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Late-Onset Complete Atrioventricular Block in an Elderly Diabetic Hypertensive: Successful Management with MRI-Compatible VVIR Pacemaker Implantation

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Abstract

Background*: Syncope in older patients generally reflects underlying cardiovascular pathology, especially conduction system disease. Complete heart block is a reversible yet potentially fatal cause of syncope and requires prompt recognition and pacing. Patients with T2DM and HTN have a higher risk because of progressive conduction tissue fibrosis and ischemia.*

Case Presentation: *This is the case of a 75-year-old female with known T2DM and HTN presenting with recurrent syncopal episodes. Electrocardiogram showed symptomatic complete heart block. After temporary pacing, she successfully underwent implantation of a St. Jude Medical Endurity PM 1172 MRI-safe VVIR pacemaker via the right subclavian vein. The procedure was uneventful, and she was discharged in a stable condition on optimal medical therapy.*

Discussion: *Chronic diabetes and hypertension cause structural and electrophysiologic remodeling of the conduction system through microangiopathy, oxidative stress, and interstitial fibrosis, with eventual AV nodal dysfunction. Symptomatic complete AV block necessitates immediate pacing for survival. MRI-compatible pacemakers offer two advantages: first, an effective correction of bradyarrhythmia, and second, preserved accessibility for future neuro- or musculoskeletal imaging. This case illustrates diagnostic vigilance in syncope presenting in elderly diabetic hypertensive patients, temporary pacing stabilization, and the excellent chronic safety profile of MRI-conditional VVIR devices.*

Conclusion: *This case emphasizes how early diagnosis and prompt implantation of the device are clinically important in elderly diabetic hypertensive patients presenting with symptoms of complete AV block. MRI-conditional VVIR pacemakers ensure both hemodynamic stability and long-term imaging safety, reinforcing their role in contemporary electrophysiologic practice.*

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Introduction

Syncope is a transient loss of consciousness resulting from global cerebral hypoperfusion. It represents one of the most common clinical presentations encountered in both emergency and cardiology settings. It is characterized by its abrupt onset, short duration, and spontaneous resolution, which distinguishes it from seizures and other causes of transient unconsciousness. Syncope has different aetiologies — benign neurocardiogenic events to fatal arrhythmic causes, such as complete heart block — which give it clinical significance. In elderly patients, especially in the presence of type 2 diabetes mellitus and hypertension, syncope might represent the first manifestation of advanced conduction system disease.

The 2018 ESC Guidelines on Syncope have recommended that all patients presenting with syncope receive a prompt and thorough evaluation beginning with a detailed clinical history and physical examination, together with a 12-lead ECG for the identification of arrhythmic or structural cardiac causes of syncope [1]. According to the ESC guidelines, delays in the diagnosis of cardiac causes of syncope are associated with increased mortality. Despite these clear recommendations, real-world studies expose gaps in adherence, particularly related to ECG interpretation and risk stratification in the ED. Numeroso et al. noted that although the ESC 2018 guidelines improved diagnostic uniformity, there still is a need for greater clinician awareness in the identification of conduction abnormalities, especially among elderly patients.

From a pathophysiological point of view, third-degree AV block represents the most advanced form of conduction system disease, characterized by an absence of atrioventricular conduction and an escape rhythm generated distal to the block. This may result in severe bradycardia, hypotension, syncope, and even cardiac arrest if untreated. The elderly are more prone to degenerative changes within the conduction system, including fibrosis and calcification of the His-Purkinje tissue; all these processes are accelerated by long-standing hypertension and diabetes mellitus [2].

