

CASE REPORT

Resumption of interatrial conduction after atrial premature beat in baseline interatrial aberrancy

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Abstract

Interatrial block (IAB) is a delay or blockage of interatrial conduction from the right atrium to the left atrium, causing prolongation of the P-wave duration on the electrocardiogram. This condition is unfortunately not uncommon in clinical practice, especially among the elderly. It is often overlooked because the P wave is small and abnormalities can be difficult to detect. An isolated IAB does not usually cause any abnormal symptoms and may not require any specific treatment. Nevertheless, a relationship between an IAB and other cardiovascular conditions including left atrial electromechanical dysfunction, atrial remodeling, atrial fibrosis, atrial fibrillation, and stroke has been reported. Early diagnosis of this condition is critical. This case report presents a functional interatrial block or interatrial aberrancy that returned to normal after an atrial premature complex where the interatrial conduction remained normal in subsequent beats.

KEYWORDS

advanced interatrial block, atrial aberrancy, atypical advanced interatrial block, interatrial aberrancy, interatrial block, second-degree interatrial block

1 | INTRODUCTION

Interatrial block (IAB) is one of the most common electrocardiogram (ECG) abnormalities among the elderly. Studies have found a relationship between IAB and other cardiovascular conditions such as left atrial electromechanical dysfunction, atrial remodeling, atrial fibrosis, atrial tachyarrhythmias especially atrial fibrillation, stroke, and cardiovascular and all-cause mortality (Agarwal et al., 2003; Ariyaratnam et al., 2007; Bayés de Luna et al., 1999; Benito et al., 2017; Goyal & Spodick, 2001; Magnani et al., 2011; O'Neal et al., 2016). The definition of the IAB is a delay or blockage of the atrial signal transferred from the right atrium to the left atrium (Bayés de Luna et al., 2017). These can occur at any location in the atrium. The upper part of the interatrial zone, especially Bachmann's region, is usually involved in an advanced IAB (A-IAB).

The typical ECG pattern of A-IAB, biphasic P wave in inferior leads, is caused by caudo-cranial direction of the signal. This ECG pattern was described in 1985 and confirmed in a consensus report in 2012 (Bayés de Luna et al., 1985, 2012). Antonio Bayés de Luna et al. (1988) first demonstrated that a typical ECG pattern of A-IAB was associated with atrial fibrillation/atrial flutter (Bayés de Luna et al., 1988). This interatrial block was later named as Bayés syndrome (Bacharova & Wagner, 2015). Edward K Chung (1972) reported the aberrant atrial conduction immediately after a premature beat (postectopic pause) which indicated organic heart disease (Chung, 1972). However, the mechanism remains not well understood. It is believed that the concealed atrial conduction and the changing of the atrial refractory period after ectopic beat play a major role in this condition. This report shows the opposite phenomenon to what Chung observed, which is the recovery to normal

