Growth-related change in effect of electrotonic interaction between dual nodal pathways in children with atrioventricular nodal reentrant tachycardia

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Background: Atrioventricular nodal reentrant tachycardia (AVNRT) is less common in children, possibly due to immaturity of the atrioventricular node (AVN). Electrotonic interaction between fast and slow pathways plays an important role in the development of AVNRT, especially in slow-fast type and slow-slow type, by lengthening the refractory period of fast pathway. We hypothesized that the interaction significantly affected older children but not infants. In the present study, we sought to find out the relationship between body size and the involvement of the interaction.

Methods: Retrospective observational study was conducted. Patients who were diagnosed with AVNRT and received radiofrequency catheter ablation with successful slow pathway discontinuation were included in the study. Patients with comorbid congenital heart diseases or with fast-slow type were excluded from the study. Fast pathway effective refractory periods (FP-ERPs) before and after the procedure were compared. ΔFP-ERP was defined as the difference between the FP-ERPs. Correlation coefficient between ΔFP-ERP and body surface area (BSA) of the patients was obtained to describe the influence of growth on the interaction between dual nodal pathways.

Results: Eleven cases with median BSA of 1.22m2 (range 0.78 – 1.51 m2) were included in the study. Fast pathway effective refractory period was significantly shortened after slow pathway disconnection (403.8 ± 95.8 ms vs. 305.6 ± 91.5 ms P <0.001). Furthermore, strong positive correlation was found between ΔFP-ERP and BSA (r =0.659, P =0.028).

Conclusion: The results of the study indicated that FP-ERP lengthened as body size increased. That might explain why AVNRT is more common in adolescents and adults than in younger children.