Calciphylaxis in hemodialysis patients : diagnosis and treatment, about a case

ABSTRACT :

Calciphylaxis is a condition that causes cutaneous necrosis, which primarily affects patients with end-stage renal disease undergoing dialysis. Histologically, this condition is characterized by subintimal calcific deposits in small-caliber arteries, leading to luminal obstruction. Unlike medial calcification, which affects the media of arteries, calciphylaxis affects the intima of arterioles. Early diagnosis and appropriate management, including addressing the underlying cause, can improve the poor prognosis associated with this condition.

In this case report, a 59-year-old woman with end-stage diabetic nephropathy and chronic kidney disease on hemodialysis presented with large, painful, ulcerated lesions on the inner aspects of both knees that were shallow and showed no signs of bacterial superinfection. Hypercalcemia was noted on biochemical analysis, and radiographs of the thighs revealed vascular calcifications of the superficial femoral, popliteal, and leg arteries bilaterally. Histological examination revealed dermal neovascularization with stasis thrombi and secondary epidermal necrosis, indicating an underlying thromboembolic phenomenon. The management consisted of analgesic treatment and daily local care, along with intensified dialysis sessions with sodium thiosulfate and rheopheresis. A marked improvement in the patient's condition was observed following an accidental occurrence of resolving gas embolism after hyperbaric oxygen therapy, which played a significant role in the regression of cutaneous necrosis.

Therefore, hyperbaric oxygenation may be considered as a potential treatment option for calciphylaxis.

INTRODUCTION:

Calciphylaxis is a rare and severe pathology that affects patients with end-stage chronic kidney disease. It is a phenomenon of ischemic, cutaneous, and sometimes systemic necrosis due to the obliteration of arterioles first by subintimal calcium deposits and then by thrombosis [1]. It evolves in the context of primary hyperparathyroidism, anticoagulant therapy, or neoplasia. We report a case of uremic calciphylaxis in the context of end-stage renal failure.

CASE REPORT:

A 59-year-old woman, followed for end-stage chronic kidney disease on hemodialysis due to diabetic nephropathy since September 2021, with a history of ischemic stroke complicating an embolic cardiopathy on oral anticoagulant, hypertension, type 2 diabetes, and morbid obesity (BMI=46.8), presented since July 2022 large, painful, ulcerated, lividoid, fibrinous lesions with deep secondary induration and necrosis on the lateral aspects of both thighs, without bone contact, and involvement of the inner aspects of the knees, less deep, without signs of bacterial superinfection (figure 1).

Laboratory results revealed hypercalcemia at 2.74 mmol/l, normal phosphatemia at 0.55 mmol/l, and hyperparathyroidism at 11 times the normal range. Radiography of the thighs showed vascular calcifications of the superficial femoral, popliteal, and tibial arteries bilaterally, without notable abnormality of the bone structure (figure 1). Histology did not show lesions of calciphylaxis on two skin biopsies with one-month interval; the first biopsy showed dermal neoangiogenesis with stagnant thrombi and secondary epidermal necrosis, suggestive of an underlying thromboembolic phenomenon, which was also found in the second biopsy, with the presence of hypodermal ischemic necrosis areas and fibrin-cruoric thrombi of small hypodermal capillaries whose primitive or secondary nature was difficult to determine. Even in the absence of characteristic calciphylaxis lesions on histology, the diagnosis of calciphylaxis was established based on the typical clinical and biological presentation, and confirmed retrospectively after improvement under treatment.

Initial management consisted of local care with hydrocellular dressings and Algosteril and treatment with sodium thiosulfate 25 mg three times per week, but after one month, the

patient's pain worsened, and there was no improvement in the skin lesions. The patient was then hospitalized in the dermatology department and continued hemodialysis in our unit. Secondary management consisted of analgesic treatment and daily local care with mechanical debridement of fibrin and Algosteril packing with secondary hydrocellular dressing. Hemodialysis was intensified from 3 to 6 times per week, with intravenous sodium thiosulfate 25 mg three times per week and rheopheresis treatment twice per week during the first two weeks and once per week during maintenance phase, with a total of eight sessions. We also stopped the oral anticoagulant as a contributing factor to calciphylaxis and due to the increased risk of bleeding associated with rheopheresis. Additionally, the patient presented a resolving gas embolism after hyperbaric oxygen therapy, which also partially resolved the skin necrosis. The patient's condition improved, with healing of the skin lesions and regression of pain.