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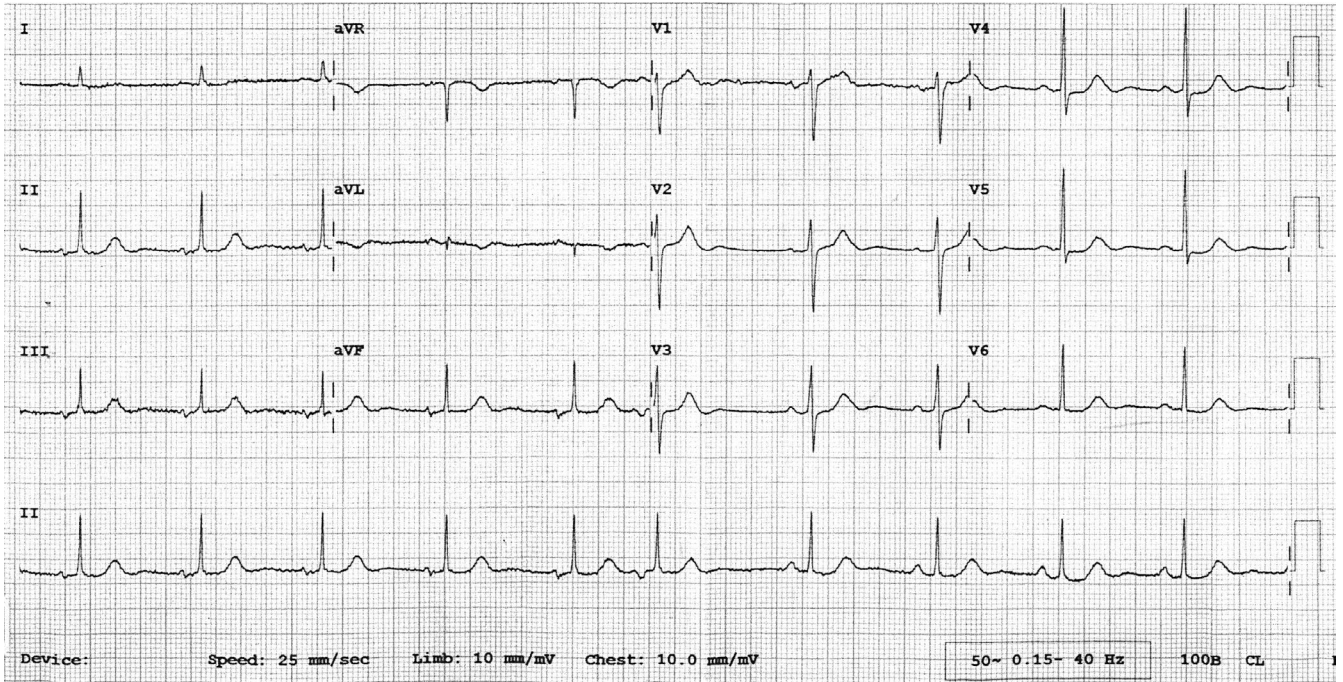


FIGURE 1 The 12-lead ECG shows interatrial aberrancy with resumption of the conduction after atrial premature beat

