IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Takotsubo Syndrome Following Permanent Pacemaker Implantation: A Case Of Reversible Left Ventricular Dysfunction

[1]Massri Emad Aldin, [1]Nesnassi Mohammed Mounir, [1]El Bahri Loubna, [1]El Amri rachida, [1]Cherti Mohammed

1: Department of Cardiology B, IBN SINA hospital, Rabat, Morocco

Abstract: Takotsubo syndrome (TTS), or stress-induced cardiomyopathy, is characterized by transient regional wall motion abnormalities of the left ventricle (LV) in the absence of obstructive coronary artery disease. Although typically triggered by acute emotional or physical stress, its occurrence after cardiac device implantation—such as permanent pacemakers—is exceptionally rare. We report the case of a 74-year-old woman who developed apical ballooning syndrome and acute left ventricular systolic dysfunction following the implantation of a dual-chamber permanent pacemaker for complete atrioventricular (AV) block. The condition spontaneously resolved over the course of one month. This case highlights the importance of clinical suspicion for TTS in frail patients undergoing invasive cardiac procedures, especially when symptoms and imaging findings mimic acute coronary syndrome.

I. INTRODUCTION

Takotsubo syndrome (TTS), first described in Japan in the 1990s, derives its name from the Japanese octopus trap ("takotsubo"), reflecting the distinctive appearance of the left ventricle during systole—characterized by apical ballooning and basal hyperkinesis [1]. Once considered rare, TTS is now estimated to occur in 1%–3% of patients presenting with suspected acute coronary syndrome (ACS) [2].

The syndrome predominantly affects postmenopausal women and is frequently triggered by sudden emotional or physical stress. The pathophysiology is multifactorial, involving:

- Excessive catecholamine surge
- Microvascular dysfunction
- Myocardial stunning
- Inflammatory or autoimmune response [3]

Pacemaker implantation, although life-saving, represents a form of iatrogenic physical and emotional stress, particularly in elderly or anxious patients. While rare, Takotsubo cardiomyopathy following pacemaker implantation has been increasingly described in the literature [4–5,7,10]. Diagnosis may be difficult because pacing obscures ECG findings, and elderly patients often present with atypical symptoms [6,8].

This report describes a unique case of reversible stress cardiomyopathy following permanent pacemaker implantation, supporting the hypothesis that procedural and emotional stress can precipitate TTS in vulnerable patients.

II. Case Presentation

A 74-year-old woman with a history of hypertension (on amlodipine) and type 2 diabetes mellitus (on oral hypoglycemics) presented to the emergency department with syncope and progressive asthenia lasting two months. On admission, she was bradycardic (heart rate 25 bpm) but hemodynamically stable. There was no history of drug-induced bradycardia, infection, or prior cardiac disease.

Electrocardiogram (ECG) revealed complete atrioventricular block with narrow QRS complexes. Laboratory results showed normal troponin T, renal function, and electrolytes. Transthoracic echocardiography (TTE) demonstrated normal biventricular size and function (EF 60%).

She underwent urgent dual-chamber permanent pacemaker implantation. The patient was anxious and agitated before and during the procedure, although it was technically uneventful.

On postoperative day three, she developed new-onset dyspnea and fatigue. Repeat TTE revealed:

- Apical akinesis with systolic ballooning
- Severely reduced LV ejection fraction (EF 25%)
- Moderate circumferential pericardial effusion

Biomarker analysis showed:

- Troponin T: mildly elevated (≈2× baseline)
- BNP: six-fold increase
- CRP: elevated

Coronary angiography was not performed due to patient refusal, and cardiac MRI was contraindicated because of the recent pacemaker. However, the InterTAK Diagnostic Score indicated a 62.6% probability of TTS, supporting the diagnosis of Takotsubo syndrome triggered by procedural and emotional stress [6].

No specific heart failure therapy was initiated, and the patient was managed supportively. At one-month follow-up, echocardiography showed complete recovery:

- Normalized EF (55%)
- Resolution of apical ballooning and pericardial effusion
- Normalization of biomarkers

III. Discussion

This case highlights the rare but clinically significant phenomenon of pacemaker-induced Takotsubo syndrome. Although the pathophysiology of TTS is not fully understood, catecholamine-induced myocardial stunning remains the leading mechanism [3,9]. The combination of emotional distress, bradyarrhythmia, and procedural stress likely triggered the sympathetic surge responsible for myocardial dysfunction.

Post-cardiac injury syndrome (PCIS)—which includes pericardial inflammation and effusion after cardiac device implantation—may act synergistically to precipitate TTS [5]. The presence of pericardial effusion, elevated inflammatory markers, and emotional distress in this case supports that hypothesis.

