Calciphylaxis Induced Gangrene: A Case Report

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Introduction

Gangrene is a common diagnosis within the diabetic and vascular disease patient. However, there are many diseases that can cause gangrene or complicate the process and treatment of gangrene that are important to recognize in these same patients. The authors present a case of gangrene following a common in office podiatric procedure in a patient with both diabetes and end stage renal disease complicated by calciphylaxis.

Case Report

A 48 year old female presented with right foot wounds following a partial nail avulsion of the left hallux. Patient was seen by her podiatrist in 2008 due to onychocryptosis with paronychia. She subsequently developed osteomyelitis and had a surgical debridement in 2009. Approximately three weeks following the last procedure and discharge from the hospital, the patient was referred to the Wound Care Center for continued evaluation and treatment.

The patient's medical history was significant for diabetes, end stage renal disease with dialysis treatment, ischemic heart failure, and coronary artery disease with quadruple coronary artery bypass, peripheral vascular disease, high blood pressure, dyslipidemia, and asthma. Also, the patient had recently been hospitalized for calciphylaxis in the trunk region. She experienced extensive necrosis of the stomach which was diagnosed via biopsy. This required multiple surgical debridements of the stomach and eventual placement of a Wound Vac for wound closure. During her hospitalization the osteomyelitis and wound infections were treated with both vancomycin and ciprofloxacin.

While hospitalized an extensive workup of the gangrene was performed. Peripheral vascular studies performed as an in-patient revealed segmental pressures of the limbs to be greater than 220mmHg suggesting calcification of the vessels with no compressibility. Values were elevated from the thigh to the calf, bilaterally. Toe pressures were only obtainable on the right foot and a TBI of 0.57 was measured. Radiographs of the left foot did not reveal any osteolysis or cortical disruption suggestive of osteomyelitis. Surgical debridement was performed of the left hallux with partial phalangectomy of the distal phalanx. Biopsy revealed osteomyelitis and calcific deposits within the soft tissues of the wound. Laboratory results for phosphorus, calcium, and PTH were 4.5, 9.2, and 159.0 respectively.

On initial presentation to the wound care clinic (April 2nd, 2009), a complete history was taken and full review of the patient's records was performed. Physical examination at the wound care center revealed a wound on the left hallux measuring 2.3 x 2.0 x 0.1cm (width, length, depth). An additional wound was noted dorsally on the 2nd digit measuring 1.7 x 1.0 x 0.1cm (Figures 1 and 2). No undermining was noted and the wound was noted to be dry with no acute signs of infection. Edema was noted to the dorsal aspect of the foot and ankle, bilaterally. Dorsalis pedis and posterior tibial pulses were palpable, bilaterally.

Debridements were deferred due to the history of calciphylaxis and the patient was referred for hyperbaric oxygen therapy and prescribed nitroglycerin patches (0.2mg/hour) to aid in increasing blood flow to the area.

The patient continues to be followed, however, upon the most recent examination (April 9th, 2009), the wound measured 2.0 x 2.0 x 0.1cm to the hallux and 1.4 x 0.8 x 0.1cm to the 2nd digit.

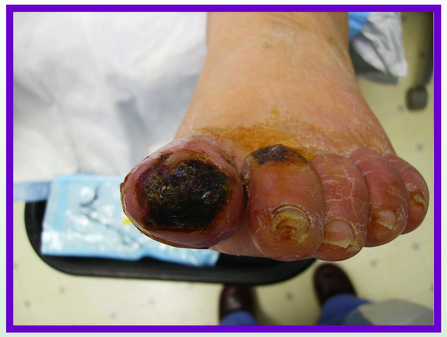

Figure 1. Photo of dorsum of the foot on initial examination

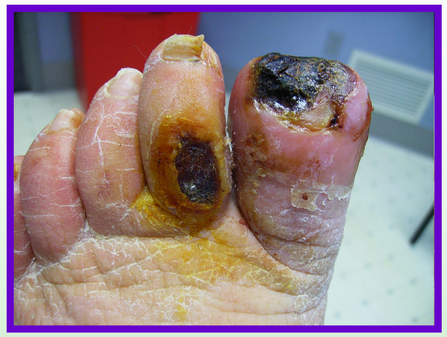

Figure 2. Photo of distal aspect of the digits on initial examination

Discussion

Calciphylaxis is a syndrome of calcification of the tunica media of the small and medium sized arteries which results in the progressive necrosis of the skin or peripheral gangrene in patients with uremic disease.[1-5] In particular, end stage renal disease patients are the most commonly diagnosed patients. [2,5] Other at risk groups include females and patients with a hypercoaguable condition, Caucasian decent, Type I Diabetes Mellitus, prednisone therapy, recent and significant weight loss, warfarin use, and low serum albumin.[6] Diagnosis of calciphylaxis in the end stage renal disease patient occurs in approximately 1-4% of patients.[3,6]

The challenge in diagnosis of calciphylaxis is that it is clinically difficult to differentiate from gangrene caused by typical peripheral vascular disease.[5] The lesions commonly manifest similarly to systemic vasculitis beginning with ischemic appearing changes and skin necrosis which evolves into non-healing ulcers with irregular margins.[1] Most patients diagnosed with calciphylaxis also have hyperparathyroidism and increase an calcium, phosphorus, and parathyroid hormone.[1,5] In kidney failure patients, this hyperparathyroidism is compensatory as a result of decreased intestinal calcium absorption due a lack vitamin D.[6] Clinically, there are two major variants of calciphylaxis; proximal and distal.[5] The former is found in thigh and abdominal areas and is associated with a poor prognosis compared to the latter which involves the digits.[5]

Melikoglu, et al reported that in most cases a radical parathyroidectomy resolves the skin lesions; however, the survival rates were unchanged.[4,6] However, Hafner et al reported that a significant improvement in survival was found in patients who underwent parathyroidectomy at a rate of 61 percent, but those that did not survive often succumbed not to calciphylaxis but to their end stage renal disease.[2,7]

The histological appearance of calciphylaxis is that of subcutaneous vessel occlusion of the tunica media and internal elastic lamina by calcification and fibrous proliferation.[4] Additionally, initimal edema, hyperplasia, and fibrosis may be seen without any inflammatory cells or vasculitis changes.[3,4,6]

In order to fully diagnose calciphylaxis a complete workup is necessary. This consists of biochemical investigation for hyperparathyroidism including PTH, serum calcium, and phosphate.Howe Tissue biopsies of the necrotic areas are also recommended to look for histological changes within the vasculature.[2]

Treatment of calciphylaxis is aimed at correction of the biochemical imbalances through low phosphate diets, phosphate binders, and dialysis with low calcium baths.[2,3] Aggressive wound care is also extremely important as a secondary complication of calciphylaxis associated gangrene may cause infection and sepsis.[2] Hyperbarics has also been found to be an effective means of treatment.[3] Most importantly, the use of corticosteroids should be avoided as these can worsen the disease process.[3] A small study was recently released that suggested that an infusion of sodium thiosulfate three times weekly may be a successful form of treatment.[3,8-11]

Conclusion

Gangrene is most often the result of peripheral vascular disease or complications related to diabetes or renal disease. It is important to recognize that there are occasions in which gangrenous changes can result from other disease processes. Patient presentation with an unusual onset or atypical symptoms should be worked up for one of these less common etiologies to ensure proper treatment is instituted without delay to decrease the chance of less favorable outcomes.

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