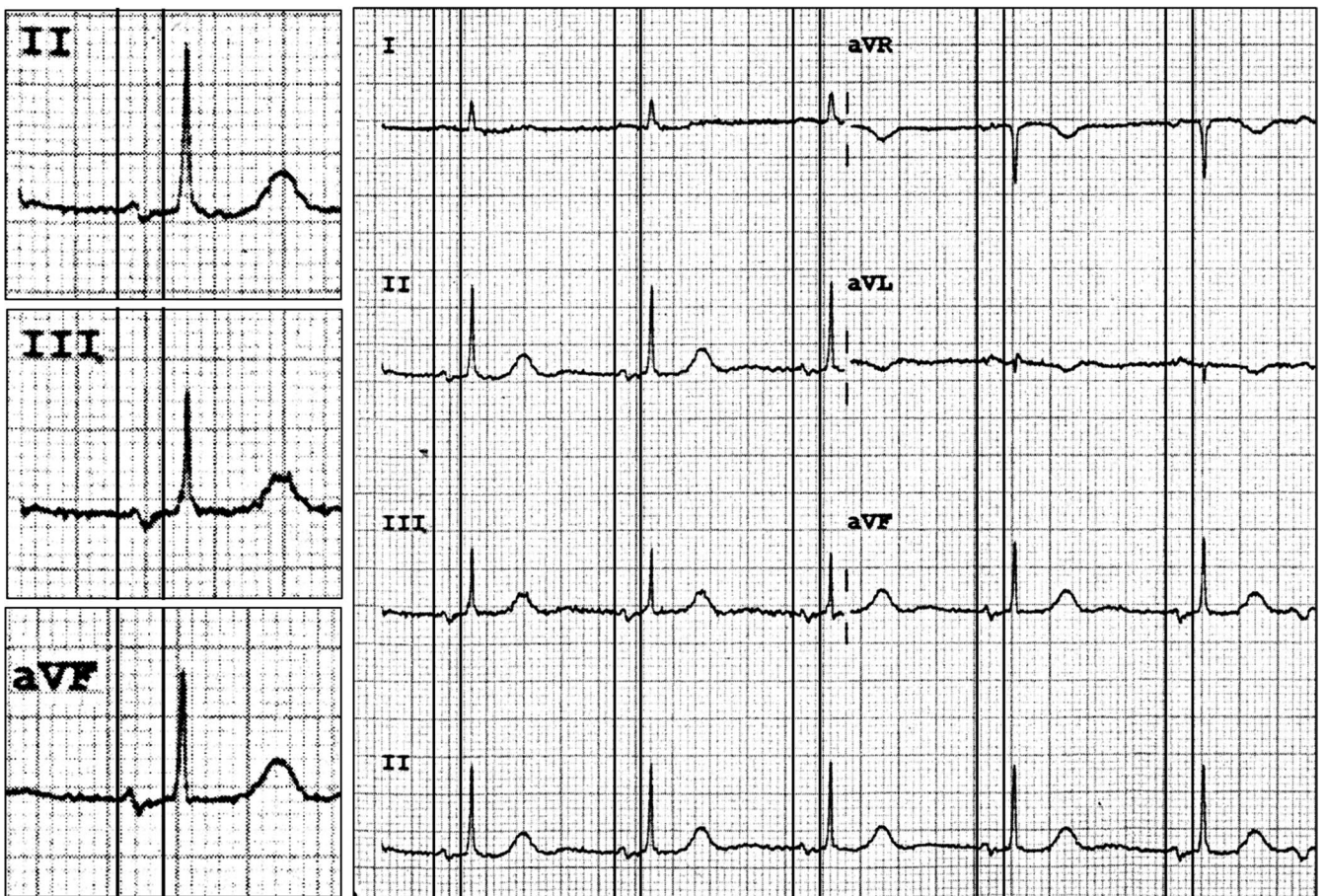


FIGURE 2 Three different P-wave morphologies of atypical advanced interatrial block in the inferior leads

