

Uremic pericarditis: A case report of favorable outcomes with early detection and management

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ABSTRACT

Uremic pericarditis is a rare, potentially life-threatening complication of end-stage renal disease (ESRD) caused by the accumulation of uremic toxins. This case report describes a 32-year-old man with diabetes and ESRD on hemodialysis who developed uremic pericarditis. The patient presented with fever, chest pain, dyspnea, cough, and foot pain. Diagnostic investigations led to treatment with broad-spectrum antibiotics and surgical debridement of a necrotizing soft tissue infection of the right foot. The lack of clinical improvement in hemodynamic status prompted rapid investigation with electrocardiography and echocardiography, confirming the diagnosis of uremic pericarditis. Prompt initiation of renal replacement therapy with close monitoring led to a successful management outcome. This case report highlights the importance of early recognition, appropriate interventions, and a multidisciplinary approach in treating uremic pericarditis.

Keywords: End-stage renal disease, uremic pericarditis, dialysis-associated pericarditis, pericardial friction rub

INTRODUCTION

Uremic pericarditis develops secondary to the failure of damaged kidneys to excrete uremic toxins, leading to their systemic buildup.¹ Elevated levels of urea, creatinine, and other metabolic waste products cause inflammation of the pericardium, resulting in a characteristic clinical presentation.^{2,3} The pathophysiology of uremic pericarditis involves a complex interplay of inflammatory mediators and oxidative stress. Inflammatory cytokines, such as interleukin-1 (IL-1) and tumor necrosis factor-alpha (TNF- α), initiate and propagate pericardial inflammation. Furthermore, oxidative stress contributes to endothelial dysfunction and cell injury, exacerbating the inflammatory response.^{2,3}

The diagnosis of uremic pericarditis requires a high index of suspicion and a thorough clinical assessment.

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Standard presenting features include chest pain, pericardial friction rub, dyspnea, and signs of cardiac tamponade. Electrocardiography, echocardiography, and laboratory investigations help confirm the diagnosis and assess the extent of pericardial involvement.^{2,3} The management of uremic pericarditis should alleviate symptoms, reduce inflammation, and prevent complications. Prompt initiation of renal replacement therapy (RRT) with hemodialysis or peritoneal dialysis remains the cornerstone of treatment to eliminate uremic toxins. In addition, anti-inflammatory medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs) or corticosteroids, can reduce pericardial inflammation in mild cases. In severe cases with cardiac tamponade, pericardiocentesis or pericardial window surgery may be required.²

CASE

A 32-year-old man with diabetes and end-stage renal disease (ESRD) on hemodialysis presented to the emergency department with fever, chest pain,

Table

Laboratory	Patient Value	Reference Range
White blood cell	30.3 (H)	4.23–9.07 × 10 ³ cells/mm ³
Hemoglobin	9.7 (L)	13.7–17.5 g/dL
Hematocrit	29.1 (L)	40.1–51.0%
Platelet	425 (H)	163–337 cells/mm ³
Corrected Sodium	116 (L)	136–145 mEq/L
Potassium	5.1 (H)	3.5–5.1 mEq/L
Chloride	78 (L)	97–107 mEq/L
Bicarbonate	11 (L)	20–30 mEq/L
Glucose	287 (H)	65–115 mg/dL
Blood urea nitrogen (BUN)	100 (H)	6–20 mg/dL
Creatinine	7.8 (H)	0.5–12 mg/dL
Estimated glomerular filtration rate	8.14 (L)	>60.0 mL/min
Calcium	5.7 (L)	8.8–10.5 mg/dL
Total Protein	5.5	6.4–8.3 g/dL
Albumin	1.9 (L)	3.5–5.2 g/dL
Hemoglobin A1c	11.2 (H)	<5.6%
B-type natriuretic peptide	57,095 (H)	<124 pg/mL
Pro-Calcitonin	7.85 (H)	<0.09 ng/mL
C-Reactive protein	33.2 (H)	0–0.5 mg/L

dyspnea, cough, foot pain, and five missed hemodialysis sessions. On physical examination, he appeared lethargic. His vital signs included a blood pressure of 97/44 mmHg, mean arterial pressure of 62 mmHg, and a heart rate of 75 beats per minute. Respiratory rate and oxygen saturation were within normal limits. He had pitting edema and a 14 cm by 10 cm wound extending in depth to the calcaneus. Cardiac examination revealed a pericardial friction rub along the left sternal border. His presenting labs revealed leukocytosis, anemia, hyponatremia, hyperkalemia, uremia, and high anion gap metabolic acidosis (Table 1). The primary diagnosis was necrotizing soft tissue infection, and vancomycin and cefepime were started as empiric treatment. The surgery team was consulted for emergent debridement and excision of the right foot wound.

After surgery, the patient was admitted to the intensive care unit, where he remained hypotensive with severe metabolic derangements. At this time,

his electrocardiogram revealed diffuse ST-segment elevation, consistent with acute pericarditis. Chest x-ray showed bilateral pleural effusion (Figure 1). Transthoracic echocardiography (TTE) demonstrated a moderate pericardial effusion (Figure 2) without signs of cardiac tamponade and grossly preserved systolic and diastolic functions. Laboratory investigations revealed elevated blood urea nitrogen (BUN) and serum creatinine levels, confirming the diagnosis of uremic pericarditis.

