

# Electrophysiologic behaviour of a left sided accessory pathway with decremental (Mahaim-like) properties

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Received 13 September 2011; revised 10 November 2011; accepted 17 January 2012

## ABSTRACT

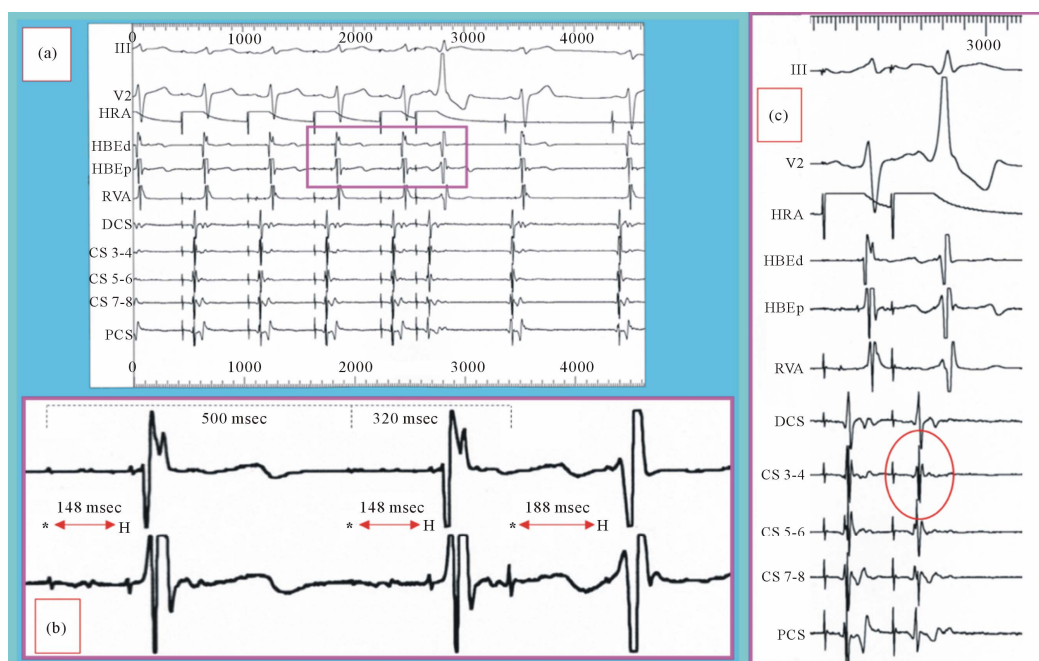
The observation of a left sided accessory pathway with decremental properties is rare. We describe the behaviour of one of these pathways which was characterized by the presence of retrograde conduction (not previously reported) and thus inducibility of atrio-ventricular orthodromic reentrant tachycardia.

**Keywords:** Accessory Pathway; Decremental Properties

## 1. INTRODUCTION

A 52 year-old male was admitted to our cardiology de-

partment complaining recurrent episodes of palpitation. The ECG pattern showed sinus rhythm with PR interval 80 msec and signs of minimal ventricular pre-excitation. The electrophysiologic study showed a left lateral eccentric and decremental retrograde conduction. During programmed right atrial stimulation, antegrade long conduction times were detected, along with a progressive lengthening of the A-H interval, a contemporary shortening of the H-V interval and a progressive pre-excitation of QRS complexes with right bundle branch block (RBBB) morphology (**Figures 1(a)-(b)**). The earliest ventricular activation was observed at the level of the distal dipoles of the coronary sinus diagnostic catheter,



**Figure 1.** Electrophysiologic study; programmed right atrial stimulation ( $S_0 - S_0$  500 msec;  $S_0 - S_1$  320 msec). Lengthening of the spike (\*)-H interval, contemporary shortening of the H-V interval (H wave moving inside the slow initial component of V wave), and progressive pre-excitation of QRS complexes with a right bundle branch block (RBBB) pattern are visible (1(a) and 1(b) [details]). The earliest ventricular activation (details in 1(c)) occurs at the level of CS 3 - 4 (one of the distal dipoles of the coronary sinus diagnostic catheter, red circle), thus suggesting the presence of a left lateral accessory pathway with decremental properties. HRA = High Right Atrium; HBEd and HBEP = His Bundle catheter Electrodes distal and proximal, respectively; RVA = Right Ventricular Apex; DCS = Distal Coronary Sinus; PCS = Proximal Coronary Sinus; \* = spike.

thus suggesting the hypothesis of a left lateral accessory pathway with decremental properties (**Figure 1(c)**).

During these manoeuvres, two different arrhythmias were induced. The former was an antidromic atrio-ventricular reentrant tachycardia with RBBB morphology (cycle length 248 msec); the site of the earliest ventricular activation was confirmed to be at the level of the left lateral wall (**Figure 2**). The latter was an orthodromic atrio-ventricular reentrant tachycardia with normal QRS morphology and late progression to an aberrant, RBBB-like ventricular conduction (cycle length 282 msec); also the earliest site of the atrial back-activation was detected at the level of the left lateral wall (**Figure 3**).

