

Post-cardiac injury syndrome following permanent pacemaker implantation presenting exclusively as massive pleural effusion: A rare occurrence

Nasiha Khalid, Ikram Ahmed Rana

Abstract

Post-Cardiac Injury Syndrome (PCIS) akin to Dressler's syndrome is late-onset pericarditis that is triggered by the body's immune system and presents commonly as pleuro-pericardial symptoms and raised inflammatory markers. Its occurrence following the insertion of a pacemaker has been reported infrequently and varies in different studies with an estimated prevalence of 1-2%. Our case reports a unique incidence of isolated pleural effusion following the implantation of a pacemaker in a 62-year-old female with complete heart block with no evidence of pericardial effusion on imaging. She developed dyspnoea, pleuritic chest pain, and lethargy. She successfully responded to treatment with NSAIDs and colchicine with no recurrence. This report demonstrates the uncommon course of the disease and highlights the need to consider PCIS as a possible diagnosis in patients presenting with predominant pulmonary findings and suspect it early so that timely treatment can be started, thereby preventing complications.

Keywords: Artificial cardiac pacemaker, Pleural effusion, Pericardial effusion, Pericarditis.

DOI: <https://doi.org/10.47391/JPMA.8237>

Submission completion date: 25-10-2022

Acceptance date: 10-05-2023

Introduction

Post-Cardiac Injury Syndrome (PCIS) includes a spectrum of a heterogeneous group of conditions that consist of post-myocardial infarction pericarditis (Dressler syndrome), post-pericardiotomy syndrome, and post-traumatic pericarditis.¹ Post-pericardiotomy syndrome has been observed after cardiac surgery, percutaneous intervention, pacemaker implantation, radiofrequency ablation, and pulmonary vein isolation.² After the implantation of a pacemaker, the prevalence of PCIS is reported to be 1.8%, although a markedly lower prevalence (<0.2%) has also been observed.³ Clinical evaluation usually reveals mild to moderate effusions in the pericardium and the pleural space, and sometimes pericardial friction rub on

auscultation.⁴ Our case describes an unusual presentation of PCIS as an isolated pleural effusion without any echocardiographic and computed tomographic (CT) evidence of pericardial effusion.

Case Report

A 62-year-old non-smoker female underwent an uneventful single chamber permanent pacemaker implantation for a complete heart block on August 8, 2022, at Tahir Heart Institute, Chenab Nagar, Pakistan. She had no known co-morbidities. Post-procedure pacing checks and chest radiographs were satisfactory. However, two days after her procedure, she developed a fever along with shortness of breath with chest pain that aggravated on lying flat and got better in sitting posture. No pericardial or pleural rub was audible. Her chest X-ray revealed a few thin linear atelectatic bands in the right and left lower lung zones (Figure 1).

A raised total leucocyte count (TLC) was found on the laboratory workup. On the suspicion of chest infection, she was started on antibiotics along with anti-inflammatory drugs for chest pain. After five days of Tazobactam/Piperacillin treatment along with anti-inflammatory drugs, her TLC improved, and C-reactive protein (CRP) dropped from 62 mg/L to 32 mg/L (normal value <5). Her chest X-ray normalised and she was discharged one week after the procedure. Two weeks later, on August 21, 2022, she presented with a complaint of worsening dyspnoea, chest pain, fever, and lethargy. On physical exam, she was

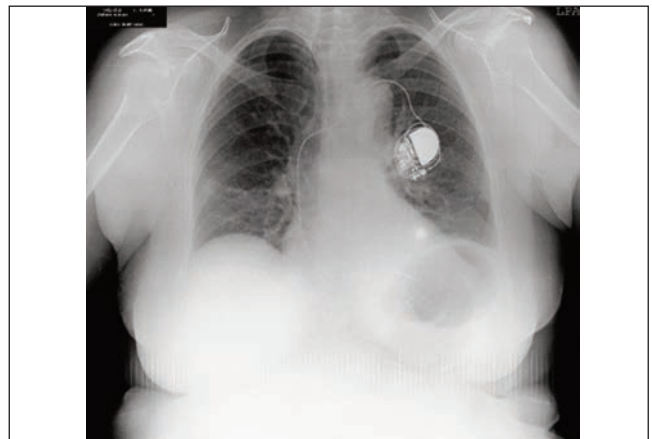


Figure-1: CXR, two days after the procedure.

Tahir Heart Institute, Chenab Nagar, Pakistan.