A key Danish Nationwide Registry-based analysis by Haxha et al. (2023) showed that subjects with T2DM had almost a two-fold increased risk of complete heart block compared to their nondiabetic counterparts [2]. The authors postulated that diabetic autonomic neuropathy, microangiopathy, and myocardial fibrosis together may affect conduction pathways. Furthermore, hypertension-induced left ventricular hypertrophy and interstitial fibrosis add to the deterioration in impulse propagation. These findings emphasize that T2DM and HTN are not comorbidities but pathogenic factors contributing to conduction failure in the aging hearts. The 2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Bradycardia and Cardiac Conduction Delay further defines management standards for CHB. The guideline thus recommends permanent pacemaker implantation (Class I indication) in symptomatic third-degree AV block or asymptomatic block with ventricular rates less than 40 bpm while awake [3]. In patients with CHB presenting with syncope, especially elderly patients, pacing remains the definitive therapy. This further outlines the importance of early recognition and the role of a multidisciplinary approach to evaluation, particularly when comorbidities mask classical symptoms.

The prognosis after pacemaker implantation in elderly patients with CHB is well understood. In a seminal study published by Shen et al. in 1994, patients aged 65 years and above who received pacing for heart block had five-year survival rates of approximately 52%, with outcomes largely dependent on coexisting structural heart disease [4]. Those without significant myocardial pathology had significantly longer survival, emphasizing the lifesaving potential of timely pacing intervention.

However, successful pacemaker therapy requires not only device implantation but also careful infection prevention and postoperative care. Infection of cardi

ac implantable electronic devices is more common in elderly diabetic patients, significantly increasing morbidity and mortality. Detailed strategies to reduce infection risks are discussed in the EHRA international consensus document (2020), led by the EHRA and endorsed by professional bodies like the HRS and ESCMID [5]. These include the use of peri-procedural antibiotic prophylaxis, aseptic surgical technique, and rigorous wound monitoring, measures particularly important in high-risk populations such as the diabetic population.

Recent progress in the development of MRI-compatible pacemaker technology has increased therapeutic options. MRI-compatible systems like the one used in our patient provide diagnostic flexibility to elderly patients who may need future neuroimaging or musculoskeletal MRI for comorbid conditions. This technological evolution represents a significant stride toward better patient safety and quality of life.

In summary, syncope in elderly diabetic and hypertensive patients must be investigated with a high degree of suspicion for complete heart block. Application of evidence-based guidelines such as those by the ESC (2018) and ACC/AHA/HRS (2018) allows for prompt diagnosis and lifesaving intervention. In addition, addressing infection prevention related to devices and appropriate selection of devices, highlighted by the EHRA consensus (2020), are crucial for long-term success [5]. This case report adds to the growing literature that underlines the interrelationship between metabolic disease and abnormalities in cardiac conduction and points out the essential role permanent pacemaker implantation plays in restoring hemodynamic stability and preventing the recurrence of syncope.

We present the case of a 75-year-old diabetic hypertensive female with symptomatic complete heart block, successfully managed with an MRI-safe VVIR pacemaker, with the focus being on early recognition, guideline-directed pacing, careful device selection, and multidisciplinary care to accomplish optimal outcomes.

Case Presentation

Patient Information

A client 75-year-old was admitted to the Department of Cardiology on 16 October 2025 with complaints of recurrent syncope over several hours, associated with mild chest discomfort but no palpitations or dyspnoea.

- Her past medical history included:
- Hypertension, on Telmisartan 40 mg HS
- Type 2 Diabetes Mellitus, on Glycomet GP 1 BD

Osteopenia,onShelcal100mgBD

She was adherent to medications and diabetic diet. She denied prior cardiac interventions or stroke.

Clinical Findings

On admission, her blood pressure was 132/78 mmHg, but her pulse rate was 38 beats/min, regular, and of low volume. She was conscious but weak, with no focal neurological deficit. Cardiovascular examination revealed regular bradycardia, no murmurs, and normal heart sounds.

12-lead ECG demonstrated complete heart block with atrioventricular dissociation, narrow QRS escape rhythm (~38 bpm), and no acute ischemic changes. Laboratory results showed normal electrolytes, renal function, and cardiac enzymes, excluding metabolic or ischemic triggers.

Timeline of Events

Date	Event	Details
16/10/2025	Admission	Presented with syncope; ECG showed CHB
	Temporary Pacemaker Insertion (TPI)	Inserted via right subclavian access
18/10/2025	Permanent Pacemaker Implantation (PPI)	VVIR mode, MRI-safe (St. Jude Endurity PM 1172)
22/10/2025	Discharge	Patient stable and asymptomatic

Diagnostic Assessment

The diagnosis of symptomatic complete heart block was made based on clinical bradycardia and ECG findings. Echocardiography revealed preserved left ventricular systolic function with mild concentric LV hypertrophy and no significant valvular abnormalities.

