



Review Article

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Update on Electrocardiographic Data in Junctional Rhythm

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Abstract

In a junctional rhythm, the P wave is usually inverted, and it may occur just before, or just after, or within the QRS complex. This pattern of P waves occurs because of retrograde activation of the atria from the junctional pacemaker almost concurrently with the ventricles. The QRS complexes have a normal morphology because the intraventricular conduction of the junctional impulses occurs in a normal pattern. A junctional rhythm with a rate of 40 – 60 bpm is a junctional escape rhythm. A junctional rhythm with a rate of 60 – 100 bpm is a junctional tachycardia.

Keywords: Junctional rhythm, Junctional tachycardia, Accelerated junctional rhythm, Junctional escape rhythm, Junctional bradycardia.

INTRODUCTION

Junctional rhythm originates from the area around the atrioventricular (AV) node and the intrinsic rate of the junctional pacemaker is 30 – 60/minute [1]. The junctional rhythm works as an 'escape' or 'rescue' rhythm in order to avoid asystole when there is complete AV block [1,2]. When the rate of junctional rhythm is faster than the sinus rhythm, it is called accelerated junctional rhythm [1-3].

Electrocardiography in Junctional rhythms

The classic electrocardiogram (ECG) finding of an accelerated junctional rhythm is AV dissociation with varying P-R interval. The ventricular rate is faster than the atrial rate in accelerated junctional rhythm whereas the ventricular rate is slower than the atrial rate in complete heart block [1,3,4]. The ECG findings in junctional rhythm include inverted or retrograde P waves just before, or just after, or buried within the QRS complex and a narrow QRS complex. To differentiate junctional rhythm from the sinus bradycardia, it should be noted that the P waves are upright, occurring before the QRS complexes with a fixed P-R interval in the sinus bradycardia [1,4-7].

A regular rhythm with narrow QRS complexes with a rate of 60-100 beats per minute is seen in junctional tachycardia. Non-paroxysmal junctional tachycardia is the same as accelerated junctional rhythm. It has a ventricular rate of 60 – 100 per minute, slow onset and is a sustained occurrence [5,6,8,9]. Extrasystolic junctional tachycardia occurs from a series of three or more junctional premature beats, has an abrupt onset with a paroxysmal occurrence and a ventricular rate of 120 – 150 per minute [5,7-10].

Refer to figure 1 below for an ECG example of accelerated junctional rhythm.

A junctional escape rhythm is the one where the junctional pacemaker takes over the rhythm of the heart when there is sinoatrial (SA) block or severe bradycardia and thus is a sort of a rescue rhythm. A junctional bradycardia that occurs following sinus block or sinus arrest is a type of rescue against prolonged asystole [1,2,9-11].

Refer to figure 2 below for an ECG showing junctional bradycardia with atrial fibrillation and a complete heart block.

Premature complexes or extrasystoles are electrical impulses occurring due to premature firing of an automaticity focus other than the SA node which is the normal pacemaker [10,12-15]. A P wave of the junctional premature complex if visible, is usually inverted due to retrograde activation of the atria and the P wave may occur just before, or just after, or be buried in the QRS complex [8,10,14-17].

DISCUSSION

An accelerated junctional rhythm may be seen in acute myocardial infarction, usually inferior myocardial infarction and sometimes in anterior myocardial infarction. Cardiac catheterization, acute rheumatic fever, valve surgery, direct current cardioversion, chronic obstructive pulmonary disease, hyperkalemia, digitalis

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toxicity, serious infections, thyrotoxicosis may lead to accelerated junctional rhythm [1,3,6,8,9,14]. Junctional tachycardia may be asymptomatic as the ventricular rate occurs in the similar range as that of the sinus rhythm [5, 10-13].

Junctional bradycardia may occur due to SA node dysfunction, amiodarone, beta blockers, digoxin, diltiazem. Junctional bradycardia may also occur normally in athletes [1,9-11,13-15].

An ectopic rhythm that originates from latent pacemaker within the AV junction constitutes junctional tachycardia. This subsidiary pacemaker is latent normally when the rhythm originates from the SA node. The activation of automaticity of the junctional pacemaker leads to a junctional tachycardia [5,7,10,12,16,17].

