Unusually Prolonged Bradycardia in A Child After Percutaneous Device Closure of Patent Ductus Arteriosus

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Introduction: Profound bradycardia after large patent ductus arteriosus (PDA) closure is recognized and reported in dogs. In human, the condition was reported to occur after occlusion of large arteriovenous (AV) fistula, which is very similar to large PDA in hemodynamics. The condition is explained by baroreceptor reflex activity called Nicoladoni-Branham sign and is usually benign and self-limiting. Understanding causal relations or possible mechanisms can alleviate unnecessary worries, medications or interventions.

Methods: 4 yrs boy was diagnosed as having large PDA and undergone percutaneous device closure. His baseline heart rate (HR) was 80 bpm and blood pressure (BP) was 97/43mmHg. Pre-op 12 leads ECG showed sinus rhythm with P-wave axis at 0 degree. PDA size was 11mm in echo and 10.3mm in angiogram. PDA was closed with Lifetech PDA Occluder Device 22/20 mm. After procedure was successfully finished, his aortic pressure increased from (79/45/61) to (83/49/66) and HR was 124/min. Around 6Hr after procedure, sinus bradycardia was started to notice with HR 50bpm. However, the child had no symptoms and vital signs are stable throughout. His BP increased to 100/60mmHg. In 24 hr Holter ECG monitoring, sinus bradycardia was present throughout with resting HR 47–68 bpm. The child was sent home with no medication for bradycardia. Recheck ECG was done intermittently and only after 3weeks of PDA closure, his resting HR increased to 74bpm with sinus rhythm. We had similar experience in a 6yr old boy who also received device closure for large PDA.

Result: Closure of large PDA can be followed by transient bradycardia. This phenomenon can be explained by a reflex mechanism, in which increase in mean arterial pressure stimulate arterial baroreceptor causing decrease in heart rate via vagal activation. This condition required no treatment and can prolong for a few days, but except in our case, which lasted for 3 weeks. Another factor is traction or pressure on Vagal trunk by very large device although such mechanical injuries happened in surgical PDA ligation and not reported before to occur in percutaneous device closure.

Conclusion: We reported an occurrence of profound bradycardia following occlusion of large PDA in 4yr boy. The condition was only transient and spontaneously resolved. Branham’s sign of reflex bradycardia is considered to be underlying mechanism although pressure effect on Vagus nerve still cannot be totally excluded.