

## Isorhythmic dissociation by alternating interference with double nodal response after cardiac surgery: a case report

### Dissociation isorythmique par interférence alternant avec une double réponse nodale après une chirurgie cardiaque. A propos d'un cas

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#### Résumé

La dissociation auriculoventriculaire isorythmique par interférence est une entité rythmologique rare dans la pratique courante et souvent méconnue. Son association à une dualité nodale engendrant une double réponse ventriculaire est exceptionnelle. Nous rapportons l'observation d'une telle association dans un contexte post-opératoire d'une correction chirurgicale d'une communication interauriculaire dans les suites d'une tentative de fermeture de ce défaut par un amplatzer compliquée d'une migration de la prothèse.

#### Mots-clés

Dissociation isorythmique, dualité nodale, chirurgie cardiaque

#### Summary

Isorhythmic atrioventricular dissociation by interference is a rhythmic entity that is rare in current practice and often unrecognized. Its association with a nodal duality generating a double ventricular response is exceptional. We report the observation of such association in a postoperative context of a surgical correction of interauricular communication following an attempt to close this defect by an amplatzer complicated by a migration of the prosthesis.

#### Keywords

Isorhythmic dissociation, double nodal response, cardiac surgery

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## INTRODUCTION

Isorhythmic atrioventricular dissociation by interference is a clinical situation that appears to be rare, the exact prevalence of which is not known [1-3]. It is characterized by the presence of an often sinus rhythm competing with a junctional or ventricular rhythm. The frequencies of the two rates are close which creates a hidden conduction in the conduction pathways causing a functional blocking often at the nodal level. Nodal duality, observed in about 25% of the general population, only exceptionally generates a double ventricular response, described for the first time in 1979 and reported in about 20 publications [4,5].

We report the case of an association between an atrioventricular dissociation by interference and a double nodal response in a postoperative context.