If the atria are activated by the SA node, then the P waves would be positive with no relation to the QRS complexes and the junctional pacemaker activates ventricles only. This results in a slightly higher ventricular rate than the atrial rate. This may be visible as a slight shortening of the R-R interval than the P-P interval. Eventually, there may occur isorhythmic AV dissociation with nearly similar atrial and ventricular rates [11-15,18].

CONCLUSION

In a junctional rhythm, a P wave is commonly not visible on an ECG. If the P wave is visible; it may be just before, just after, or buried within the QRS complex and inverted in the inferior leads. The QRS complexes are narrow. Accelerated junctional rhythm or nonparoxysmal junctional tachycardia has a rate of 60 -100/minute. Paroxysmal junctional tachycardia has a rate of 120-150/minute or even up to 220/minute. Escape junctional rhythm has a rate of 40 – 60/minute.

Conflict of interest

The authors declare no conflict of interest.

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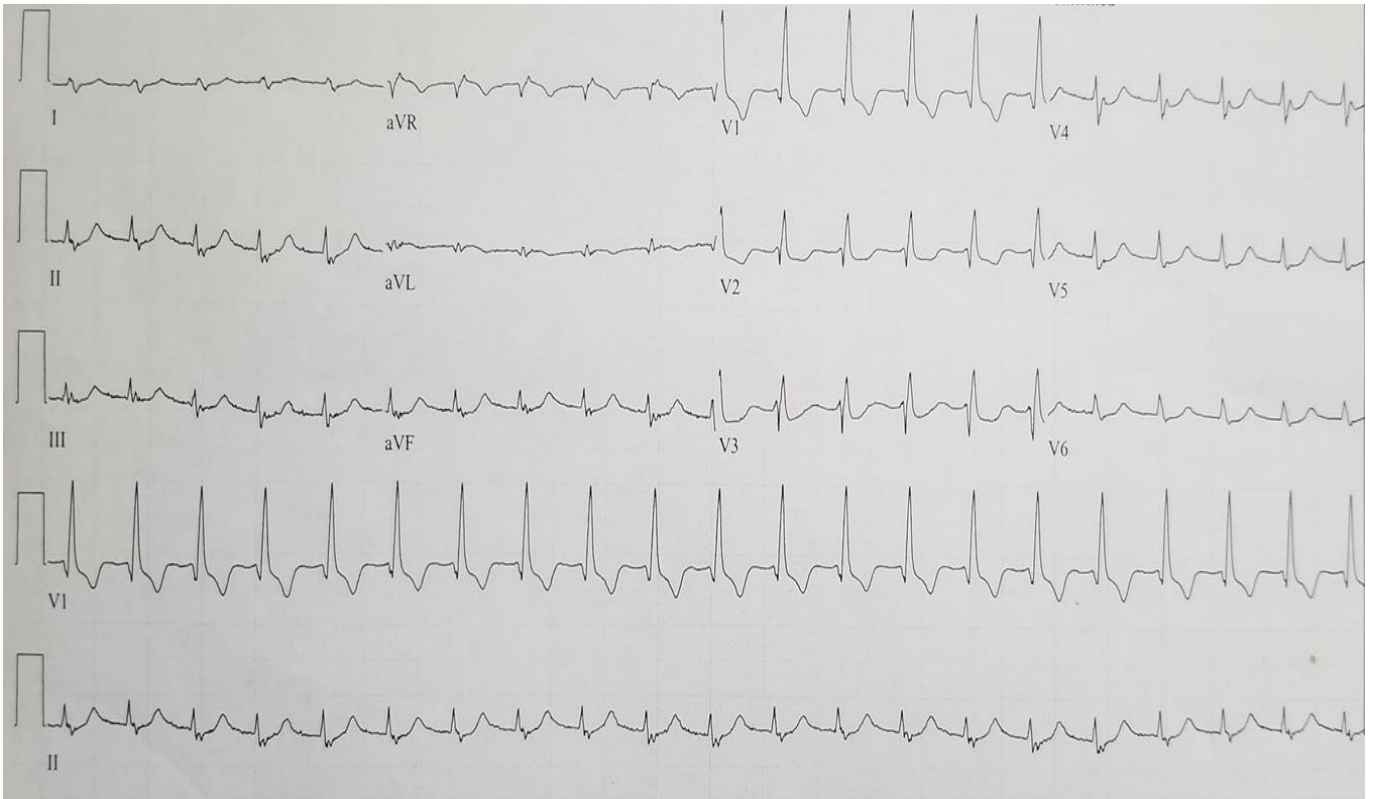


