

Multinodular Plaque on the Penis

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A 34-year-old man presented for evaluation of a slowly growing group of firm white bumps on the penis. The lesions were nontender and asymptomatic. Medical and family history was notable for gout, though he was not being treated. Physical examination revealed a 3-cm, firm, multinodular, chalky white plaque on the dorsal aspect of the penile shaft. A tangential biopsy was performed and sent for hematoxylin and eosin staining.

WHAT'S THE DIAGNOSIS?

- a. actinomycotic mycetoma
- b. dystrophic calcification
- c. multinodular syphilis
- d. planar xanthoma
- e. tophaceous gout

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The authors report no conflict of interest.

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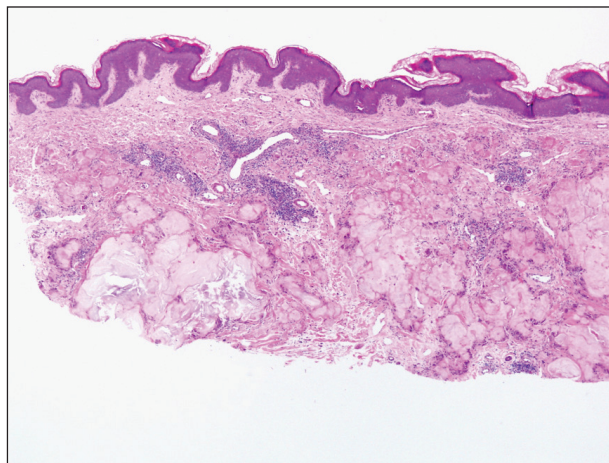
THE DIAGNOSIS: Tophaceous Gout

Biopsy revealed amorphous pink material within the center of palisading granulomas lined by histiocytes and giant cells. Scattered crystal remnants also were identified within the center of the granulomas; however, the majority of the crystals were dissolved during the formalin processing of the tissue to become the amorphous material. A perivascular mixed inflammatory infiltrate composed of lymphocytes, histiocytes, and plasma cells surrounded the tophi nodules. A biopsy confirmed the diagnosis of tophaceous gout (Figure).

Gout is a systemic metabolic disease characterized by the supersaturation of monosodium urate (MSU) crystals in joints and bursae. Peripheral joints most commonly are affected due to the poor solubility of MSU crystals at low temperatures.¹ It is one of the most common forms of inflammatory arthritis, with an estimated prevalence of 4% of adults in the United States.² An estimated \$1 billion is spent each year on ambulatory care for gout.³ Gout occurs most commonly in men and usually manifests in the fifth or sixth decades of life.⁴ Risk factors for the development of gout include obesity, hypertension, poor dietary habits and kidney function, excessive alcohol intake, and diuretic use.³

Disease manifestations range from asymptomatic hyperuricemia to acute gouty arthritis and chronic tophaceous gout. Patients may present with chronic tophaceous gout without a prior clinically apparent acute gout episode.^{5,6} Uncontrolled gout may result in large accumulations of MSU crystals, leading to well-circumscribed masses (known as tophi), as demonstrated in our patient.¹ Tophi are pathognomonic features of gout and are the sine qua non of advanced gout (also known as chronic tophaceous gout).² Clinically, these tophi appear as subcutaneous, yellowish white, firm and smooth nodules that are highlighted on the skin.⁴ Tophi most commonly are found on the helix, articular and periarticular tissue, and the tissue of the hands and feet. They usually are visible on physical examination but also may be detected on imaging studies.^{2,4}

Gouty tophi have been reported in extraordinary locations, such as in sclerae; vocal cords; heart valves; abdominal striae; nerves; axial skeleton^{4,7}; and the penis, as in our patient and one other case.² These gouty deposits can appear similarly to lipomas, rheumatoid and osteoarthritic nodules, and infectious and malignant processes.^{1,5} When tophi present in unusual locations, tissue biopsy often is necessary to confirm the diagnosis. Tissue preservation in alcohol is required to preserve the urate crystals. Microscopically, urate crystals appear as tightly packed, brown, needle-shaped crystals surrounded by granulomatous inflammation with foreign body giant



At scanning magnification, palisaded granulomas surrounding feathery gray amorphous material were seen (H&E, original magnification $\times 40$).

cells, macrophages, and possibly some fibrosis. When examined under polarized light, the MSU crystals are negatively birefringent. However, when clinical suspicion for gout is low and the tissue is instead formalin fixed, as was performed in our case, the crystals dissolve into fibrillary amorphous deposits within the center of the granulomatous inflammation, which is another characteristic histologic finding in tophaceous gout.⁸

Management of gout focuses on urate-lowering therapy including lifestyle changes. Lower serum urate levels are associated with a decreased incidence of acute gout attacks and chronic tophaceous gout.² Urate-lowering drugs often are combined with anti-inflammatory drugs during acute attacks. Lifestyle changes, such as weight loss, exercise, reduced alcohol consumption, high fluid intake, and a low-purine diet also are beneficial.^{3,4} Although gout cannot be cured, it can be effectively managed, and appropriate treatment can improve quality of life and reduce the risk for permanent joint damage and structural deformities. If medical treatment and lifestyle changes fail to adequately control tophaceous gout or if tophi become symptomatic, surgical removal of tophi is appropriate.⁴

At follow-up, our patient opted for surgical removal of the penile tophi. Using local anesthesia, surgical debulking via curettage was performed. Open defects were closed with fine absorbable sutures, and prophylactic antibiotics were given. Allopurinol also was started. Six weeks following extraction, the patient reported no complications and the area was continuing to heal.

Tophaceous gout would be distinguished from conditions in the differential diagnosis based on histologic findings from hematoxylin and eosin (H&E)-stained sections. Actinomycotic mycetoma is rare in the United States and is characterized by a seropurulent or stringy exudate with grains, ulcerations, melicerous scabs, and retractable scarring.⁹ On H&E-stained sections, actinomyces appear filamentous with deeply basophilic staining and radially oriented acidophilic projections.¹⁰ Calcinosis cutis of the penis has been reported to appear as asymptomatic papules; however, microscopic sections reveal deeply basophilic calcium deposits within the tissue.¹¹ Multinodular syphilis shows characteristic histology with lichenoid or vacuolar interface dermatitis, slender acanthosis, plasma cells, and endothelial swelling of the small vessels. A *Treponema pallidum* immunoperoxidase stain shows numerous organisms. Planar xanthoma shows xanthomatous or foamy histiocytes throughout the dermis on H&E-stained sections.¹²

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