Fascicular Ventricular Ectopics with Echo Trigeminy.

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Ventricular echo beat following a ventricular premature contraction (VPC) is a well-known cause of ventricular bigeminy. However, ventricular trigeminy resulting from a VPC is less often reported in literature. Here we report the case of a 36-year-old female who presented with history of occasional irregular palpitations since the past several months. Cardiac examination revealed no abnormalities except for an occasional irregularity of the pulse.

The patient’s ECG is shown in Figure 1 and the conduction pattern is depicted in the ladder diagram below (Figure 2). Each sinus beat is followed by an anterior fascicular VPC, which is retrogradely conducted and associated with a ventricular echo (the QRS immediately following the ectopic). Here we discuss the possible mechanisms underlying this trigeminal rhythm.

Figure 1: Standard 12 lead electrocardiogram showing ventricular trigeminy.

Figure 2: Ladder diagram showing the possible mechanisms underlying the trigeminal rhythm.

Discussion

Triggered activity or localized reentry in the fascicular system can give rise to premature impulses or ventricular tachycardia. The surface ECG in anterior fascicular VPC is characterized by RBBB pattern with inferior QRS axis. The diagnosis of fascicular rhythm relies on the recording of the His bundle potential before the onset of surface ventricular activation. Ventricular trigeminy is an infrequent arrhythmia characterized by a group of 3 beats that may occur in 2 scenarios:

1. Two normal beats followed by a VPC.
2. One normal beat followed by 2 VPCs.

Ventricular echo beats frequently described in clinical literature are recognized when a

References

1. Wei Ma, MD; Xunzhang Wang, MD; Eugenio Cingolani, MD; Anees Thajudeen, MD et al., Mapping and Ablation of Ventricular Tachycardia From the Left Upper Fascicle, Circ Arrhythm Electrophysiol. 2013;6:e47-e51.
characteristic sequence is found- a ventricular or junctional beat with a retrograde P wave is followed after a short interval by a QRS complex with a configuration suggesting supraventricular origin. Experimental evidence suggests that the echo phenomenon is due to a longitudinal functional dissociation within the A-V node, as suggested by Scherf and Shookhoff in 1926. Moe and co-workers postulated the existence of a dual A-V nodal conduction system basing their conclusions on indirect studies in the canine heart. The possibility of inhomogeneous conduction in the A-V node of experimental animals was recognized by several other workers. The results of their experiments led Moe and associates to the concept that in the upper part of the A-V node, two functionally different and separate pathways could be present, converging on a final common pathway which feeds the sub nodal conduction system.

In the occurrence of ventricular echo beats, retrograde conduction took place only along one pathway (α or slow pathway), the other (β or fast pathway) failing to participate, presumably due to a longer effective refractory period. The resulting atrial response could then be transmitted antegradely in the pathway, which was open to conduction at that time (fast pathway). Unless the refractory period of the final common pathway prohibited further antegrade conduction, activation of the ventricles followed, resulting in the third QRS complex. An alternative hypothesis is that reflection of the impulse takes place in the A-V node at a lower level than the atrium. Experiments on canine hearts by Mignone and Wallace support the possibility of such a mechanism.

In the case reported by us, the patient is awaiting electrophysiologically evaluation as radiofrequency catheter ablation can be performed successfully by identification of the earliest fascicular potential, which can be curative in this case.

**References**

1. Wei Ma, MD; Xunzhang Wang, MD; Eugenio Cingolani, MD; Anees Thajudeen, MD et al., Mapping and Ablation of Ventricular Tachycardia From the Left Upper Fascicle, Circ Arrhythm Electrophysiol. 2013;6:e47-e51.