Secondary causes (drug toxicity, electrolyte distur-

bance, ischemia, hypothyroidism) were excluded.

Therapeutic Interventions

Under aseptic precautions and local anesthesia (2% Lox), a **temporary pacemaker** was inserted via the right subclavian vein on the day of admission (16/10/2025).

On 1**8 October 2025**, a **permanent pacemaker implantation (PPI)** was performed:

- **Device:** St. Jude Medical Endurity PM 1172 (Serial No. 5257875), VVIR mode, MRI safe
- **Ventricular Lead:** Tendril STS (Serial No. EEM354846), active fixation at right ventricular apex
- **Lead Parameters:** Threshold 1.0 V, Impedance 1,120 Ω
- **Pocket Preparation:** Irrigated with gentamicin 80 mg and saline
- **Closure:**Vicryl2.0and4.0
- The procedure was completed uneventfully.

Post-Operative Course and Follow-Up

Post-implant ECG demonstrated stable ventricular pacing at 70 bpm with no capture loss. Wound inspection on day 4 revealed healthy margins.
She was maintained on:

- **Cefuroxime 500 mg** BD × 5 days
- **Linezolid 600 mg** BD × 5 days
- **Telmisartan 40 mg** OD
- **Glycomet GP 1** before breakfast
- **Pantoprazole D 40 mg** OD
- **Calcium and Vitamin D supplement (SITE 100 mg)** HS
- **Nevanac ophthalmic drops** 2 drops TDS × 1 month

By **22 October 2025,** she was asymptomatic, ambulatory, and discharged with diabetic dietary advice and pacemaker care instructions.

Discussion

Syncope is a common and potentially life-threatening presentation in both the emergency and cardiology settings for the elderly. The etiologies are quite broad, ranging from vasovagal, orthostatic, and cardiac, among which high-grade AV block is a particularly critical subset because of the risk of sudden cardiac death [1]. The current case describes a 75-year-old female patient with longstanding hypertension and type 2 diabetes mellitus who presented to the hospital for recurrent syncope and was diagnosed to have a complete heart block.

Cardiac conduction abnormalities are more common in the T2DM patient population, likely related to microvascular ischemic injury, autonomic dysfunction, and accelerated fibrotic degeneration of the conduction system [2]. Hypertension further contributes to structural cardiac remodeling, which furthers the development of conduction delay and AV block. This combination increases the susceptibility of elderly patients to symptomatic bradyarrhythmias, emphasizing the need for heightened clinical vigilance.

Management of symptomatic complete heart block follows established guidelines from the ACC/AHA/HRS 2018 and ESC 2018, recommending temporary pacing for hemodynamic stabilization followed by permanent pacemaker implantation, particularly in elderly patients presenting with syncope [1,3]. Our patient immediately received a temporary transvenous pacemaker upon admission, which stabilized her hemodynamics and allowed the safe implantation of a right prepectoral MRI-conditional VVIR pacemaker. Such devices allow for added clinical flexibility, particularly in the elderly, who may require future neuroimaging or advanced MRI studies [5].

Use of MRI-compatible pacemakers has grown into the most critical factor in device selection for the elderly. Traditional devices restrict diagnostic modality because of incompatibility with MRI, while MRI-conditional devices increase the imaging modality without interfering with device functionality and safety [5]. The condition applies to diabetic or hypertensive patients, who have a future chance of developing cerebrovascular or musculoskeletal disorders that require examination through MRI.

Long-term results in elderly patients show that this intervention has very good results in terms of syncope recurrence, cardiovascular morbidity, and mortality [5]. Successfully conducted implantation diminishes the risk of potential complications that can result from a continued bradycardia condition, such as heart failure, trauma due to syncope, and sudden cardiac death. Diabetic patients, however, still have higher risks for device-related infections and require scrupulous perioperative prophylaxis,

sterile technique, and systematic follow-up after implantation [5]. In the present case, a combination of perioperative antibiotics, sterile surgery protocol, and close observation ensured an uneventful recovery and a stable post-procedural course.

