Penile calciphylaxis: 5-year experience and literature review

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ABSTRACT

Introduction: Necrosis of the penis is a rare condition that may occur as a result of infectious dissemination, circulatory disorders, or even in patients with penile prostheses. It has been reported in a few patients on dialysis, usually associated with diabetes mellitus, cholesterol embolism, and calciphylaxis.

Case reports: Three patients with this condition seen at our hospital in the last 5 years are reported.

Conclusions: Calciphylaxis is a rare but often fatal condition occurring in approximately 1% of patients with chronic renal failure. It is characterized by calcification of subcutaneous arteries and infarction of the subcutaneous cellular tissue and overlying skin. It is associated to a high morbidity and mortality, and diagnosis is usually based on clinical signs and symptoms. Management is controversial, particularly with regard to surgery, which may range from penectomy to local care of lesion, debridement, or antibiotic therapy.

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Resumen

Introducción: La necrosis de pene es una entidad infrecuente, que puede ocurrir como diseminación de infecciones, desórdenes circulatorios, o incluso en pacientes con prótesis peniana. Se han descrito pocos casos en pacientes sometidos a diálisis, que suelen asociarse a diabetes mellitus, embolismo de colesterol y calcifilaxis.

Casos clínicos: Exponemos los casos clínicos de 3 pacientes con esta entidad, manejados en nuestro hospital durante los últimos 5 años.

Conclusiones: La calcifilaxis es una rara pero frecuentemente fatal condición en pacientes con fallo renal crónica, aproximadamente en el 1% de estos pacientes; se caracteriza por calcificación de arteriolas subcutáneas e infarto del tejido celular subcutáneo y la piel adyacente. Se asocia a una elevada morbimortalidad; el diagnóstico habitualmente es clínico. En lo referente al manejo, existe controversia, sobre todo en relación con la conducta quirúrgica que se debe seguir, que va desde falectomía hasta cuidados locales de la lesión, desbridación y antibiototerapia.

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Introduction

Necrosis of the penis is a rare condition that may occur as a result of the spread of an infection (like Fournier's gangrene), circulatory disorders, or even in patients with penile prostheses. Very few cases of this condition have been described in patients undergoing dialysis. In these cases, there may be an occasional association with diabetes mellitus, cholesterol emboli, and calciphylaxis (a term that means atherosclerosis accompanied by calcification of the small blood vessels). Due to the excellent collateral circulation of the perineum and lower abdomen, the condition is rare.

Diagnosis is usually clinical, based on past history, physical examination, and tests such as skin biopsy. The most common symptoms are pain and urinary obstruction. Mortality is high—exceeding 50% at 6 months—when the penile necrosis develops in diabetics and patients with renal failure.

Management may be either surgical or conservative, and is usually dictated by the patient's condition and his symptoms.

The purpose of this article is to share our experience with the condition in the past five years; we thus add three more cases to the scientific literature.

Case reports

Case 1

A 64-year-old male with a history of inadequately treated type 2 diabetes mellitus for 20 years, untreated systolic hypertension diagnosed 6 months ago, heart failure diagnosed 6 months ago, and chronic renal failure, also diagnosed 6 months ago, and treated with peritoneal dialysis.

The patient consults for a 2-week picture that developed after he was hospitalized for metabolic decompensation, when a transurethral catheter was used for two weeks; he complained of moderate, oppressive hypogastric pain radiating to the glans penis; he used self-prescribed topical treatments which afforded no improvement. The pain increased to the point of being incapacitating three days before his admission, for which reason he visited our service. He denied fever and other symptoms.

The physical examination showed an abdomen with no abnormalities, necrosis in the glans penis, and purulent discharge through the urethral meatus (Fig. 1), as well as necrosis in the first and second toes of both feet (Fig. 2).

Laboratory tests showed: hemoglobin 9.9 g/dL, leukocytes 11,100, platelets 304,000, glucose 138 mg/dL, BUN 143.8 mg/dL, creatinine 7.71 mg/dL, calcium 7.79 mmol/L, phosphorus 7.08 mmol/L, potassium 5.75 mmol/L, pH 7.17, pCO₂ 47 mmHg, and HCO₃⁻ 17.1 mmol/L.

A penectomy was performed; it was initiated as a partial removal, but due to a lack of vascularization up to the base of the penis during the operation it was decided to make it complete; additionally, a perineal meatus was made (Fig. 3).

The pathology report was the following: distal ischemic necrosis of the glans and prepuce associated with microthrombosis and bacterial proliferation, dystrophic calcification of the arterial tunica media on the resection edges (Fig. 4).

The culture of the secretion yielded Escherichia coli, for which reason the patient received antibiotic therapy for 7 days. He was in hospital for 9 days, and was discharged in good general condition; he is currently being monitored.

Case 2

A 48-year-old male with a history of type 2 diabetes mellitus, systemic hypertension and hypothyroidism diagnosed 8 years ago and inadequately treated, and chronic renal failure for 2 years treated with hemodialysis.

He visited our service complaining of two weeks of pain in the glans penis plus irritative urinary symptoms; one week
afterwards he noted paleness of the glans and a sensation of local anesthesia, and a growing purplish lesion on the dorsal aspect of the glans accompanied by a purulent discharge appeared.

The physical examination revealed: pale, hypothermic glans, with a necrotic area on the dorsal aspect, accompanied by purulent, fetid secretion.

