

Article

Cardiac Tamponade in a Chronic Renal Failure Patient with Suspicion of Dialysis Pericarditis: A Case Report

Pipiet Wulandari ^{1,2}, Suryono ^{1,2}, Aris Prasetyo ³, Jauhar Firdaus ³, Kristianingrum Dian Sofiana ³, Laksmi Indreswari ³, Adelia Handoko ³, Bagus Setia ³

¹ Department of Heart and Vascular Diseases; RSD dr. Soebandi, Jember, Indonesia

² Laboratory of Physiology, Faculty of Medicine, University of Jember, Jember, Indonesia

³ Faculty of Medicine, University of Jember, Jember, Indonesia

* Correspondence: pi Piet_wulandari@unej.ac.id

Abstract: Pericardial effusion is a condition characterized by fluid accumulation in the pericardial cavity. This fluid accumulation can cause disturbances in cardiac contractility, affecting hemodynamic stability. Fluid accumulation is caused by several factors, ranging from the amount of fluid, the speed of fluid accumulation, and the ability of the pericardium to accommodate fluid. One of the causes of pericardial effusion is pericarditis. Pericarditis can be caused by infection and non-infection, such as in patients with chronic renal failure with an incidence of 2-21%, which can lead to cardiac tamponade. In this study, a 46-year-old male patient who came to the emergency room of Dr. Soebandi Hospital, Jember with complaints of shortness of breath in the last 2 months. The patient also complained of heartburn. The patient had a history of chronic renal failure and routinely performed hemodialysis. On examination of vital signs, thoracic photographs, and echocardiography, a picture of cardiac tamponade was found. Cardiac tamponade can occur in patients with chronic renal failure. This is due to the condition of uremia which causes pericarditis. Inflammation of the pericardium causes blood that is intravascular to enter the pericardial cavity, causing fluid accumulation there. If not treated immediately, it can lead to cardiac tamponade which endangers the patient's life.

Citation: P. Wulandari, S. Suryono, A. Prasetyo, J. Firdaus, K. D. Sofiana, L. Indreswari, A. Handoko, and B. Setia, "Cardiac Tamponade in a Chronic Renal Failure Patient with Suspicion of Dialysis Pericarditis: A Case Report", *IJHIS*, vol. 2, no. 1, pp. 34–37.

Received: 15-04-2024

Accepted: 17-05-2024

Published: 31-05-2024



Copyright: © 2024 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution-ShareAlike 4.0 International License (CC BY SA) license (<http://creativecommons.org/licenses/by-sa/4.0/>).

Keywords: pericardial effusion, cardiac tamponade, chronic renal failure, pericarditis.

1. Introduction

Cardiac tamponade is a medical emergency that occurs when there is an effusion in the pericardial space that compresses the heart and causes a decrease in cardiac output and hemodynamic changes (Yacoub, et al, 2021; R. Schusler and S. L. Meyerson, 2018; Khan et al, 2018). This fluid accumulation is caused by several factors, including the amount of fluid, the speed of fluid accumulation, and the ability of the pericardium to hold fluid, causing pericarditis (Imazio, M and G. M. De Ferrari, 2020; Rosansky, et al, 017). Pericarditis can be caused by infectious and non-infectious causes, one of which is hemodialysis in cases of chronic renal failure with an incidence of 2-21% (Adler et al, 2015). Although this number is quite large, pericarditis in patients with chronic renal failure can present with asymptomatic massive pericardial effusion that can turn into cardiac tamponade so it is of particular concern (Mactier et al, 2011). We here report a cardiac tamponade patient with a history of chronic renal failure who was on routine hemodialysis.

2. Case Report

A 46-year-old man came to the emergency room with complaints of shortness of breath in the last 2 months which had worsened since the previous day. In addition, the

patient also complained of heartburn and vomiting. Since 3 months ago, the patient has been diagnosed with CKD and has been doing routine hemodialysis twice a week. Previously, shortness of breath was rarely felt and could still carry out light activities as a farmer. Physical examination revealed decreased lung sounds on percussion and rhonchi on auscultation. The patient underwent laboratory examination and obtained anemia (Hb: 7.7 g/dL), transaminitis (SGOT/SGPT: 393/229), hyponatremia (Na: 131.5 mmol/L), hyperkalemia (K: 5.2), uremia (Urea: 102 mg/dL), and increased renal function values (serum creatinine: 4.1 mg/dL; BUN: 48 mg/dL). The thorax photo examination showed a typical water bottle sign in the pericardium effusion (Figure 1), while the echocardiogram (ECG) examination showed AV Block degree II type 1 with low voltage QRS complex (amplitude <5 mm in extremity and precordial leads) (Figure 2). To confirm the patient's diagnosis, an echocardiographic examination was performed, resulting in left ventricular dilatation and massive pericardial effusion in the anterior wall 3.12 cm and posterior wall 2.04 cm (Figure 3). Then, the patient was planned for pericardiocentesis.