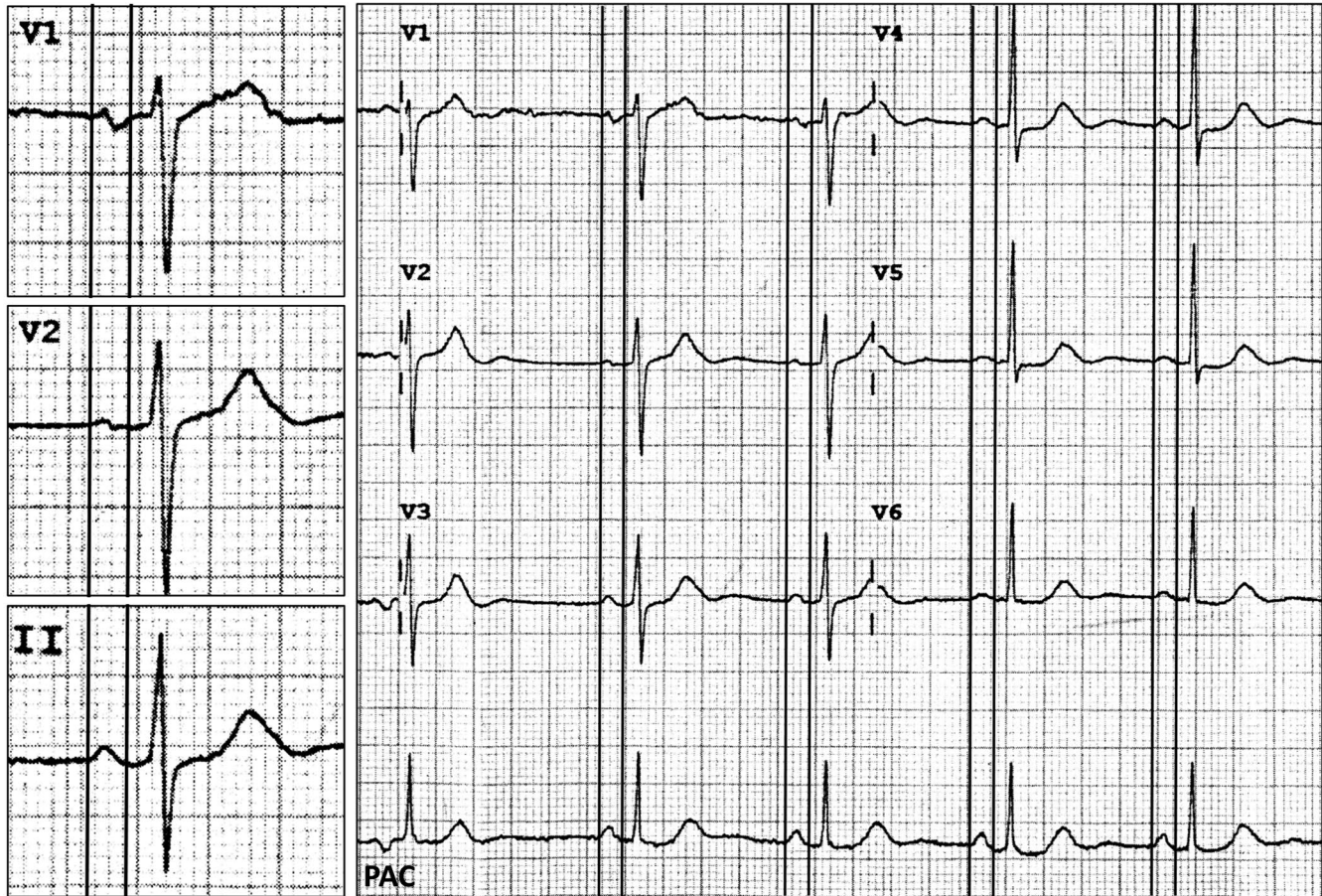


FIGURE 3 Normalization of interatrial conduction after a premature atrial complex (PAC)

from an interatrial block after an atrial premature beat with the interatrial conduction remaining normal in subsequent beats.

2 | CASE REPORT

An 81-year-old Thai female patient with past medical history of chronic hepatitis B virus infection was detected with having an abnormal heartbeat after an annual physical examination. A 12-lead ECG was performed as shown in Figure 1. She was then sent to cardiologist for consult at the heart clinic. She denied any palpitations or presyncopal symptoms. Her current medication was only 0.5 mg of entecavir daily.

3 | DISCUSSION

From the ECG (Figure 1), it is noted that the first five P waves in the inferior leads are slightly uncharacteristic and different from what would normally be expected for a sinus P wave. Looking carefully at the P wave (Figure 2), it can be observed that there are three different P-wave morphologies in the inferior leads, all of which have a P wave duration greater than 120 ms. Lead II shows triphasic P

wave (positive–negative–positive), lead III shows isodiphasic P wave (neutral–positive–negative), and lead aVF can also be characterized as isodiphasic P wave (positive–negative–neutral). The 6th beat is observed to be a premature atrial complex (PAC) followed by a postectopic pause. It is interesting that the P-wave morphology in lead II following the pause has returned to the normal sinus P-wave morphology (upright, monophasic morphology with slightly less than 120 ms of P-wave duration) (Figure 3). The P-R and P-P interval remain the same after postectopic pause (Figure 4) confirming that the heartbeat remains in sinus rhythm.

