

Unmasking Sick Sinus Syndrome in a Centenarian Following Spontaneous Conversion from Persistent Atrial Fibrillation: A Case Report

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ABSTRACT

Sick sinus syndrome (SSS) is a common cause of syncope in elderly patients, but may be masked by persistent atrial fibrillation (AF). Spontaneous rhythm conversion in AF can unmask underlying sinus node dysfunction. We report the case of a 100-year-old patient with persistent AF who developed transient sinus pauses and syncope following spontaneous conversion to sinus rhythm. Continuous telemetry revealed significant post-conversion bradyarrhythmia's, consistent with symptomatic SSS. This case highlights the diagnostic complexity of SSS in the setting of persistent AF and aging-related conduction system disease. It emphasizes the importance of recognizing latent sinus node dysfunction following rhythm normalization. Clinicians should maintain a high index of suspicion for SSS in elderly patients with AF presenting with syncope. Prompt diagnosis and individualized management can lead to meaningful clinical outcomes, even in centenarians.

Keywords: Atrial Fibrillation; Pacemaker; Sick Sinus Syndrome; Syncope

Categories: Cardiology; Geriatrics

Background

Atrial fibrillation (AF), the most common sustained cardiac arrhythmia, affects over 10% of individuals aged 80 years and older, with its prevalence increasing significantly with age. In elderly populations, AF often presents with atypical features, including a slow ventricular response, which can complicate diagnosis and management [1]. Sick sinus syndrome (SSS), characterized by the inability of the sinus node to generate an appropriate heart rate, is a common cause of arrhythmia in the elderly. It encompasses a spectrum of conduction abnormalities, including sinus bradycardia, sinus pauses, and tachy-brady syndrome [2]. Diagnosing sick sinus syndrome (SSS) in patients with atrial fibrillation (AF) is particularly challenging because the irregular atrial activity during AF can mask underlying sinus node dysfunction [3]. In certain cases, spontaneous conversion from AF to sinus rhythm can unmask latent sinus node dysfunction, leading to marked sinus pauses. This may result in syncope, a transient loss

of consciousness caused by cerebral hypoperfusion. Syncope in the setting of AF, especially when accompanied by bradyarrhythmias, is a clinically significant and potentially underappreciated manifestation [4]. Continuous cardiac monitoring plays a crucial role in diagnosing transient arrhythmic events. Telemetry and implantable loop recorders have been instrumental in capturing intermittent episodes of bradyarrhythmias and correlating them with clinical symptoms [5]. We present the case of a 100-year-old man with atrial fibrillation who developed syncope due to sinus pauses, illustrating the diagnostic complexity and importance of recognizing SSS in this population.

Case Presentation

A 100-year-old male known to have AF on Apixaban (Eliquis 2.5 mg twice daily), hypertension on Amlodipine 5 mg and Telmisartan 80 mg, coronary artery disease with a history of calcifications of the left anterior descending artery for which he is continued on a statin,

and heart failure with preserved ejection fraction (HFpEF) secondary to grade 2 diastolic dysfunctions. He is also on furosemide (Lasix) 20-40 mg daily in an alternate regime. Other comorbidities include benign prostatic hyperplasia on Silodosin 8 mg a day and a history of colon cancer, status- post surgical resection more than two decades ago. On March 17, 2025, he presented to the outpatient clinic with multiple episodes of syncope lasting 1-2 minutes and shortness of breath. The first set of vital signs were hypotension (BP 95/77 mmHg) and severe bradycardia (HR 37 bpm), with normal respiratory rate (16), oxygen saturation (100%), and temperature (36.7°C) (Table 1). The EKG at the time was atrial fibrillation with a low ventricular response. He was admitted to the cardiac care unit (CCU) and placed on telemetry monitoring for further evaluation and consideration of pacemaker insertion for suspected symptomatic bradycardia. No recurrent spells of dizziness or syncope were seen during this hospital course. The patient's heart rate fluctuated between 40 bpm and 51 bpm mainly (had 2 readings of in the late 30s bpm upon admission) and the rest of the vital signs were normal.

