

## Low Atrial Rhythm: A Friend or Foe

Debasish Das

**Authors Affiliation:** Assistant Professor, Dept of Cardiology, All India Institute of Medical Sciences (AIIMS), Bhubaneswar, Odisha 751019, India.

### Abstract

The patient is a 29-year-old male gynecology resident presented with on and off palpitation since last 10 years who is on irregular diltiazem therapy. He is normotensive, euglycemic and with no reversible cardiovascular risk factors. During the course of routine investigation, EKG revealed low atrial rhythm with negative P waves in leads II, III, aVF, and lateral leads with mild dilation of left ventricle with normal ejection fraction. Beta blocker was initiated and the rhythm shortly reverted to normal sinus rhythm and was asymptomatic. Although a benign phenomenon, early evaluation and management of this ectopic rhythm warrants in a young person.

**Keywords:** Atrial; Rhythm; Sinus

### How to cite this article:

Debasish Das. Low Atrial Rhythm: A Friend or Foe. J Cardiovasc Med Surg. 2019;5(3):147-149.

### Introduction

Low atrial rhythm or retrograde atrial activation is activation rather than beginning at the SA node. This is initiated at an area below SA node and it occurs when the site below the SA node usurps control from the SA node by accelerating its own automaticity or because the SA node abdicates its role by decreasing its automaticity. The conduction to the SA node is retrograde while the conduction to the AV node is an antegrade. The retrograde conduction to the SA node show inverted P waves

in inferior leads while the antegrade conduction via the AV node show normal QRS complex. A low atrial rhythm refers to when the rhythm comes from lower in the atrium with negative P waves in leads I, II, aVF, and V4 through V6 with or without shortening of the PR interval. A negative P wave in lead I suggest that the origin of activation is in the left atrium, whereas inverted P waves in the inferior leads normally correspond to posterior atrial site. Changes in the autonomic tone or the presence of sinus node disease causes an inappropriate slowing of the sinus node that may exacerbate this type of rhythm.

### Case Presentation

The patient is a 29-year-old male gynecology resident presented with on and off palpitation since last 10 years without conventional risk factors and he is on irregular diltiazem therapy. Upon routine investigation, EKG revealed inverted P wave in

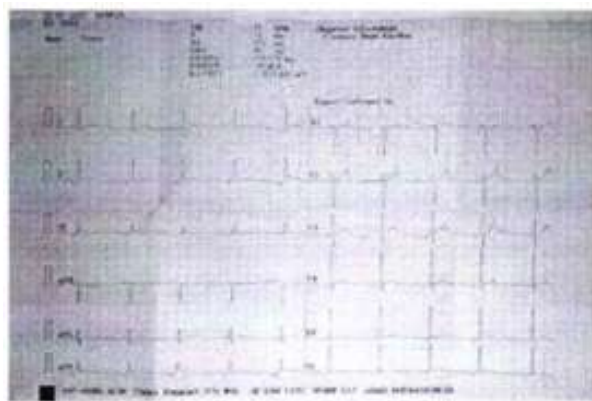
**Corresponding Author:** Debasish Das, Assistant Professor, Dept of Cardiology, All India Institute of Medical Sciences (AIIMS), Bhubaneswar, Odisha 751019, India.

**E-mail:** [dasdebasish54@gmail.com](mailto:dasdebasish54@gmail.com)

**Received on** 08.08.2019

**Accepted on** 04.09.2019

inferolateral leads suggestive of low atrial rhythm (Fig. 1). Echocardiogram revealed mild left ventricle (LV) dilation with normal LV ejection fraction. Serum electrolytes and thyroid profile were within normal limits. Low atrial rhythm on background of intrinsic bradycardia or AV block is ruled out through serum electrolytes biochemistry profile. Mild LV dilatation in EKG is secondary to long history of paroxysmal tachycardia. Chronotropic competence is tested through stress testing, which is within normal limits. Holter monitoring revealed the same without significant pauses or bradycardia. Invasive electrophysiologic (EP) evaluation is not taken as the patient did not provide the consent.



**Fig. 1:** ECG showing inverted P wave in inferolateral leads suggestive of low atrial rhythm.

As the patient showed low atrial rhythm with palpitation, the patient was administered oral sustained release beta blocker (metoprolol). The patient experienced symptom relief and slowly converted to normal sinus rhythm. Upon discharge, he was advised to undergo EP study for any further recurrence in the future.

## Discussion

In low atrial rhythm cases, based on the relative velocity of antegrade and retrograde conduction, the P wave may precede, follow, or hidden within QRS complex. Junctional Rhythm is also a low atrial rhythm that is observed in children, young and athletes. The current presentation with inverted P wave in inferolateral leads is classical case of coronary sinus rhythm, which is also a spectrum of low atrial rhythm. Increased vagal tone during sleep in young healthy individuals generate physiological junctional rhythm, which is usually benign and does not require any intervention. Pathological junctional rhythm occur in digitalis

toxicity cases during acute myocardial infarction and/or following a cardiac surgery.

Low atrial rhythm may be entirely asymptomatic or may be accompanied by symptoms. The symptoms include palpitation, fatigue, or poor exercise tolerance. These may occur during a period of junctional rhythm in patients who show abnormal bradycardia for their level of activity. Syncope or presyncope may also occur secondary to extreme bradycardia. Low atrial rhythm is dangerous for aircrew flying high performance aircraft. Our case is a typical coronary sinus rhythm originating from the lower posterior part of left atrium with inverted P waves in inferolateral leads which is quite benign.

Low atrial rhythm also occurs with sinus venosus atrial septal defect as the sinus node may be defective, hence alternate focus arising in the low atrium gives the dominant rhythm. The PR interval is also shorter in low junctional and low atrial rhythm, more in the former than in the latter. Low atrial rhythm has been reported in acute amlodipine intoxication<sup>1</sup>. A rare autosomal dominant disorder in four generations of a family with congenital heart diseases (atrial septal defect, tetralogy of Fallot, and persistent left superior vena cava) and low atrial rhythm has also been documented recently<sup>2</sup>. Low atrial rhythm also occurs in black scorpion envenomation as venom induces sinus arrest and ectopic pacemaker comes into action with escape low atrial rhythm. Propylphenazone toxicity also induces acute inferior myocardial infarction with low atrial rhythm known as Kounis syndrome. So low atrial rhythm long thought as a benign entity and friendly rhythm can be a foe underneath.

## Conclusion

We report a rare case of long standing low atrial rhythm in a young patient who is unresponsive to diltiazem and with mild LV dilation. Long belief for low atrial rhythm, "a friendly rhythm can also be a foe"... to remember.

**Consent:** Informed consent has been obtained from the patient.

**Conflicts of Interest:** The authors declare that there are no conflicts of interest regarding the publication of this paper.

**References**

1. Miranda CHI, Xavier L, Fiorante F, *et al.* Cardiac rhythm disturbances associated with amlodipine acute intoxication," *Cardiovascular toxicology.* 2012;12(4):359-62.
2. Van de Meerakker JBI, Van Engelen K, Mathijssen B, *et al.* A novel autosomal dominant condition consisting of congenital heart defects and low atrial rhythm maps to chromosome 9q. *European Journal of Human Genetics.* 2011;19(7):820-6.

