

EP CASE REPORT

Interatrial electrical dissociation: when the left atrium does not know what the right atrium is doing

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A 59-year-old man, with a history of previous ablation of cavotricuspid isthmus for clockwise typical atrial flutter 8 years before, underwent electrophysiological study for the recurrence of atrial flutter, with minimally symptomatic bradycardia.

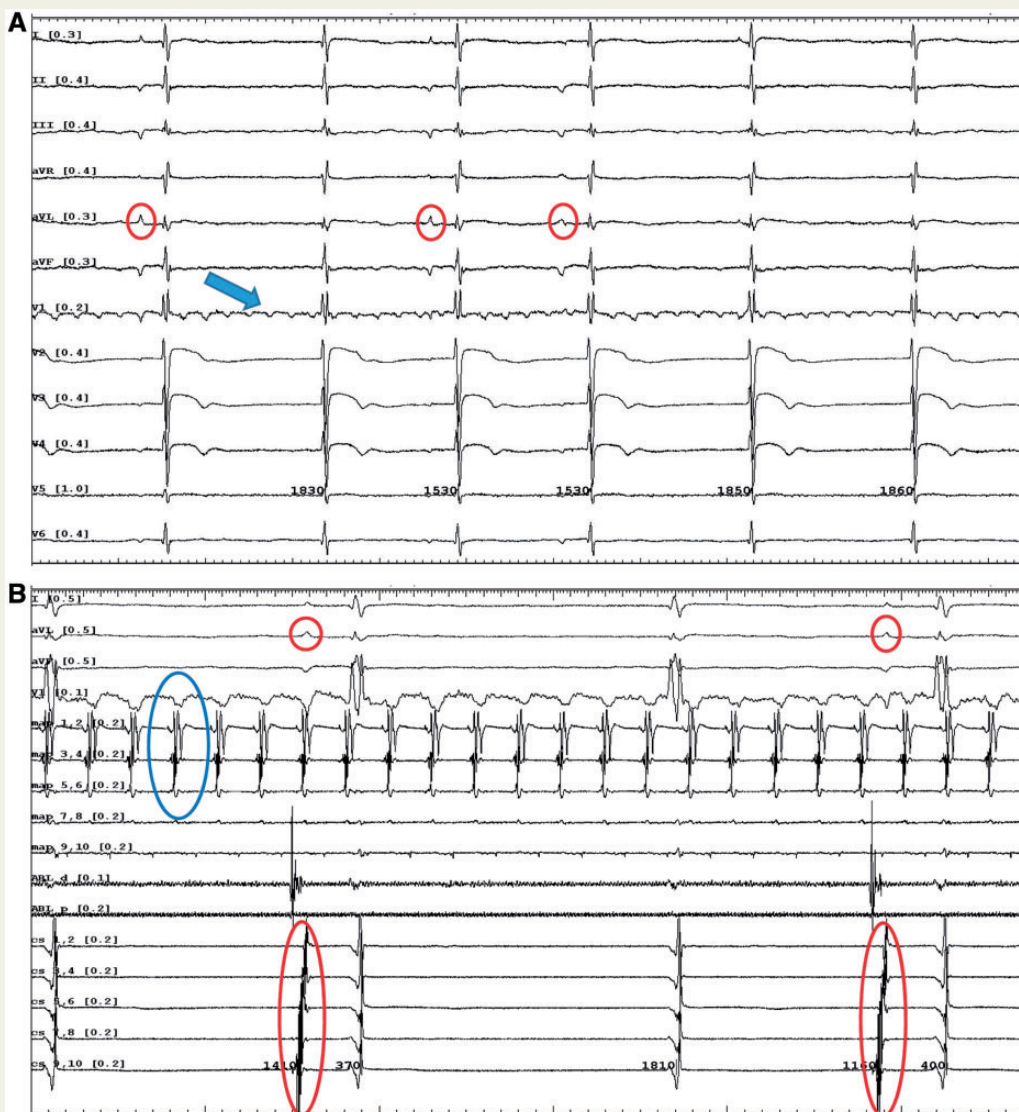


Figure 1 Panel (A) The 12-lead surface electrocardiogram recorded in a patient during an atrial flutter ablation procedure. Lead V1 shows a fast (250 bpm) but regular atrial rhythm (blue arrow), while in the other 11 leads a slower (45 bpm) ectopic atrial rhythm with different P morphologies can be noticed (red circles). Panel (B) Surface and intracardiac recordings, same rhythm as in panel A. Interatrial electrical dissociation can be noticed: the mapping catheter (map 1-10) positioned in the right atrium recorded a fast, organized atrial tachycardia with the same cycle length of the atrial arrhythmia recorded in V1 lead (blue circle), while a slower atrial rhythm was recorded in the left atrium (coronary sinus catheter: CS1-10) and D1, aVL and aVF leads (red circles).

The electroanatomic map of the right atrium showed multiple low-voltage areas in the cavotricuspid isthmus zone (consistent with the previous ablation), the posterolateral atrial wall and around the ostium of the coronary sinus, the latter suggesting the presence of extensive atrial myocardial fibrosis.

During the manipulation of the mapping catheter in the superior portion of the interatrial septum on the right atrial side, the following 12-lead electrocardiogram was recorded (*Figure 1A*).

Lead V1 (which explores predominantly the right atrial electrical activity) shows a fast (250 b.p.m.) but regular atrial rhythm (blue arrow), while in the other leads a slower (45 b.p.m.) ectopic atrial rhythm with different P morphologies can be noticed (red circles). The RR interval is irregular suggesting a varying grade of atrioventricular (AV) block.

The intracardiac electrograms (*Figure 1B*) revealed interatrial electrical dissociation: the mapping catheter (map 1–10) positioned in the right atrium recorded a fast (250 b.p.m.), organized atrial tachycardia (blue circle), while a slower atrial rhythm (red circles) was recorded in the left atrium [coronary sinus catheter (CS)].

Supra-Hisian AV block was also diagnosed, likely due to the presence of extensive atrial fibrosis involving the myocardial tissue around the AV node.

The patient eventually received a single chamber rate-responsive ventricular pacemaker with complete resolution of the symptoms during follow-up.

Interatrial dissociation is a rare but known form of cardiac electrical conduction disturbance, first described by K.F. Wenckebach in 1906.¹

The first cases were described in patients with digitalis intoxication.

Nonetheless, its existence has been questioned until the development of techniques allowing recording of the intracardiac electrical activity.

Interatrial dissociation has since then been reported after amiodarone administration for atrial arrhythmias, or after complex atrial ablation procedures.

The primary sites of interatrial electric connection in the normal atria are presumed to be along the Bachmann bundle, interatrial septum (primarily fossa ovalis), and the musculature of the proximal coronary sinus.²

In our patient, who never used amiodarone, the presence of extensive atrial fibrosis (particularly around the CS ostium as demonstrated by the electroanatomic map) and the traumatic injury during catheter manipulation near the Bachmann's bundle could have led to interatrial bidirectional conduction block.

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References

1. Wenckebach KF. Beiträge zur Kenntnis der menschlichen Herzstätigkeit. *Arch. f. Anat. u. Physiol Physiologische Abteilung* 1906;297–354.
2. Ho SY, Anderson RH, Sánchez-Quintana D. Atrial structure and fibres: morphologic bases of atrial conduction. *Cardiovasc Res* 2002;**54**:325–36.