Blood laboratory tests showed: hemoglobin 8.02 g/dL, leukocytes 8,060, platelets 355,000; blood chemistry: glucose 277 mg/dL, creatinine 5.5 mg/dL, BUN 90.1 mg/dL; liver function tests: AST 48, ALT 32, alkaline phosphatase 332, LDH 232; serum electrolytes: sodium 128.8 mmol/L, potassium 6.28 mmol/L, chloride 96.4 mmol/L, calcium 7.92 mmol/L, and phosphorus 7.36 mmol/L.

A partial penectomy was performed without complications.

The pathology report read: necrosis and acute and chronic inflammatory process with an abscess and ulceration, with arteriosclerosis obliterans.

The patient is currently being monitored.

Case 3

A 54-year-old male with a history of type 2 diabetes mellitus since age 30, and chronic renal failure for 2 years treated with hemodialysis. Four years ago he underwent a supracondylar amputation of the lower limb.

He visited our service for asymptomatic blister-like lesions on the glans that appeared one month before and became ulcerations one week later; he subsequently noticed paleness and experienced intense pain on the glans penis.

Upon physical examination the glans was pale and hypothermic, and had a necrotic lesion measuring approximately 1.5 cm on the ventral aspect, transurethral purulent secretion, and induration of the distal third of the penis.

Blood laboratory tests showed: hemoglobin 10.1 g/dL, leukocytes 4,890, platelets 283,000; blood chemistry: glucose 55 mg/dL, creatinine 7.88 mg/dL, BUN 65.5 mg/dL; serum electrolytes: sodium 145.3 mmol/L, potassium 4.81 mmol/L, chloride 99 mmol/L, calcium 8.3 mmol/L, phosphorus 9.21 mmol/L. Liver function tests: AST 18, ALT 14, alkaline phosphatase 64.

A Doppler ultrasound of the penis with Caverject was done, which showed a total absence of flow to 100% of the penis.

The patient was offered surgical treatment and he decided to go to another institution.

Discussion

Distal necrosis of the penis associated with renal failure is a rare condition; only a few cases have been reported in the literature. It is characterized by calcification of small and medium blood vessels, and is often accompanied by a high mortality rate (approximately 64% of cases). The condition is rare because the penis usually receives blood supply from three different interconnected arterial pathways: the dorsal artery of the penis, the deep artery of the penis, and the urethral artery.

There are two main types of etiology: dry or of vascular origin, and infectious or Fournier’s gangrene. Dry gangrene
is often the result of inadequate blood flow; the main causes of this are diabetes mellitus, kidney disease and secondary hyperparathyroidism, priapism, and venous thrombosis8.

Vascular calcification is a well-known condition associated with end-stage renal disease. In a study with patients on long-term hemodialysis, the authors observed radiologic evidence of vascular calcification in 39% of patients at the initiation of the dialysis, and found that it rose to 92% after 10 years9; furthermore 19% of men undergoing hemodialysis have calcification in the artery of the penis.

Calciphylaxis is a rare but often fatal condition occurring patients with chronic renal failure (in approximately 1% of these patients)10. First described in 1962 by Selye, it is characterized by the calcification of the subcutaneous arterioles and infarction of the cellular subcutaneous tissue and the adjacent skin, which are considered the primary and secondary lesion, respectively. The pathophysiology of this condition is not clear; there is no specific diagnostic test, and diagnosis is based on the clinical features and the histopathological results9. Based on the lesions, it is classified as proximal (thorax, abdomen, thighs and arms) or distal (forearm, hand, leg, foot, fingers and toes).

In 1997, Wood et al11 introduced the term penile calciphylaxis.

Necrosis of the penis is characterized by the development of painful skin ulcers, purplish lesions on the glans12, mummification, self-amputation, and local superinfection9. This condition has a high morbidity and mortality; diagnosis is usually clinical, based on past history, physical examination, and tests such as skin biopsy4. To date, there is no diagnostic test for this condition. A relationship has been found with abnormalities in serum calcium phosphate. The normal range of phosphate and calcium is 20.6 to 52.5 mg/dL; many patients in the end-stages of renal failure have an elevated serum calcium phosphate, and a secondary diagnostic cut-off level of 70 mg/dL has been suggested with abnormalities in serum calcium hyperparathyroidism13,15.

The imaging studies recommended include ultrasound and penile arteriography. The use of computerized tomography for early diagnosis of the condition has recently been proposed. Precontrast cuts where calcifications of the internal pudendal artery or even the artery of the penis can be observed, as well as an area of nonenhancing glans penis with a clear margin of healthy tissue. Tomography may help the urologist to plan the surgery and to determine the margins10.

There is controversy about the surgical approach for treating penile necrosis. Wood et al11 suggest penectomy11; however, other authors suggest local wound care, débridement, and antibiotic therapy14. In the published cases, the most common approach to these lesions when infection is present is an aggressive surgical management to offer the longest survival and the lowest morbidity. If the urethral meatus or the urethra are involved, a suprapubic catheter to divert the urine is recommended, since transurethral catheters are known to negatively affect wound care. Even making a perineal meatus must be considered for patients who are expect to survive a long time. Some authors have suggested performing a parathyroidectomy in cases of secondary hyperparathyroidism13,15.

Conclusions

Penile necrosis in patients with end-stage renal failure is a rare condition that seems to be associated with systemic calciphylaxis, an entity not yet well understood, but which we know has a poor prognosis. The condition causes infection and gangrene of the penis due to calcification of the tunica media and fibrosis of the tunica intima of the blood vessels; it is found only in patients with end-stage renal failure; diabetes mellitus apparently plays a pathophysiologic role. Surgical management is controversial; the most appropriate approach depends on the presence or absence of infection, i.e., a more aggressive approach is recommended in patients with infection. Further study of this condition is necessary to produce more specific management protocols.

BIBLIOGRAPHY