Diagnosing TTS in paced patients is challenging, as pacing obscures ECG changes such as ST-segment elevation or T-wave inversion [6,9]. Thus, echocardiography and biomarkers play key diagnostic roles.

The InterTAK Diagnostic Score, validated by Ghadri et al. [6], incorporates clinical and ECG criteria (female sex, emotional/physical stressor, psychiatric/neurologic history, ECG changes, and troponin elevation). A probability ≥50% supports TTS diagnosis even in the absence of coronary angiography.

A growing body of case reports confirms that TTS can follow pacemaker insertion, particularly among elderly women, and most patients recover normal cardiac function within weeks [7–10]. A 2022 systematic review by Strangio et al. [7] identified emotional distress and procedural anxiety as frequent triggers. Similarly, Dev et al. [9] described a recent case complicated by ventricular arrhythmia, highlighting the potential severity of this reversible condition.

IV. Conclusion

Takotsubo syndrome may occur as an unexpected complication of permanent pacemaker implantation, particularly in frail or anxious elderly women. Emotional and procedural stress, compounded by post-cardiac injury inflammation, likely contribute to its pathogenesis.

Given the diagnostic challenges in paced patients, clinicians should maintain a high index of suspicion when acute LV dysfunction develops post-implantation. Serial echocardiography, biomarker monitoring, and use of validated scoring systems such as the InterTAK Score can facilitate accurate diagnosis. Most patients, as in this case, experience complete functional recovery with supportive care alone.

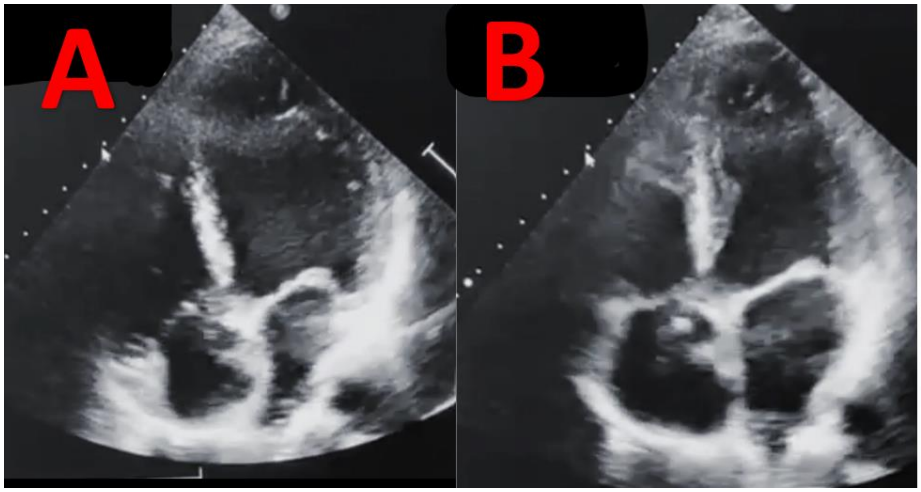

Figure 1 Trans-thoracic echocardiography (TTE) conducted prior to pacemaker placement showed a standard apical 4 chamber image, which indicated the presence of normal end-diastolic (A) and end-systolic (B) dimensions, together with a conserved ejection fraction of 60%.

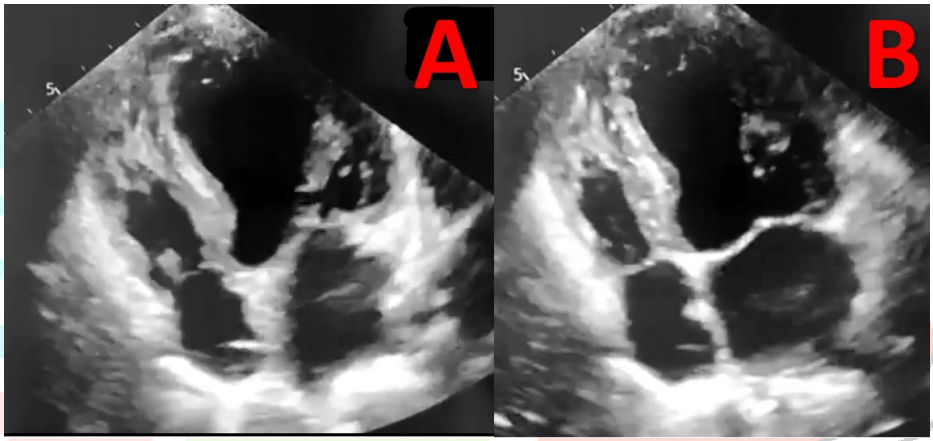

Figure 2 Trans-thoracic echocardiography (TTE) conducted using apical 4 chamber imaging, two days after the implantation of a pacemaker, reveals a dilated left ventricle in the end-diastolic image (A). Additionally, systolic apical ballooning with dyskinesia and mid ventricular hypokinesia are seen(B). These findings occur prior to the installation of pericardial effusion.