The concept of an interatrial block is quite similar to the blockage of the SA exit, AV node, or a bundle branch block in ventricles, which can be categorized as a delay or blockage of the signal into 3 levels: i) first degree (delayed atrial conduction time or partial interatrial block; P-IAB), ii) second degree (transiently block interatrial conduction or interatrial aberrancy), and iii) third degree (completely blocked interatrial conduction or advanced interatrial block; A-IAB) (Bayés de Luna et al., 2012; Chhabra et al., 2014). The criteria for the interatrial block have not been conclusive. Most diagnoses are reached with the P-wave duration of either ≥ 110 ms (Chhabra et al., 2014) or ≥ 120 ms (Bayés de Luna et al., 2012). In the advanced IAB, the P-wave morphology can exhibit a typical biphasic pattern (positive–negative), which is not demonstrated in this patient. It

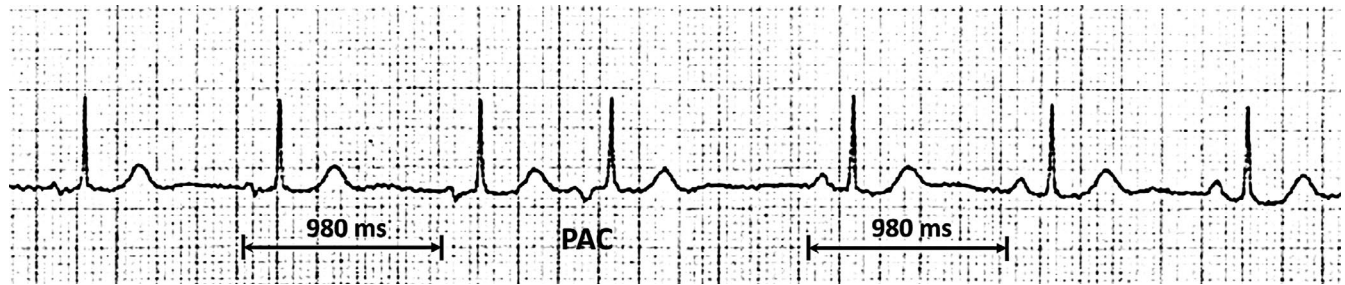


FIGURE 4 The P-P interval before and after premature atrial complex (PAC)

may also be an atypical pattern such as isodiphasic pattern (neutral-positive-negative or positive-negative-neutral) as shown in lead III and lead aVF, respectively, or triphasic pattern (positive-negative-positive) as shown in lead II (Bayés de Luna et al., 2017). This triphasic P-wave pattern in lead II corresponds to the type II atypical A-IAB according to recently published morphological criteria (Bayés de Luna, Escobar-Robledo, et al., 2018). The P wave in lead III and aVF, however, do not meet the criteria. This requires the presence of many atypical P-loop patterns depending on the severity of conduction delay or blockage within the Bachmann's region.

Interestingly, the atypical advanced IAB in this patient returned to the normal sinus P-wave morphology after a premature atrial complex (PAC), which is consistent with second-degree IAB. The P-R and P-P intervals that followed the pause presented the same duration as the previous intervals. This type of blockage has been recently published, but is typically the pattern of an A-IAB that appears again (Bayés de Luna, Baranchuk, et al., 2018; Wang et al., 2019). This is not what was observed in this patient case report where the P-wave morphology remains normal in subsequent beats. The resumption mechanism of interatrial conduction after atrial premature beat is not well understood. It is believed that the concealed atrial conduction and the changing of the atrial refractory period after an ectopic beat play a major role in this condition using the same mechanism as the intra- and interventricular conduction disturbances in the bundle branches in ventricles (Bayés de Luna, Baranchuk, et al., 2018; Chung, 1972).

4 | CONCLUSIONS

This case report presents the normalization of atypical advanced interatrial block after atrial premature beat where the interatrial conduction remained normal in subsequent beats. The case classification is consistent with a second-degree interatrial block.

CONFLICT OF INTEREST

None.


AUTHOR CONTRIBUTIONS

Wrote and edited the manuscript: The author.

ETHICAL APPROVAL

This report was written respecting patient privacy and confidentiality.

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