This case underlines a few important clinical lessons: early recognition of conduction system disease in elderly diabetic hypertensive patients is vital; temporary pacing offers life-saving hemodynamic support prior to PPI; MRI-conditional pacemakers enhance diagnostic flexibility over the long run, with minimal risk of device-related complications. Interdisciplinary coordination among cardiology, endocrinology, and nursing teams optimizes outcomes, particularly in populations at risk for procedural complications due to comorbid conditions.

This case thus reinforces the importance of timely diagnosis, appropriate pacing strategies, and careful device selection in the management of symptomatic complete heart block in the elderly with metabolic and hypertensive comorbidities. In each case, adherence to current international guidelines has ensured both short-term safety and long-term functional benefit, emphasizing the value of evidence-based, multidisciplinary care [1-5].

This case illustrates early recognition, rapid stabilization, and guideline-driven pacing in elderly patients with CHB. Careful device selection, infection prevention, and multidisciplinary follow-up optimize outcomes and ensure long-term functionality of devices.

Conclusions

This case underlines the paramount importance of considering syncope as a potential sentinel event in elderly patients with chronic hypertension and T2DM. The key message in such patients is to keep a high index of suspicion for brady arrhythmic causes, foremost among them being complete AV block. A prompt 12-lead ECG remains the cornerstone in diagnosis and allows for the timely detection of conduction abnormalities and thus prevention of potentially fatal outcomes.

Early detection of the disease, followed by temporary transvenous pacing for hemodynamic stabilization and timely permanent pacemaker implantation in accordance with the 2018 ACC/AHA/HRS Guidelines and ESC Syncope Guidelines, is the gold standard of management for excellent functional recovery and survival.

Therefore, the application of an MRI-safe VVIR pacemaker in this case adds to the contemporary clinical value, since neuroimaging or musculoskeletal MRI is common among elderly patients in later years. The ability to safely undergo future imaging studies without device interference enhances diagnostic flexibility and patient safety.

In addition, multidisciplinary coordination among cardiology, endocrinology, infectious disease, and nursing teams was crucial for optimal outcomes. Diabetes mellitus significantly heightens the susceptibility to cardiac implantable electronic device (CIED) infections; therefore, the principles of infection prevention-peri-procedural antibiotic prophylaxis, strict aseptic technique, and careful wound monitoring-are of the highest importance.

This case shows that timely recognition and intervention for conduction abnormalities in elderly diabetic hypertensive patients can not only prevent recurrent syncope and sudden cardiac death but also greatly improve the quality of life and long-term prognosis.

Learning Points

- Early ECG assessment: Syncope in elderly patients with diabetes and hypertension should prompt immediate ECG evaluation to rule out high-grade or complete AV block.
- Comorbidity-related risk: Diabetes and hypertension contribute to fibrotic degeneration of the conduction system, markedly increasing susceptibility to brady arrhythmias.
- Stepwise pacing management: Temporary pacing provides crucial hemodynamic support before permanent pacemaker implantation, reducing perioperative complications.
- MRI-safe device advantage: The use of MRI-conditional pacemakers offers long-term diagnostic flexibility for elderly patients who may require neuroimaging or other advanced imaging modalities.
- Infection prevention focus: In diabetic and

immunocompromised individuals, strict perioperative infection control, wound surveillance, and regular post-implant follow-up are vital for preventing CIED-related complications and ensuring device longevity.

Patient Perspective

The patient reported complete resolution of her syncopal episodes and expressed gratitude for the care received. She was counseled on wound care, avoidance of electromagnetic interference, and adherence to scheduled follow-ups.

Ethical Approval

This case report does not involve any experimental procedures on human or animal subjects. All patient data were anonymized and handled in accordance with institutional and ethical standards. Therefore, there are no ethical issues associated with this study.

Conflict of Interest

The authors declare no conflicts of interest.

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