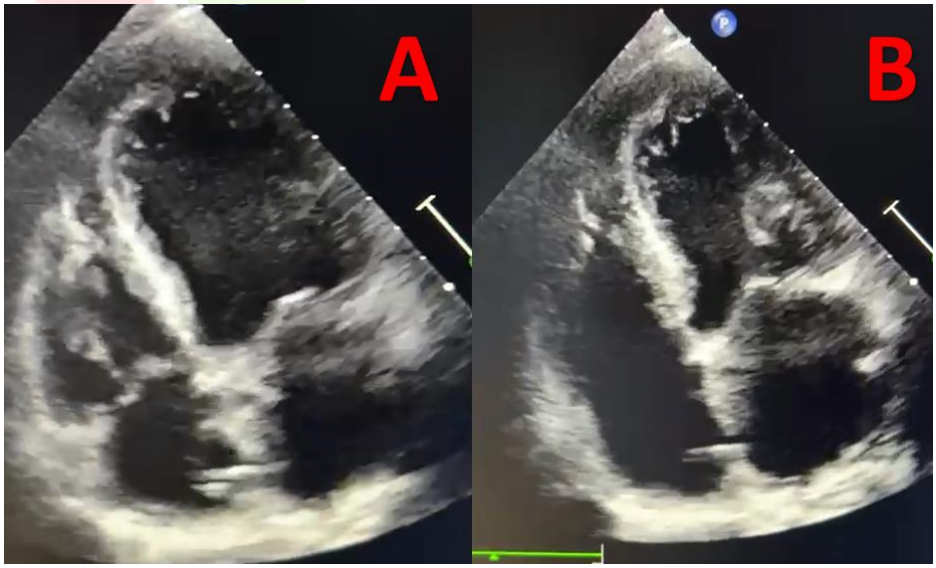

Figure 3 Trans-thoracic echocardiography (TTE) conducted after one month of pacemaker placement showed a standard apical 4 chamber image, which indicated the presence of normal end-diastolic (A) and end-systolic (B) dimensions, together with a conserved ejection fraction of 55%.

REFERENCES

[1] Ahmad SA, Brito D, Khalid N, Ibrahim MA. *Takotsubo Cardiomyopathy*. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023.

[2] Templin C, Ghadri JR, Diekmann J, et al. Clinical features and outcomes of Takotsubo (stress) cardiomyopathy. *N Engl J Med.* 2015;373(10):929–938.

[3] Lyon AR, Bossone E, Schneider B, et al. Current state of knowledge on Takotsubo syndrome: a position statement from the Heart Failure Association of the ESC. *Eur J Heart Fail.* 2016;18(1):8–27.

[4] Gianni M, Dentali F, Grandi AM, Sumner G, Hsu R, Lavender K. Apical ballooning syndrome or Takotsubo cardiomyopathy: a systematic review. *Eur Heart J.* 2006;27(13):1523–1529.

[5] Dashwood A, Rahman A, Al-Marashi HA, Jennings C, Raniga M, Dhillon P. Pacemaker-induced Takotsubo cardiomyopathy. *HeartRhythm Case Rep.* 2016;2(3):272–276.

[6] Ghadri JR, Wittstein IS, Prasad A, Sharkey S, Dote K, Akashi YJ, et al. International Expert Consensus Document on Takotsubo Syndrome (Part II): diagnostic workup, outcome, and management. *Eur Heart J.* 2018;39(22):2047–2062.

[7] Strangio A, Leo I, Sabatino J, et al. Takotsubo syndrome after pacemaker implantation: a systematic review. *Rev Cardiovasc Med.* 2022;23(12):401–408.

[8] Kurisu S, Inoue I, Kawagoe T, et al. Persistent left ventricular dysfunction in Takotsubo cardiomyopathy after pacemaker implantation. *Circ J.* 2006;70(5):641–644.

[9] Dev D, El-Din M, Vijayakumar S, et al. Takotsubo cardiomyopathy following pacemaker insertion complicated with polymorphic ventricular tachycardia: a case report. *J Med Case Rep.* 2024;18:238.

[10] Wei Z-H, Dai Q, Wu H, Song J, Wang L, Xu B. Takotsubo cardiomyopathy after pacemaker implantation. *J Geriatr Cardiol.* 2018;15(3):246–248.