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Calcific uremic arteriolopathy

A 51-year-old man with end-stage renal disease, on peritoneal dialysis for the past 4 years, presented to the emergency department with severe pain in both legs. The pain had started 2 months previously and had progressively worsened. After multiple admissions in the past for hyperkalemia and volume overload due to noncompliance, he had been advised to switch to hemodialysis.

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On examination, the skin from his toes up to his scrotum was covered with extensive tender necrotic ulcers with eschar formation surrounded by violaceous plaques and scattered flaccid bullae (**Figure 1**). His peripheral pulses were intact.

Laboratory analysis revealed the following values:

- Serum creatinine 12.62 mg/dL (reference range 0.73–1.22)
- Blood urea nitrogen 159 mg/dL (9–24)
- Serum calcium corrected for serum albumin 8.1 mg/dL (8.4–10.0)
- Serum phosphorus 10.6 mg/dL (2.7–4.8).

His history of end-stage renal disease, failure of peritoneal dialysis, high calcium-phosphorus product (8.1 mg/dL × 10.6 mg/dL = 85.9 mg^2/dL^2, reference range ≤ 55), and characteristic physical findings led to the diagnosis of calcific uremic arteriolopathy.

Early ischemic manifestations: livedo reticularis and painful retiform purpura on the thighs and other areas of high adiposity

CALCIFIC UREMIC ARTERIOLOPATHY

Calcific uremic arteriolopathy or "calciphylaxis," seen most often in patients with end-stage renal disease, is caused by calcium deposition in the media of the dermo-hypodermic arterioles, leading to infarction of adjacent tissue.[1–3] A high calcium-phosphorus product (> 55) has been implicated in its development; however, the calcium-phosphorus product can be normal despite hyperphosphatemia, which itself may promote ectopic calcification.

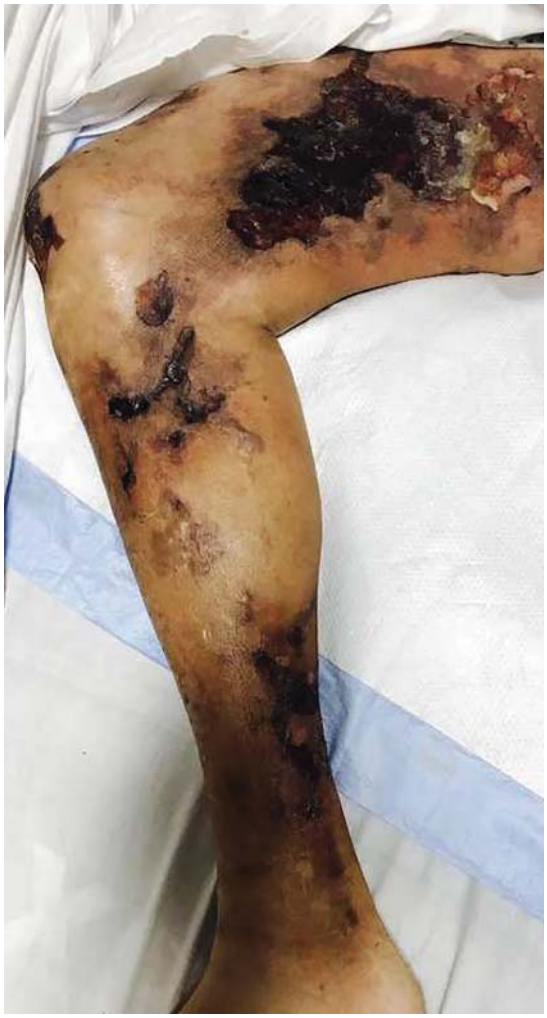

Figure 1. Necrotic ulcers with eschar formation surrounded by indurated plaques, accompanied by scattered flaccid bullae.

Early ischemic manifestations include livedo reticularis and painful retiform purpura on the thighs and other areas of high adiposity. Lesions evolve into violaceous plaquelike

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subcutaneous nodules that can infarct, become necrotic, ulcerate, and become infected. Punch biopsy demonstrating arteriolar calcification, subintimal fibrosis, and thrombosis confirms the diagnosis.

Differential diagnosis

Warfarin necrosis can cause large, irregular, bloody bullae that ulcerate and turn into eschar that may resemble lesions of calcific uremic arteriolopathy. Our patient, however, had no exposure to warfarin.

Pemphigus foliaceus, an immunoglobulin G4-mediated autoimmune disorder targeted against desmoglein-1, leads to the formation of fragile blisters that easily rupture when rubbed (Nikolsky sign). Lesions evolve into scaling, crusty erosions on an erythematous base. With tender blisters and lack of mucous membrane involvement, pemphigus foliaceus shares similarities with calcific uremic arteriolopathy, but the presence of necrotic eschar surrounded by violaceous plaques in our patient made it an unlikely diagnosis.

Cryofibrinogenemia. In the right clinical scenario, ie, in a patient with vasculitis, malignancy, infection, cryoglobulinemia, or collagen diseases, cryofibrinogen-mediated cold-induced occlusive lesions may mimic calcific uremic arteriolopathy, with painful or pruritic erythema, purpura, livedo reticularis, necrosis, and ulceration.[4] Our patient had no color changes with exposure to cold, nor any history of Raynaud phenomenon or joint pain, making the diagnosis of cryofibrinogenemia less likely.

Nephrogenic systemic fibrosis. Gadolinium contrast medium in magnetic resonance imaging can cause nephrogenic systemic fibrosis, characterized by erythematous papules that coalesce into brawny plaques with surrounding woody induration, which may resemble lesions of calcific uremic arteriolopathy.[5] However, our patient had not been exposed to gadolinium.

Management

Management is multidisciplinary and includes the following[1]:

- Hemodialysis, modified to optimize calcium balance[2]
- Intravenous sodium thiosulfate: the exact mechanism of action remains unclear, but it is thought to play a role in chelating calcium from tissue deposits, thus decreasing pain and promoting regression of skin lesions[3]
- Wound care, including chemical debridement agents, negative-pressure wound therapy, and surgical debridement for infected wounds[6]
- Pain management with opioid analgesics.

The patient was treated with all these measures. However, he died of sudden cardiac arrest during the same admission.

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