Table 1: Vital signs during the first outpatient visit.

Vital signs	Findings
Blood pressure	95/77 millimeters of mercury (mmHg)
Heart rate	37 beats per minute (bpm)
Oxygen saturation	100%
Respiratory rate	16
Temperature	36.7 Degree Celsius (°C)

Physical examination was unremarkable. Workup, including complete blood count, comprehensive metabolic panel, thyroid-stimulat-

ing hormone, and cardiac biomarkers, was normal (Table 2). Trans-thoracic echocardiography showed normal left and right ventricular systolic function with an ejection fraction of 60-64%, moderate left atrial dilation (volume index: 45 mL/m²), mitral regurgitation, moderate tricuspid regurgitation with normal pulmonary artery pressures. He was discharged the next day (March 18) after 24 hours monitoring on Theophylline 100 mg twice daily as a medical management and he was educated to return to the emergency department in case of recurrent symptoms. The patient came back on April 2, 2025, to the emergency department with two additional syncopal episodes. His EKG at presentation revealed atrial fibrillation with a heart rate of 68 bpm (Figure 1). His blood glucose was within normal limits, and there was no orthostatic hypotension. Additional testing, such as a complete metabolic panel, CBC, troponin, D-dimer, TSH, and chest X-ray, was negative. He was readmitted to the CCU, and during his stay he developed syncopal episode were telemetry monitoring showed sinus bradycardia and sinus pauses (Figure 2), which were, in addition to his atrial fibrillation, in keeping with sick sinus syndrome. With recurrence of symptoms and arrhythmic etiology established, the patient underwent successful implantation of a single-lead VVI pacemaker. Theophylline was stopped after the procedure.

Table 2: Laboratory findings during the first admission.

Laboratory findings	Patient value	Normal range
Hemoglobin	12.1 g/dL	13-18 g/dL
Glucose	111 mg/dL	76-110 mg/dL
Thyroid Stimulating Hormone (TSH)	1.28 mIU/L	0.27-4.2 mIU/L
Troponin	0.017 ng/mL	0-0.03 ng/mL

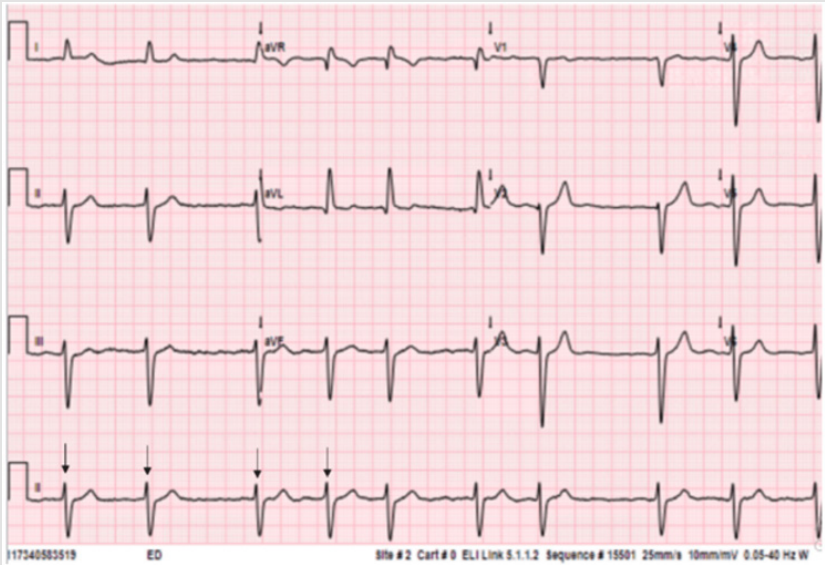


Figure 1: EKG at presentation, with the black arrows showing the irregularly irregular rhythm going with atrial fibrillation.