Figure 1. AP thorax x-ray: water bottle sign.

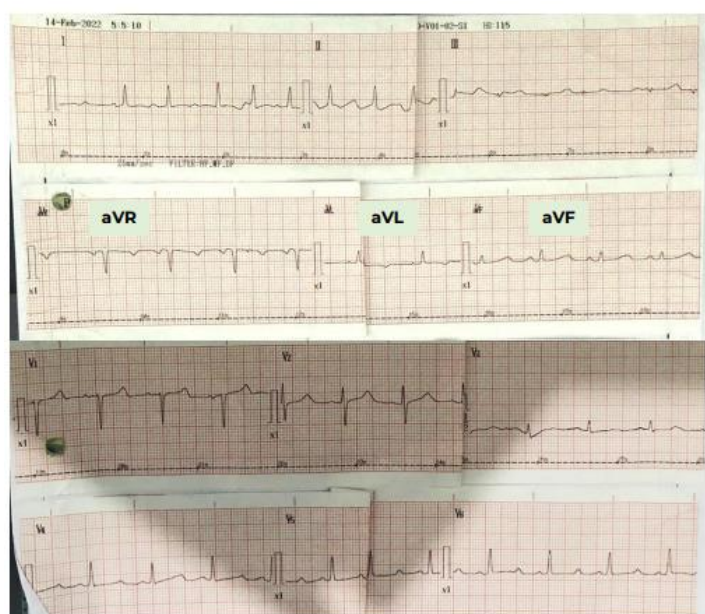


Figure 2. ECG picture of grade II AV block type 1 with low voltage QRS complex



Figure 3. Echocardiography, left ventricular dilatation, and pericardial effusion in the anterior and posterior walls.

3. Results and Discussion

We report a case of a dialysis patient in chronic renal failure complicated by cardiac tamponade secondary to dialysis-related pericarditis. The probability of cardiac tamponade in patients with pericarditis who are not on dialysis is 3.1%, in contrast to a rate of approximately 10-20% in patients on dialysis (McGuire et al, 2018). Therefore, the possibility of cardiac tamponade is very high in hemodialysis patients with pericarditis. In addition, various complications and symptoms have been reported in dialysis patients, so new complaints from patients should be taken seriously (Correa et al, 2020). The common symptom of chronic renal failure related to pericarditis is acute chest pain, and pericardial friction rub can be found on auscultation examination, and it can also appear asymptomatic so that screening with ECG is needed and ST segment elevation results are obtained (Mactier et al, 2011; Rehman et al, 2017). In our patient, ECG examination did not show ST segment elevation. Pericarditis in patients with chronic renal failure on dialysis is associated with less frequent chest pain (up to 30% of patients are asymptomatic) as weaker myocardial inflammation may not cause ECG abnormalities (Adler et al, 2015; Rehman et al, 2017).

The cause of cardiac tamponade in hemodialysis patients should be carefully investigated. The two main causes of pericarditis in hemodialysis patients are dialysis-related pericarditis and uremic pericarditis (Lee et al, 2021). Uremic pericarditis is defined as pericarditis that occurs before or within eight weeks of starting dialysis, while dialysis-related pericarditis is defined as pericarditis that occurs in patients who have been on dialysis for >8 weeks (Neves et al, 2021). The occurrence of pericarditis is due to the accumulation of toxic metabolites and nitrogen in the blood which causes the release of pro-inflammatory mediators such as interleukin 1, interleukin 6, and tumor necrosis factor (TNF) resulting in inflammation, fibrous deposition, and adhesions that cause damage to the pericardium tissue resulting in cardiac tamponade that endangers the patient's life (Yacoub et al, 2021; Awan et al, 2017; Rehman et al, 2017). Therefore, in patients undergoing hemodialysis, the heart condition should be closely monitored to detect acute pericarditis in chronic renal failure.

