CASE REPORT

Second-degree interatrial block: Brief review and concept

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Abstract

The advanced interatrial block (A-IAB) ($P \geq 120$ ms plus $\pm$ pattern in II, III and aVF) corresponds at atrial level, to right or left advanced bundle branch block at ventricular level, and it is well known that these patterns may be seen transiently in relation to tachycardia or bradycardia (tachycardia or bradycardia dependent right or left bundle branch block). We present for the first time, the same phenomenon at atrial level. In one case, the A-IAB appears in relation to tachycardization and in the other disappears during a pause induced by ventricular premature complex.

KEYWORDS

atrial fibrillation, interatrial block, intermittent, second-degree

Interatrial block (IAB), as other types of heart block, has been classified into three grades: first (partial), second (intermittent), and third (advanced) (Bayés de Luna et al., 2012). ECG definitions and criteria of partial IAB (P wave ≥ 120 ms) and advanced IAB (A-IAB) (P wave ≥ 120 ms with biphasic morphology in leads II, III, and aVF) have also been universally accepted (Bayés de Luna, 2012; Bayés de Luna et al., 1985).

However, the ECG concept of intermittent A-IAB has only been briefly and partially discussed, and the different involved mechanisms still remain poorly understood (Bayés de Luna, 2012; Bayés de Luna et al., 1985, 2012; Chung, 1972; Julià et al., 1978). In this case report, we present two ECG examples of this condition and we briefly discuss the electrophysiological mechanisms. As it happens with intermittent intraventricular blocks, the intermittent A-IAB

FIGURE 1 (a) Surface ECG of a 77-year-old man with hypertrophic cardiomyopathy. Heart rate 70 bpm: P wave 160 ms (partial IAB) and QRS pattern depicting left ventricular hypertrophy with strain. (b) Same patient was hospitalized due to a febrile episode (39°). The heart rate increased to 100 bpm, the P wave depicts a typical pattern of advanced IAB (biphasic morphology in leads II, III, and aVF) and duration of 175 ms. The advanced IAB pattern is associated with a tachycardia-dependent (Phase-3) block. This ECG pattern normalized after fever was controlled and heart rate decreased

may be considered an rate-dependent block (Elizari et al., 1974; Rosenbaum et al., 1973).

Similarly to what happens to the aberrant ventricular block pattern (Elizari et al., 1974; Rosenbaum et al., 1973), the atrial ECG of second-degree A-IAB can be related to different electrophysiological conditions: shortening of the PP cycle (Phase-3 block or tachycardia-dependent block) could produce interatrial aberrancy

(Figure 1); or the pause after a supraventricular or ventricular premature contraction may transiently mask the presence of A-IAB, turning the p waves for few beats, normal both in duration and in morphology (Figure 2) (Phase-4 block or bradycardia-dependent block). While tachycardia or bradycardia-dependent blocks have been described at the ventricular level (Elizari et al., 1974; Rosenbaum et al., 1973), we have not found cases of intermittent

FIGURE 2 Lead II ECG strip from an 82-year-old man with frequent PVCs. The first two beats show typical advanced IAB (P wave in lead II is biphasic, with P-wave duration >120 ms). After the premature ventricular contraction (PVC), there is a pause followed by a P wave of normal duration and morphology. The next P wave again depicts advanced IAB. This case serves as an example of second-degree IAB induced by a pause after a PVC

(second degree) A-IAB related to prolongation of the PP interval (bradycardia dependent). Rate-dependent blocks have not yet been described as occurring at the level of the ordinary myocardium, and hence, we may assume that these cases exemplify a block in the Bachmann region (Bayés de Luna et al., 1988) where specialized fibers may be encountered.

The characterization of this ECG entity is not only of academic interest but also of significant clinical relevance. It has already been proved that the diagnosis of A-IAB is a risk predictor of atrial fibrillation (Bacharova & Wagner, 2015; Bayés de Luna et al., 1988; Conde & Baranchuk, 2014; Enriquez, Marano, D'Amato, de Luna, & Baranchuk, 2015; Enriquez et al., 2014, 2015; Jin-Tao et al., 2016; Massó-van Roessel et al., 2017; O'Neal et al., 2016) and stroke (Agarwal, Aronow, Levy, & Spodick, 2003; Arboix, Martí, Dorison, & Sánchez, 2017; Ariyaratnam, Puri, Apiyasawat, & Spodick, 2007; Escobar-Robledo et al., 2018; Jin-Tao et al., 2017; Martínez-Sellés et al., 2016; O'Neal et al., 2016); therefore, the identification of IAB in the surface ECG may have prognostic and therapeutic implications (Luna, Martínez-Sellés, Bayés-Genís, Elosua, & Baranchuk, 2017; Martínez-Sellés & Bayés de Luna, 2017; Martínez-Sellés, Fernandez Lozano, Baranchuk, Bayés-Genís, & Bayés de Luna, 2016). More research is still needed to prove the clinical significance of second-degree A-IAB (Luna et al., 2017; Martínez-Sellés & Bayés de Luna, 2017).

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