

Paradoxical nonreentrant tachycardia induced by iatrogenic atrioventricular block

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ARTICLE HISTORY

Received 28 June 2018
Revised 29 August 2018
Accepted 4 September 2018

KEYWORDS

Arrhythmia; nonreentrant atrioventricular nodal tachycardia; dual pathway; mechanical block; Congenital heart disease

Image focus

A 5 week old male infant with complex congenital heart disease underwent cardiac catheterisation and balloon dilatation of a banded pulmonic artery. He was born with a univentricular heart: double inlet left ventricle with L-loop. He had undergone a surgical correction for aortic coarctation and pulmonic artery banding in the first week of his life.

The electrocardiogram before the catheterisation procedure showed a normal PR interval. During the procedure, transient mechanical total atrioventricular (AV) block occurred due to contact between the intracardiac balloon and the AV conduction system. At the end of the procedure, AV conduction improved to a pronounced atrioventricular delay with a PR interval of 390 ms, and the patient was admitted to the intensive care unit to monitor AV conduction. In the subsequent hours, he developed paroxysms of narrow-QRS tachycardia at a rate of 230 bpm showing 'one to two' conduction over the AV node, with each P wave followed by two QRS complexes with alternating R-R interval (Figure 1). He was treated with a low dose of intravenous metoprolol without clear effect on the tachycardia episodes; intravenously administered amiodarone with cooling resulted in acceptable rate control. After one day, the PR interval decreased again to 140 ms and the episodes of tachycardia disappeared, without recurrence during follow-up.

'One to two' tachycardias over the AV-node are well known and caused by dual fast and slow AV nodal pathway conduction [1]. Our case, however, is the first report describing a 'one to two' tachycardia caused by iatrogenic slowing of the AV nodal conduction due to mechanical block. The most probable explanation for our findings is transient block of the fast antegrade AV-nodal pathway, and concurrent slowing of the antegrade slow pathway resulting in pronounced first-degree atrioventricular block. When antegrade fast pathway conduction recovers, 'one to two' conduction over the fast and slow pathway results in tachycardia. When also slow pathway conduction improves later on, 'one to two' conduction is no longer possible because of the refractoriness of the His-Purkinje system after the previous impulse over the fast AV nodal pathway, resulting in disappearance of the tachycardia episodes.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Joris Ector is supported by a research grant from the Fund for Scientific Research—Flanders. Mieke Roggen is supported by the Eddy Merckx Pediatric Cardiac Research Fund.

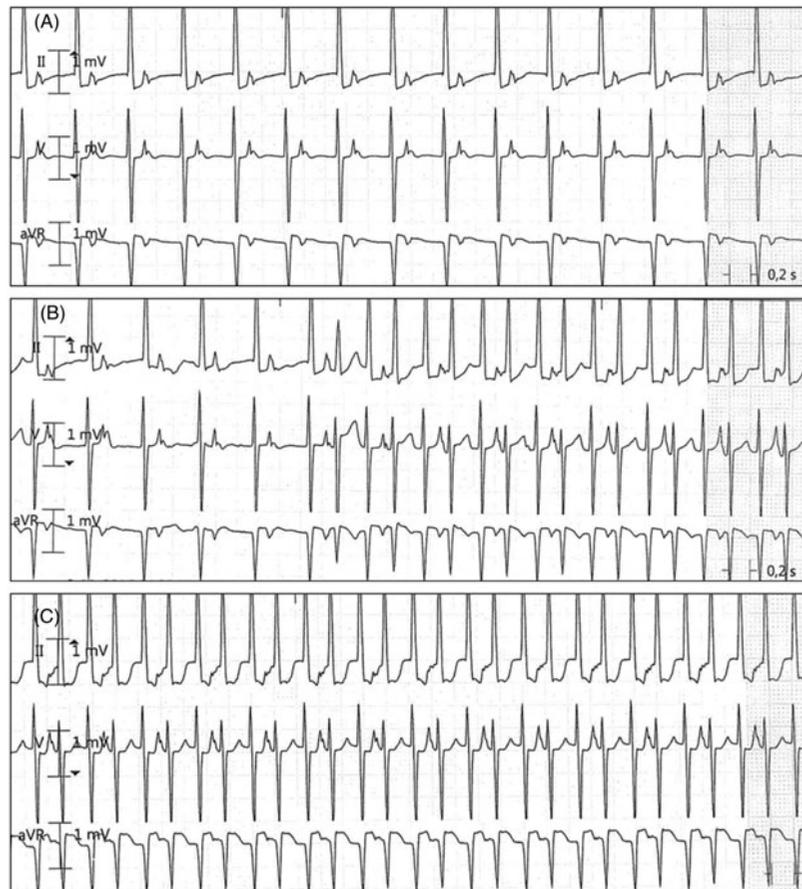


Figure 1. Electrocardiographic monitoring of leads II, V1 and aVR. (A) Pronounced PR prolongation after the balloon dilatation procedure. There is a one to one P/R relationship with a PR interval of 390 ms. (B) Initiation of a one to two tachycardia over the AV-node, showing a one to two P/R relationship with marked QRS-alternans and alternating R-R interval. (C) Continuation of the one to two tachycardia in subsequent hours, until improvement in AV nodal conduction makes one to two conduction impossible and normal one to one AV-conduction is restored.

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Reference

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