The mitral ring electrical mapping in sinus rhythm allowed the earliest ventricular activation to be recorded at the level of the left lateral wall. The accessory pathway was successfully ablated.

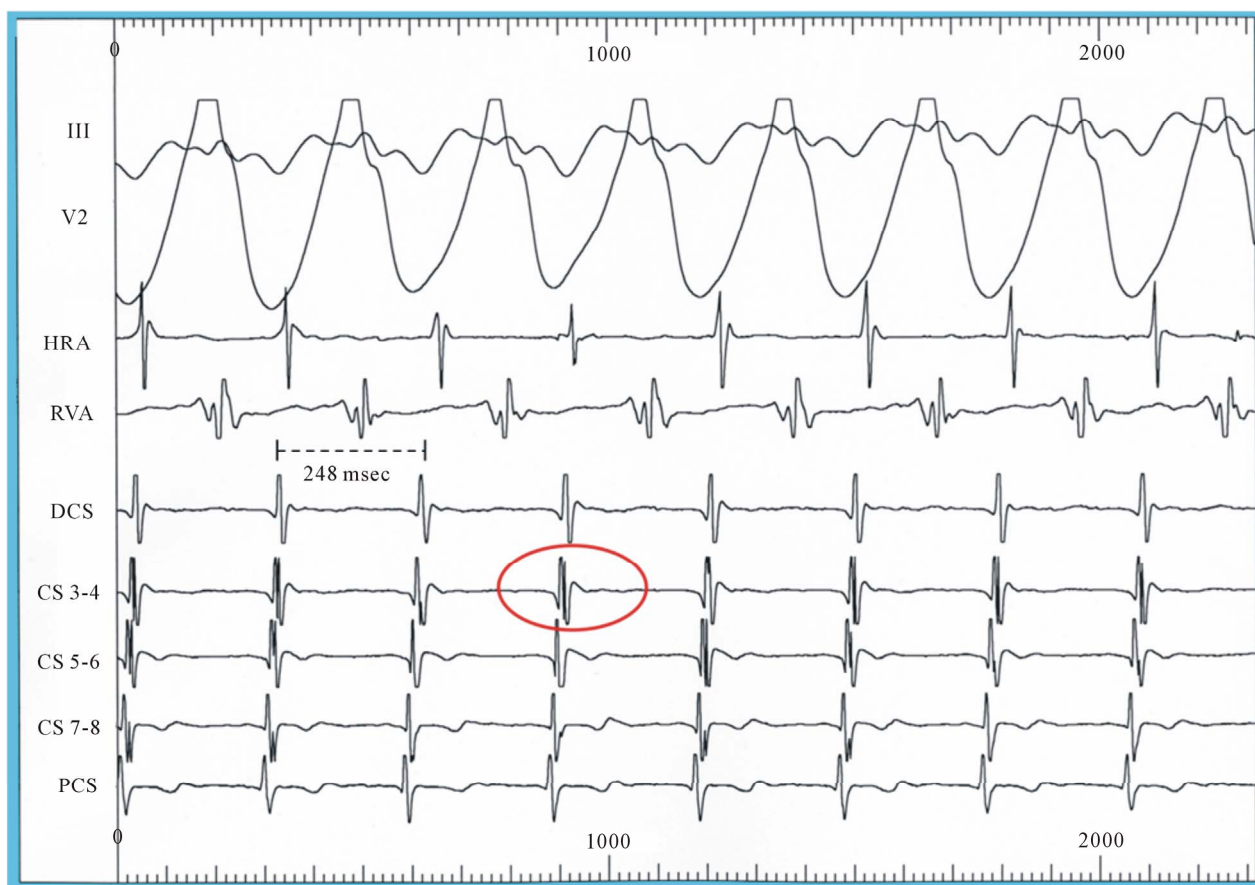
## 2. DISCUSSION

In 1938, Mahaim firstly described the existence of cardiac nodo-ventricular conduction fibres [1]. The behavi-