4. Conclusions

Pericarditis in patients with chronic renal failure can present with asymptomatic massive pericardial effusion that can turn into cardiac tamponade. Therefore, in patients undergoing hemodialysis, the heart condition should be closely monitored to detect acute pericarditis in chronic renal failure.

References

- Yacoub, M. B. S. Q. Rodriguez and K. Mahajan, *Constrictive-Effusive Pericarditis*, Las Vegas: StatPearls Publishing, 2021.
- Schusler, R and S. L. Meyerson, "Pericardial Disease Associated with Malignancy," *Current Cardiology Reports*, vol. 20, no. 10, p. 92, 2018.
- Khan, H. A. R., J. A. Gilani, M. B. Pervez, S. Hashmi and S. Hasan, "Penetrating Cardiac Trauma: A retrospective case series from Karachi," *Journal Of Pakistan Medical Association*, vol. 68, no. 8, pp. 1285-1287, 2018.
- Imazio, M and G. M. De Ferrari, "Cardiac tamponade: an educational review," *European Heart Journal*, pp. 1-9, 2020.
- Rosansky, S. J., J. Schell, J. Shega, J. Scherer, L. Jacobs, C. Couchoud, D. Crews and M. McNabney, "Treatment Decisions for Older Adults with Advanced Chronic Kidney Disease," *BMC Nephrology*, vol. 18, no. 200, pp. 1-10, 2017.
- Adler, Y., P. Charron, M. Imazio, L. Badano, G. Barón-Esquivias, J. Bogaert and A. Brucato, "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)," *European Heart Journal*, vol. 36, no. 42, pp. 2921-2964, 2015.
- Mactier, R., N. Hoenich and C. Breen, "Renal Association Clinical Practice Guideline on Haemodialysis," *Nephron Clinical Practice*, vol. 118, no. 1, pp. 241-286, 2011.
- McGuire, S. E. J. Horton, D. Renshaw, A. Jimenez, N. Krishnan and G. McGregor, "Hemodynamic Instability during Dialysis: The Potential Role of Intradialytic Exercise," *BioMed Research International*, vol. 2018, pp. 1-11, 2018.
- Correa, S, J. K. Pena-Esparragoza, K. M. Scovner and F. R. Mc Causland, "Predictors of Intradialytic Symptoms: An Analysis of Data From the Hemodialysis Study," *American Journal of Kidney Diseases*, vol. 76, no. 3, pp. 331-339, 2020.
- Rehman, K. A., J. Betancor, B. Xu, A. Kumar, C. G. Rivas, K. Sato, L. P. Wong, C. R. Asher and A. L. Klein, "Uremic Pericarditis, Pericardial Effusion, and Constrictive Pericarditis in End-stage Renal Disease: Insights and pathophysiology," *Clinical Cardiology*, vol. 40, no. 10, 2017.
- Lee, M.-J., I. Park, H. Kim, G.-T. Shin and J. C. Jeong, "Preexisting Comorbidities are Associated with the Mortality Rate as well as the Predialysis Adverse Events in Incident Dialysis Patients," *Kidney Research and Clinical Practice*, vol. 40, no. 3, pp. 419-431, 2021.
- Neves, P. D. M. d. M., F. C. Lario, S. Mohrbacher, B. M. C. Ferreira, V. A. H. Sato, É. S. Oliveira, L. V. B. Pereira, A. M. Bales, L. L. Nardotto and J. N. Ferreira, "Dialysis-related Constrictive Pericarditis: Old enemies may sometimes come back," *Brazilian Journal of Nephrology*, pp. 1-5, 2021.
- Awan, A., F. Tiruneh, P. Wessly, A. Khan, H. Iftikhar, S. Bamed and D. Larbi, "Acute Pericarditis: Descriptive Study and Etiology Determination in a Predominantly African American Population," *Cureus*, vol. 9, no. 7, 2017.
- Rehman, K. A., J. Betancor, B. Xu, A. Kumar, C. G. Rivas, K. Sato, L. P. Wong, C. R. Asher and A. L. Klein, "Uremic Pericarditis, Pericardial Effusion, and Constrictive Pericarditis in End-stage Renal Disease: Insights and Pathophysiology," *Clinical Cardiology*, vol. 40, no. 10, pp. 839-846, 2017.