DISCUSSION:

The physiopathology of calciphylaxis has not yet been fully elucidated. It appears that the calcification of cutaneous arterioles is the first step and necessary condition for the subsequent development of necrosis. Contrary to what has been thought for a long time, calcification does not occur solely due to an increase in the phosphocalcic product, which, reaching a critical threshold, would allow the formation of crystals [2]. Indeed, in the physiological state, the value of the phosphocalcic product may be sufficient for this to occur. Therefore, this is only one of the factors involved, albeit one of the most important [3]. In recent years, numerous studies have highlighted some of the mechanisms associated with calcification: a decrease in the quantity of inhibitory molecules, transformation of media myocytes into bone-like cells, release of calcium crystals by increased bone resorption, cell death, and vitamin D supplementation [4].

Calciphylaxis is a rare and severe pathology that affects patients with end-stage chronic kidney disease. It is a pathology of the dermal and subdermal microvessels that become calcified and whose thrombosis leads to cutaneous necrosis. Calciphylaxis lesions can be distal and axial, causing intense pain, infections, and high mortality rates (40-80% at 1 year) [5]. The pathophysiology is based on mineral and bone abnormalities of CKD [6] and the major role of vitamin K antagonists (VKAs) in the formation of arteriolar microcalcifications in

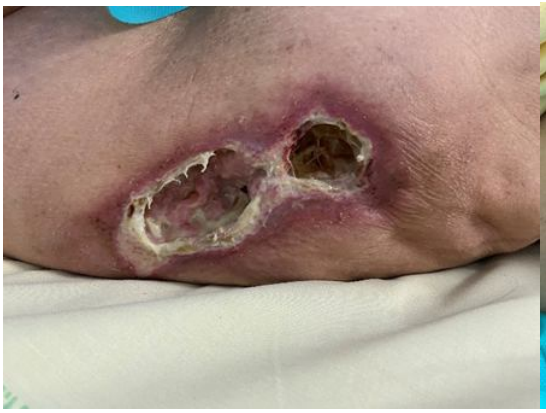
calciphylaxis [7,8]. Its prognosis remains grim, with a mortality rate at 1 year ranging from 40 to 80% [9].

The clinical presentation is characterized by hyperalgesic and indurated lesions. Initially appearing atonic with lividoid periphery, in a geographical pattern, they evolve into necrosis. The development of vascular microcalcifications is secondary to an imbalance between inducing and neutralizing factors of calcification associated with a change in phenotype of smooth muscle cells [10].

Correction of risk factors, optimization of dialysis, wound care, and pain management should be systematic for all patients with calciphylaxis. Sodium thiosulfate treatment, which is an antioxidant agent, acts by chelating calcium and attenuating prothrombotic endothelial dysfunction induced by oxidative stress. Retrospective small series have reported a beneficial effect of hyperbaric oxygen therapy in this indication [11], which is consistent with the result of our case, demonstrating an improvement in lesions after hyperbaric oxygenation, making it an effective treatment for calciphylaxis.

CONCLUSION:

Calciphylaxis remains a rare but serious complication of end-stage chronic kidney disease requiring multidisciplinary management. Early diagnosis allows for rapid and appropriate management. The beneficial effect of hyperbaric oxygenation can be considered as a systematic treatment for calciphylaxis.



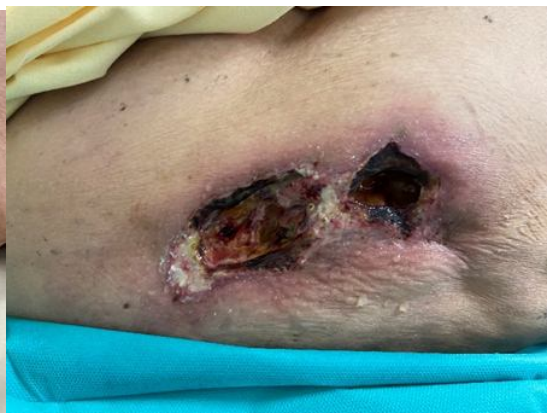


Figure 1: Ulcerated, lividoid, fibrinous lesions with induration and necrosis of the thigh.

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