Figure 1: Accelerated junctional rhythm with retrograde conduction, incomplete right bundle branch block, right ventricular hypertrophy with repolarization abnormality, ventricular rate-124/min

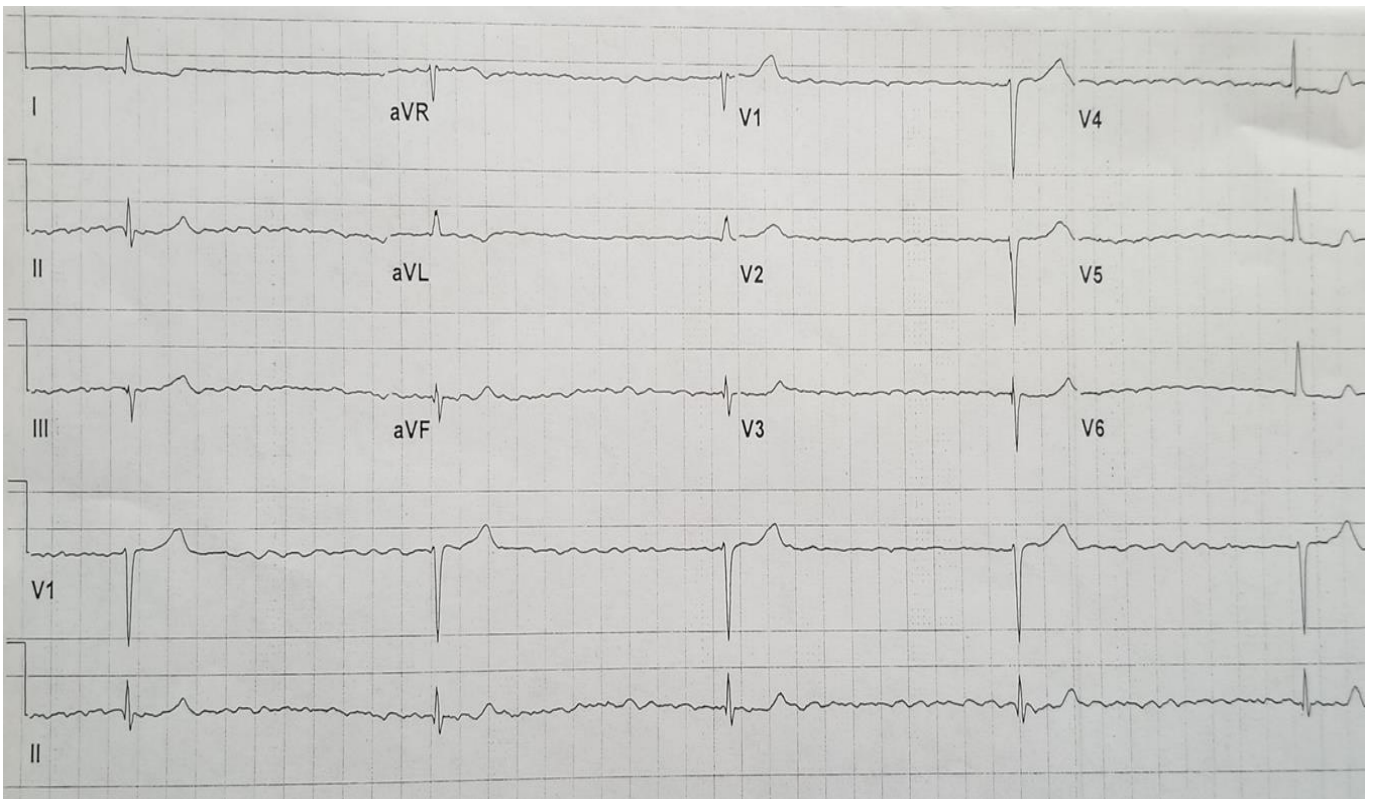


Figure 2: Junctional bradycardia-ventricular rate 28/min, with atrial fibrillation with complete heart block