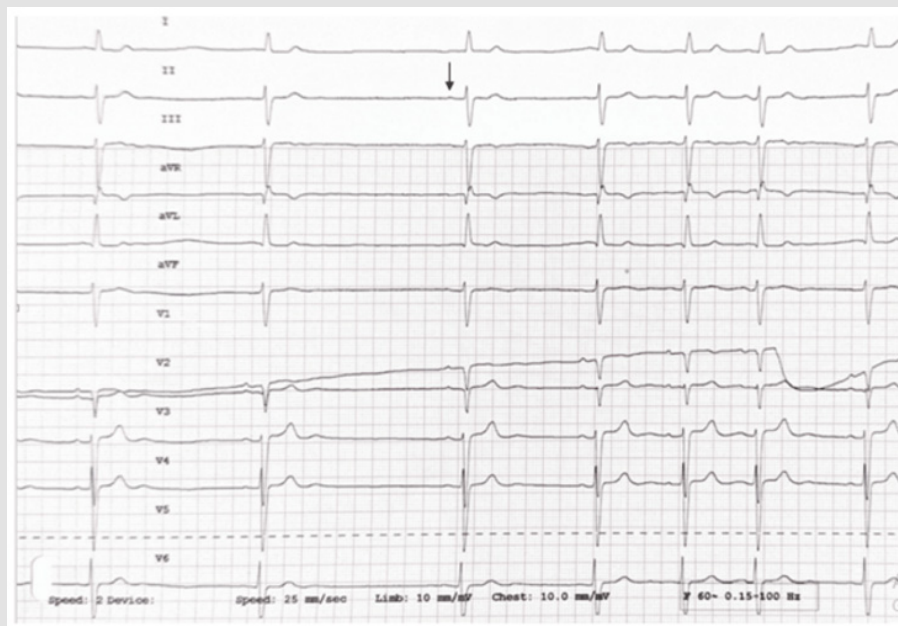


Figure 2: EKG during the second presentation, with the black arrow showing a sinus pause.

Discussion

This case highlights the diagnostic complexity of SSS in a centenarian with persistent AF, illustrating how spontaneous rhythm conversion can unmask underlying sinus node dysfunction in an elderly patient. AF is highly prevalent in older adults due to age-related atrial fibrosis and conduction system degeneration [6]. In this patient, persistent AF with a relatively controlled ventricular response may have concealed latent sinus node disease. The occurrence of syncope following spontaneous conversion to sinus rhythm revealed significant sinus pauses—an established but underrecognized manifestation of tachy-brady syndrome in the elderly [7]. The post-conversion sinus pauses were likely the result of prolonged sinoatrial recovery time, a hallmark of intrinsic sinus node dysfunction. In the setting of chronic AF, the sinus node can remain electrically silent, and its dysfunction only becomes apparent once atrial activity normalizes [8]. The development of syncope in this context supports a diagnosis of symptomatic SSS, where bradycardia leads to transient cerebral hypoperfusion [9]. Continuous cardiac monitoring, as performed in this case, was crucial for capturing these transient but clinically significant pauses. While implantable loop recorders are often helpful in outpatient evaluations, inpatient telemetry sufficed for diagnosis here [10]. Though permanent pacemaker implantation is the standard treatment for symptomatic SSS, management in centenarians must be individualized. Studies suggest that carefully selected elderly patients can benefit significantly from pacing, but decisions should account for overall functional status, comorbidities, and patient-centered goals of care [2].

This case emphasizes the need for heightened awareness of SSS in elderly patients with AF who present with syncope, as timely recognition and tailored management can meaningfully improve outcomes—even in the oldest old.

Conclusion

This case underscores the diagnostic difficulty of identifying sick sinus syndrome in elderly patients with atrial fibrillation. In our patient, sinus pauses were unmasked after spontaneous conversion to sinus rhythm, highlighting the importance of continuous monitoring. Timely diagnosis and the subsequent pacemaker implantation led to significant improvement, emphasizing the need to consider SSS in elderly patients with unexplained syncope and AF.

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