Correspondence: Nasiha Khalid. e-mail: nasihakhalid1@gmail.com

ORCID ID. 0009-0000-9624-3637

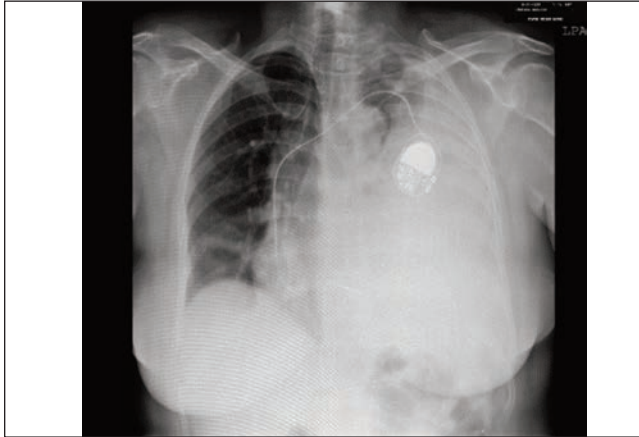


Figure-2: CXR, two weeks after the procedure showing massive left- sided pleural effusion.

Table.

Investigations	Results	Reference range
TLC ($\times 10^9/L$)	26.49	4-11
Hb (g/dl)	11.8	11-14.5
CRP (mg/dl)	329	<5

afebrile, with a heart rate of 100 breaths per minute, blood pressure 140/95mmHg, respiratory rate of 28 breaths per minute, and hypoxaemic with an O_2 saturation of 88% on room air. Chest auscultation revealed absent breath sounds on the left side and a subtle pericardial friction rub. ECG was unremarkable with paced rhythm and pacemaker interrogation was normal. Echocardiography did not show any pericardial effusion. Laboratory workup reported elevated TLC, raised CRP, and markedly low haemoglobin compared to her baseline Hb levels of 17 g/dl. (Table).

Chest X-ray and CT scan revealed massive left-sided pleural effusion but no evidence of pericardial effusion and cardiac perforation (Figure 2).

Diagnostic pleural fluid aspiration revealed haemorrhagic effusion. She was started on Imipenem/Cilastatin on suspicion of pneumonia with no improvement in inflammatory markers. Pleural fluid analysis showed results consistent with exudative pleural effusion using Light's criteria.⁵ Her blood cultures revealed no growth. She was started on high-dose Ibuprofen and colchicine therapy after two days on the suspicion of Dressler's syndrome which improved her condition and a rapid fall of inflammatory markers was seen. Chest tube placement was done and a total of 2,350 ml of fluid was drained over the course of four days. One unit of whole blood was transfused. Her CRP dropped to 39 mg/L. She was discharged on long-term Ibuprofen and colchicine therapy and follow-up visits showed further normalization of CRP and she has had no recurrence of symptoms as of yet.

Discussion

Post-cardiac injury syndrome (PCIS) first described by Dressler in 1956 as a post-myocardial infarction syndrome⁶ refers to an aetiologically heterogeneous group of autoimmune-mediated conditions of pericardial, epicardial and myocardial inflammation. By definition, post-cardiac injury syndromes include post-myocardial infarction pericarditis triggered by ischaemic myocardial necrosis, post-pericardiotomy syndrome (PPS) after surgical trauma, and, finally, post-traumatic pericarditis due to either iatrogenic or accidental injury.

A diagnosis of PCIS may be considered in patients with chest pain, fever, pericardial or pleural effusions, and a systemic inflammatory response syndrome that peaks after an appropriate latency period following prior pericardial or pleural injury. The current case highlights the need to consider the diagnosis in the so-called latent period. Alternative causes for inflammation and effusion need to be ruled out before a diagnosis of PCIS can be established. Importantly, any evidence of lead perforation must be ruled out before further diagnostic investigations.⁴ The diagnostic criteria of PCIS proposed by the 2015 ESCG (European Society of Cardiology Guidelines)⁷ require two of the following in addition to cardiac injury: (i) fever without alternative causes, (ii) pericarditic or pleuritic chest pain, (iii) pericardial or pleural rubs, (iv) evidence of pericardial effusion, and/or (v) pleural effusion with elevated CRP.

After the placement of a pacemaker, the prevalence of PCIS has been reported to be 1.8%.³ However, in one observational study of 4,705 patients with CIED (cardiac implantable electronic device) implantation, PCIS was reported in 0.1% of the patients.⁸

Concomitant pleuro-pericardial effusion is a common occurrence with mild to moderate effusions both in the pericardium (>80%) and in the pleural space (>60%).⁴ The relatively low incidence of PCIS after implantation of a permanent pacemaker makes its diagnosis a challenge and very likely to be missed as a possible differential. A large registry of pleural fluid analysis in patients with PCIS reported that all the effusions were exudative and haemorrhagic in most cases.⁹ Our patient's unique presentation with isolated haemorrhagic pleural effusion without pericardial effusion makes it even more challenging to diagnose PCIS.