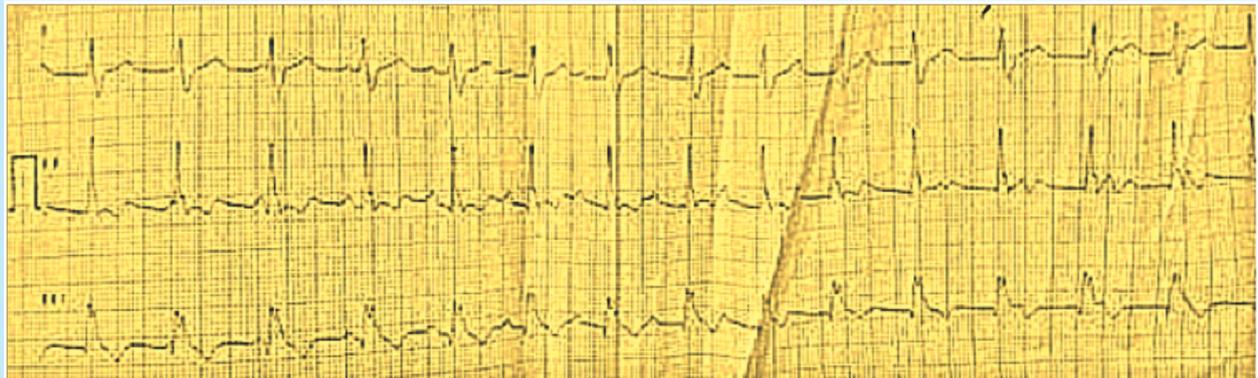
## OBSERVATION

A 19-year-old patient, hospitalized for percutaneous

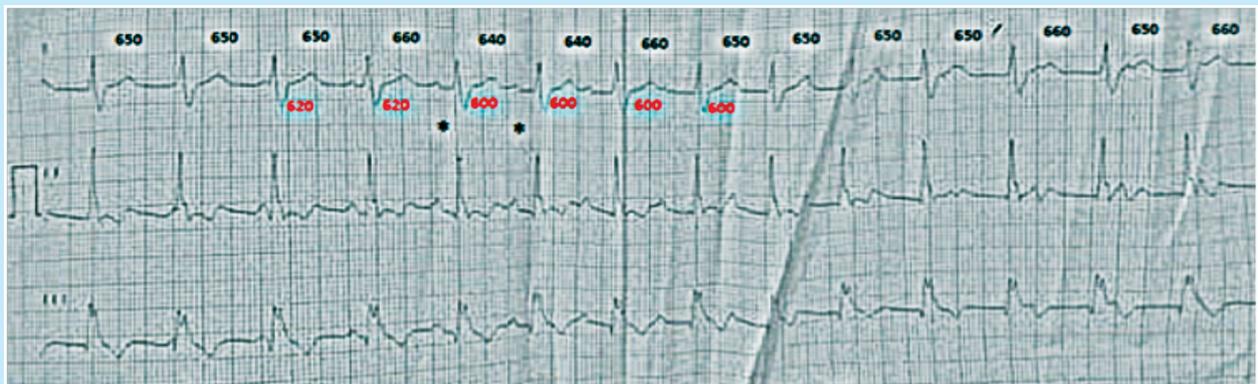
closure of a septal ostium secundum interauricular communication. The implantation of a 28mm Amplatz prosthesis proceeded without incident. Forty-eight hours later, following a systematic ultrasound examination, we discovered the migration of the prosthesis in the right atrium. The patient was urgently operated, it was noticed that the prosthesis migrated into the tricuspid annulus and caused a tear in the septal valve. The surgical procedure consisted of a right atrial approach under extracorporeal circulation, right atriotomy, removal of the amplatz, suture of the tricuspid leaflet and closure of the interatrial communication using a pericardial patch.

Postoperatively, the patient developed a fast junctional rhythm at 92bpm associated with an isorhythmic atrioventricular dissociation by interference (figure 1).

The analysis of the ventricular rate (figure 2) (black color) and auricular (red color) intervals shows a probable atrioventricular capture attested by a shortening of the ventricular cycle of 20 ms (marked by an asterisk \*).



**Figure 1:** Fast junctional rhythm at 92bpm associated with an isorhythmic atrio-ventricular dissociation by interference



**Figure 2:** ventricular cycle in ms (black), atrial cycle in ms (red)

The massage of the carotid sinus had no effect on this anomaly. On the other hand, the injection of 0.25 mg of Atropine made it possible to restore atrioventricular conduction with a Luciani-Wenckebach sequence. Forty-eight hours later, the patient experienced an irregular but periodic heartbeats (figure 3).

The fine analysis of this arrhythmia has identified a period of recurrence that can be explained by:

- Double nodal response
- Progressive lengthening on the fast track realizing a sequence of Wenckebach 4/3
- Alternating with progressive lengthening on the slow path with a Wenckebach 4/3 sequence.

