

Penile Gangrene due to Severe Vascular Calcification

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Calciphylaxis is a rare syndrome characterized by deposition of calcium in soft tissue and blood vessels leading to ischemic tissue loss in patients with end-stage renal disease. We present a rare case of penile gangrene due to severe vascular calcification in a patient with this disease. A brief medical review of literature explaining the etiology, pathophysiology, and management is presented.

Patient Description

A 57 year old man with end-stage renal disease secondary to diabetes was admitted to the hospital following a week of excruciating pain in the penis. His medical history included chronic hemodialysis, hypertension, severe peripheral artery disease, leading to amputation of his left foot a year before presentation, and gangrene of the right foot, treated conservatively. Examination of the genitalia revealed necrotic gangrene of the whole penile glans. The coronal sulcus was covered with fibropurulent discharge, and the distal penile shaft was red and slightly swollen [Figure A].

Laboratory studies revealed serum calcium levels ranging from 8 to 9 mg/dl (normal 8.6–10.5 mg/dl), phosphate 8.5 mg/dl (normal 2.4–5), and the calcium phosphor product ($\text{Ca} \times \text{P}$) was 76.5 mg^2/dl^2 (normal 20.6–52.5). The patient was non-compliant with his treatment regimen of phosphate binders, and the serum calcium phosphor product was often above 70. His serum intact parathyroid hormone was 375 pg/ml (normal 10–65). Plain abdominal film [Figure B] showed extensive calcification of medium and small blood vessels and penile corporeal bodies and glans. Major abdominal and pelvic arteries were rela-

tively spared from the massive calcification process.

Due to his co-morbidities the patient was treated conservatively with local wound care and hemodialysis. His pain was relatively controlled with analgesics and opioids. A few days later he became febrile, his blood cultures grew gram-negative bacteria, and despite proper antibiotic treatment the patient expired after 2 weeks from septic shock.

Comment

Calciphylaxis is a rare syndrome characterized by progressive vascular calcification and ischemic tissue loss in patients with end-stage renal disease. Deposition of calcium in soft tissue and blood vessels is a major problem in these patients due to low serum calcium and high serum phosphate, leading to secondary hyperparathyroidism and bone resorption. In order to suppress parathormone levels, calcium-containing medication and vitamin D analogs are given to these patients, however high calcium levels with coexisting high serum phosphate can cause precipitation of calcium in medium and small blood vessels and soft tissues [1].



[A] Patient's genitalia showing dry gangrene of the penile glans.



[B] Plain abdominal film showing extensive calcifications of pelvic and lower extremities blood vessels and extensive calcifications of the corporeal bodies and penile glans.

There is some confusion regarding the terminology of calcium precipitation. The original reports of this entity assigned the name calciphylaxis [2] because of the

apparent similarity to the calciphylaxis described by Seyle. Other investigators have argued that the name should be changed to calcific uremic arteriopathy [3].

The incidence of arterial calcification in dialysis was reported to vary from 3% to 83%, increasing with the duration of hemodialysis treatment. Vascular calcification, unlike atherosclerosis, is limited to medium and small arteries, usually sparing large vessels. Histologic examination reveals deposition of calcium within the media and the internal elastic membrane of the artery, and the lumen of the vessel is usually not involved. Probably diabetes increases the susceptibility of patients to penile calcification since only 39% of patients with end-stage renal disease have diabetes while 76% of patients with penile calciphylaxis have diabetes [4].

Penile calciphylaxis is rare, reported in 1–6% of patients with systemic calciphylaxis [4]; this condition leads to calcification of the penile arteries, causing tissue infection and gangrene. Diagnosis can be

made according to clinical presentation, medical history, abnormal calcium and phosphor serum levels, and plain film of the lower abdomen, genitalia and upper extremities demonstrating calcification of medium and small arteries. Treatment of penile lesions is still controversial. Management options include conservative treatment with local wound care and debridement versus penectomy. A review by Karpman et al. [4] did not find any statistically significant survival benefits for patients who underwent penectomy. They suggest that this option be reserved for patients with severe infection, or with severe pain refractory to analgesic treatment. The overall prognosis for patients with penile involvement is poor, with a mortality rate of 69% within 6 months.

In summary, penile gangrene due to vascular calcification is a rare phenomenon limited to patients with end-stage renal disease, leading to calcium phosphate metabolism abnormalities with precipitation of calcium in small blood

vessels, resulting in tissue ischemia, infection and gangrene. Penile calciphylaxis has a poor prognosis and high mortality rate. Treatment is controversial, ranging between surgical debridement and local conservative care, depending on the patient's acute status and overall prognosis.

References

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