The current hypothesis of PCIS stands with autoimmune pathogenesis. It is presumed that initial injury to pericardial cells combined with blood in the pericardial space triggers an immune response, resulting in immune complex deposition in the pericardium, pleura, and lungs in

predisposed individuals.¹⁰ This hypothesis is supported by the evidence of a discrete latent period between cardiac injury and clinical onset of symptoms from weeks to months, coexistent pleural effusion and possible pulmonary infiltrates, and increased anti-cardiac antibodies.¹¹ However, retrospective analysis of this case suggests that the present patient's first admission of fever with raised TLC and chest pain two days after the procedure could have been due to the same immunologic insult that was neutralised partially with anti-inflammatory drugs, and this partial recovery was mistakenly attributed to antibiotic treatment. Chest X-ray findings in lower zones bilaterally could be due to hypoventilation secondary to the post-procedure state coupled with pericardial chest pain. Presently, we do not have any reliable serological test to support our hypothesis. Detection of anti-cardiac antibodies is specific but not a sensitive marker.¹² This partial recovery was left without treatment which ultimately ended up in full-blown immunologic insult two weeks later. Had these anti-inflammatory drugs (Ibuprofen and Colchicine) been started earlier and continued for a month or so, this massive pleural effusion with subsequent chest tube intubation could have been avoided.

Conclusion

This case report suggests that raised inflammatory markers immediately (within latent period) following cardiac device implantation after the exclusion of the more common aetiologies; like infective or lead perforation should raise a high index of suspicion for post-cardiac injury syndrome or Dressler's syndrome. This will help in early diagnosis. We hypothesize that early treatment with anti-inflammatory drugs could prevent the peak inflammatory response and its associated complications like pleural effusion, though it is yet to be tested.

Consent: Informed consent was taken before submitting the case report.

Disclaimer: None.

Conflict of Interest: None of the authors has a financial relationship with a commercial entity interested in this manuscript's subject. NK contributed by reviewing the literature and drafting the manuscript. IA reviewed the manuscript and supervised the conception and design of the article. Both authors read and approved the final manuscript.

Funding Sources: None.

References

1. Wessman DE, Stafford CM. The Post-cardiac Injury Syndrome: Case Report and Review of the Literature. *South Med J*. 2006; 99:309-14. doi: 10.1097/01.smj.0000203330.15503.0b.
2. Verma BR, Montane B, Chetrit M, Khayata M, Furqan MM, Ayoub C, et al. Pericarditis and Post-cardiac Injury Syndrome as a Sequelae of Acute Myocardial Infarction. *Curr Cardiol Rep*. 2020; 22: 1-10. doi: 10.1007/s11886-020-01371-5.
3. Lehto J, Kiviniemi T. Postpericardiotomy syndrome after cardiac surgery. *Ann Med* 2020; 52: 243–64. doi: 10.1080/07853890.2020.1758339.
4. Sasse T, Eriksson U. Post-cardiac injury syndrome: aetiology, diagnosis, and treatment. [Online] [Cited 2023 May 26]. Available from: URL: <https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-15/Post-cardiac-injury-syndrome-aetiology-diagnosis-and-treatment>
5. Light's criteria. [Online] [Cited: 2023 June 03]. Available from: URL: <https://reference.medscape.com/calculator/571/light-s-criteria>
6. Dressler W. A post-myocardial-infarction syndrome: Preliminary report of a complication resembling idiopathic, recurrent, benign pericarditis. *J Am Med Assoc*. 1956; 160:1379-83. doi: 10.1001/jama.1956.02960510005002.
7. 2015 ESC Guidelines for the diagnosis and management of pericardial diseases: The Task Force for the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology (ESC) Endorsed by: The European Association for Cardio-Thoracic Surgery (EACTS). [Online] [Cited 2023 June 05]. Available from: URL: <https://pubmed.ncbi.nlm.nih.gov/26320112/>
8. Gatzoulis K, Archontakis S, Tsiachris D, Lazaros G, Apostolopoulos T, Zervopoulos G, et al. Post-cardiac injury syndrome after permanent electronic cardiac device implantation. Incidence, presentation, management, and long-term prognosis. *Int J Cardiol*. 2014; 174:163-4. doi: 10.1016/j.ijcard.2014.03.170.
9. Bielsa S, Corral E, Bagüeste P, Porcel JM. Characteristics of Pleural Effusions in Acute Idiopathic Pericarditis and Post-Cardiac Injury Syndrome. *Ann Am Thorac Soc*. 2016; 13: 298-300. doi: 10.1513/AnnalsATS.201510-668LE.
10. Imazio M, Brucato A, Rovere ME, Gandino A, Cemin R, Ferrua S, et al. Contemporary Features, Risk Factors, and Prognosis of the Post-Pericardiotomy Syndrome. *Am J Card*. 2011; 108:1183-7. doi: 10.1016/j.amjcard.2011.06.025.
11. De Scheerder I, De Buyzere M, Robbrecht J, De Lange M, Delanghe J, Bogaert AM, et al. Postoperative immunological response against contractile proteins after coronary bypass surgery. *Heart*. 1986; 56:440–4. doi: 10.1136/hrt.56.5.440.
12. Hoffman M, Fried M, Jabareen F, Vardinon N, Turner D, Burke M, et al. Anti-heart Antibodies in Postpericardiotomy Syndrome: Cause or Epiphenomenon? *Autoimmunity*. 2002; 35:241-5. doi: 10.1080/08916930290028166.