The patient was immediately started on continuous renal replacement therapy to manage uremia with a net zero fluid balance due to being hypotensive. This therapy was continued for 24 hours, followed by intermittent hemodialysis daily for six days using his tunneled dialysis catheter. The patient simultaneously received treatment with NSAIDs to reduce pericardial inflammation. A multidisciplinary team, including nephrologists and cardiologists, closely monitored the patient's

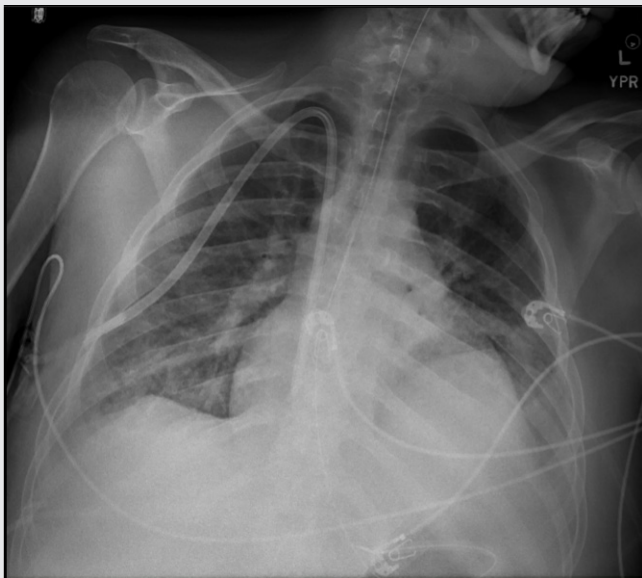


Figure 1. Chest x-ray showing bilateral pleural effusion.

cardiac and renal status. The patient's symptoms improved significantly following intermittent hemodialysis and NSAID therapy. Serial limited TTEs showed reduced pericardial effusion, and the pericardial friction rub resolved. The patient remained stable without any signs of cardiac tamponade. Pericardiocentesis was not required in this case due to the favorable response

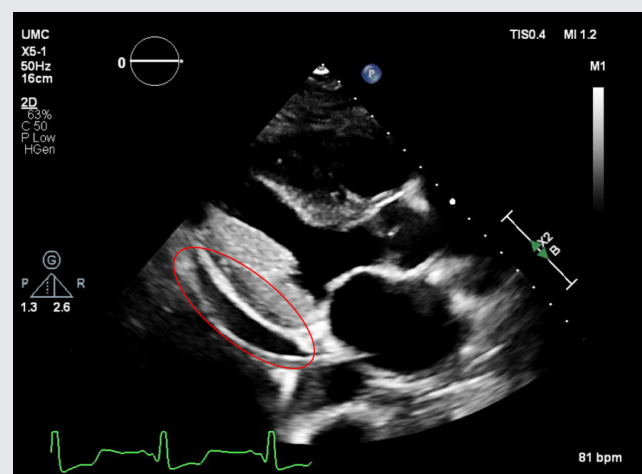


Figure 2. Transthoracic echocardiogram parasternal long-axis view of pericardial effusion.

to prompt conservative management. The patient was discharged with instructions for regular outpatient hemodialysis sessions and cardiology and nephrology follow-ups. Long-term management included maintaining a better dialysis schedule, controlling hypertension, and addressing any underlying causes of chronic kidney disease.

DISCUSSION

Uremic and dialysis-associated pericarditis is rare but significant complication of ESRD, as highlighted in this case. The prevalence is difficult to determine; the estimated incidence of uremic pericarditis is 1.4% to 29% per year, while dialysis-associated pericarditis is 0.8% to 6%.⁴ Therefore, while evaluating patients with advanced chronic kidney disease, this possibility should be considered since this condition develops quickly.¹ Early recognition of uremic pericarditis is difficult because its symptoms are not specific. Patients may present with chest pain, shortness of breath, and fever, which can also be seen in other conditions. Therefore, a high level of clinical suspicion is necessary for diagnosis. In addition, diagnostic tests, such as electrocardiography and echocardiography, may not always be conclusive, and further investigations may be required. Upon early recognition, prompt initiation of RRT and anti-inflammatory medications are crucial in preventing cardiac complications and improving patient outcomes. Regular multidisciplinary follow-up is essential for the long-term management of these patients.

CONCLUSION

Uremic pericarditis is a rare and life-threatening condition that requires timely intervention. As in this case report, a collaborative approach from medical specialists emphasizes the significance of early diagnosis and a comprehensive management strategy to ensure successful outcomes in patients with uremic pericarditis. This patient had begun to develop life-threatening consequences, including pericardial effusion and hemodynamic instability. Any further delay in diagnosis and treatment may have resulted in further decompensation and unfavorable outcomes. More research is needed to evaluate additional

therapeutic approaches and preventive strategies for this challenging condition.

LEARNING POINTS

- Uremic pericarditis involves the complex effect of inflammatory mediators and oxidative stress from the build-up of uremic toxins on the pericardium.
- Presenting symptoms and physical examination findings include chest pain, shortness of breath, pericardial friction rubs, and signs of cardiac tamponade.
- Treatment strategies aim to remove uremic toxins, alleviate symptoms, and reduce inflammation to prevent further complications.

Consent: Verbal and written permission was obtained from the patient to publish this case prior to submission.

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