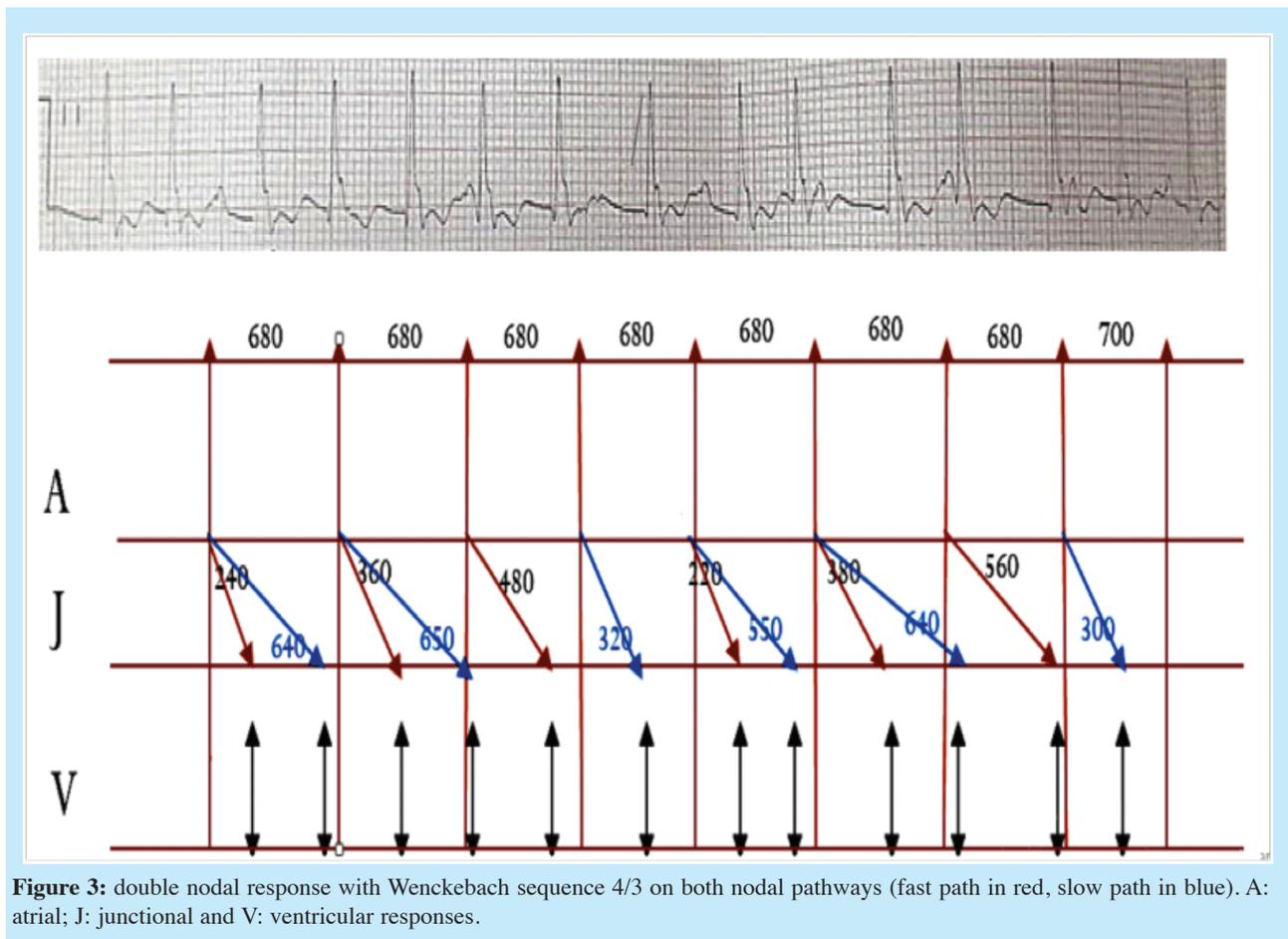
Confirmation by electrophysiological exploration was not performed because of the presence of sepsis. The evolution was marked by the installation of a complete atrioventricular block (AVB) with a junctional escapement without hemodynamic repercussion as well at rest as during exertion. The equipment by a pacemaker was not held in front of the good tolerance of the BAV.

## DISCUSSION

Atrioventricular dissociation by interference is a rare rhythmic entity [1,2]. This entity has been described in ischemic events, myocarditis, hydro-electrolytic abnormalities, digitalis intoxication, after using anesthetic drugs and after cardiac surgery. The prognosis is often good except in case of poor hemodynamic tolerance explained by atrioventricular asynchrony [1,3]. Garcia [4] has reported its association with a double response. However, this entity does not seem to be described in the literature after cardiac surgery.

Nodal duality is present in about 25% of the general population but often without consequences [6,7]. In our presentation, postoperative inflammatory phenomena were in the origin of:

- hyperautomatism generating the isorhythmic dissociation by interference
- Longitudinal nodal dissociation generating the double



**Figure 3:** double nodal response with Wenckebach sequence 4/3 on both nodal pathways (fast path in red, slow path in blue). A: atrial; J: junctional and V: ventricular responses.

nodal response associated with an obvious decremental conduction aggravated by these inflammatory phenomena. Subsequently, inflammatory sequelae would have been the cause of the installation of a complete atrioventricular block possibly aggravated by surgical trauma of the conduction pathways. The electrophysiological exploration is necessary to understand this situation but it has not been practiced. In the absence of literature data, the prognosis is difficult to formulate.

## CONCLUSION

Isorhythmic atrioventricular dissociation by interference remains a rhythmic curiosity. This case illustrates that this rhythmic entity could evolve towards the installation of an atrioventricular block but the exact mechanisms behind this issue should be clarified.

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