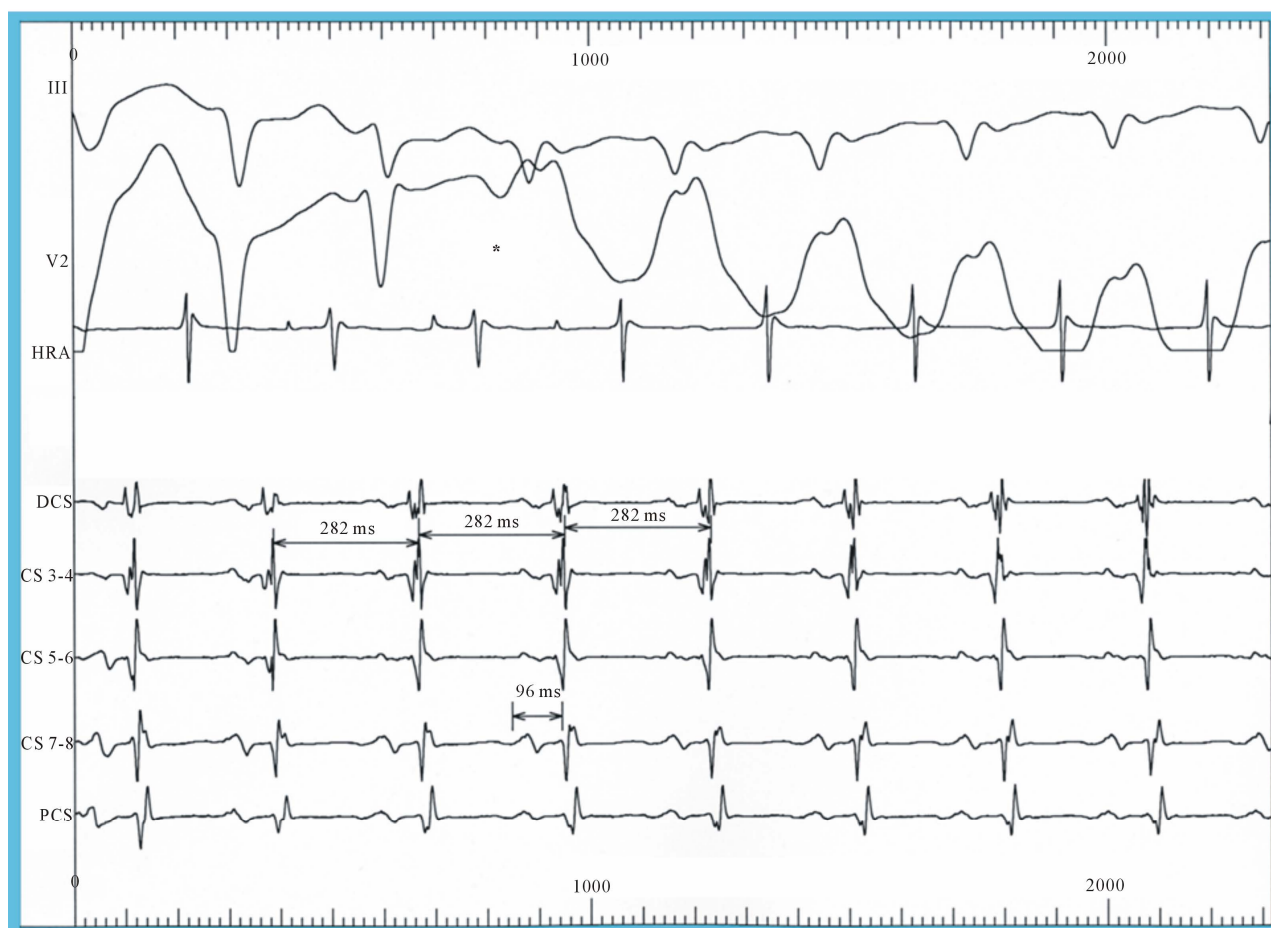
our of these fibres (which are now actually known to be atrio-fascicular or atrio-ventricular) is characterized by antegrade decremental conduction, minimal or no pre-excitation during sinus rhythm, absence of retrograde conduction over the accessory pathway, participation of the atrium in the antidromic reentrant tachycardia and responsiveness to adenosine. Most of these fibres have been described in the right atrium, although several works do exist concerning the observation of Mahaim-like properties in some left sided accessory pathways [2-7]. Indeed, the electrophysiologic properties of the pathway we describe are not fully compatible with the Mahaim fibres behaviour. The original finding is that a retrograde conduction along the pathway was present, as confirmed by both the basal ventricular stimulation and the induction of an orthodromic reentrant atrio-ventricular tachycardia. Such observation is quite rare and has been previously reported only in a right sided accessory pathway [2].

## 3. CONCLUSION

Although quite rare, findings of retrograde conduction



**Figure 2.** Antidromic atrio-ventricular reentrant tachycardia with RBBB morphology (cycle length 248 msec); the site of the earliest ventricular activation is detectable at the level of the left lateral wall (red circle). HRA = High Right Atrium; RVA = Right Ventricular Apex; DCS = Distal Coronary Sinus; PCS = Proximal Coronary Sinus.



**Figure 3.** Orthodromic atrio-ventricular reentrant tachycardia with normal QRS morphology and late progression to an aberrant, RBBB-like ventricular conduction (cycle length 282 msec, red star); the earliest site of the atrial back-activation is detectable at the level of the left lateral wall (CS 3 - 4). HRA = High Right Atrium; DCS = Distal Coronary Sinus; PCS = Proximal Coronary Sinus.

properties in left sided accessory pathways with decremental properties are possible and must be taken into account in the differential diagnosis process concerning orthodromic atrio-ventricular reentrant tachycardias.

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