49 of them were female. Pacing indications were: high degree A-V block in 64 patients, sick sinus syndrome in 26 patients, intraventricular conduction defect in 2 patients, slow atrial fibrillation in 1 patient. Patients receiving antiarrhythmic therapy were excluded from this study. Pacemaker operation mode was VVI in all patients during the study. The paced QRS duration was measured from the beginning of the ventricular pacing spike to the end of the QRS complexes on a standard surface electrocardiogram recorded with a paper speed of 25 mm/sec. We used the maximum paced QRS duration in any of the limb or precordial leads for measurement. The spontaneous QRS duration of patients if they had their own rhythm (by lowering pacing rate) was also measured.

All of the patients were examined for an underlying heart disease, and left ventricular systolic functions investigated echocardiographically during pacemaker rhythm. M-mode and two dimensional echocardiography was used. IVSt, LVPWt, LVdd, and LVSd were measured, EF and SV were calculated. Any underlying heart disease was also recorded.

Patients were divided into two groups according to their paced QRS duration. Group I consisted of 30 patients with a paced QRS duration 180 msec. Group II consisted of 63 patients with a paced QRS duration 180 msec. There were no age sex, and underlying heart disease difference between two groups. Statistical analysis was performed by using unpaired student's t test. A p value less than 0.05 was considered statistically significant.

## RESULTS

Mean pQRSd and sQRSd in group I were 196.8 msec and 122.0 msec respectively. The mean values of pQRSd and sQRSd in group II were found to be 157.8 msec, and 102.9 msec re-

spectively. Patients in group I had significantly wider pQRSd compared to patients in group II ( $P < 0.05$ ). There were no statistically significant sQRSd differences between groups.

The thickness of interventricular septum (IVSt), and left ventricular posterior wall (LVPWt) was compared in both groups. In group I mean IVSt and mean LVPWt were 1.18 cm and 1.11 cm respectively. Same measurements in group II were 1.08 cm and 0.99 cm respectively. IVS and LVPW were thicker in group I than in group II. These differences were statistically significant ( $p < 0.05$ ).

Left ventricular systolic functions were also compared. Mean left ventricular ejection fraction (EF) in group I and in group II were 59.1% and 67.4% respectively. Mean stroke volumes in group I and in group II were 72 cm<sup>3</sup> and 105 cm<sup>3</sup> in the same order. Ejection fraction and stroke volume mean values in group I were significantly lower than group II ( $p < 0.05$ ).

The left ventricular diastolic dimension also differed significantly with a mean value of 5.4 cm in group I and 5.0 cm in group II ( $p < 0.05$ ). There was no significant left ventricular systolic dimension differences between two groups.

## DISCUSSION

The QRS complexes during right ventricular pacing usually resembles LBBB configuration. It has been demonstrated that the QRS duration in LBBB is prolonged by reduced left ventricular function and left ventricular hypertrophy<sup>1-3</sup>. Recently Moulton et al. showed that a premature ventricular complex with a long duration and broad notch is a reliable marker for reduced left ventricular function<sup>4</sup>. Sumiyoshi et al. investigated clinical significance of QRS duration during ventricular pacing<sup>5</sup>. In this study we demonstrated that paced QRS duration is influenced by left ventricular function and left ventricular wall thickness. When a paced QRS duration wider than 180 msec is detected, left ventricular function may be re-

duced or left ventricular hypertrophy may be present. In these patients echocardiographic evaluation is strongly recommended.

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