Surgical Wound Dehiscence Due to Gout: A Case Presentation

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CASE PRESENTATION

Wounds due to postoperative gouty excision are a rare complication in podiatry. Here, we present a unique case of a chronic non-healing postoperative ulcer that was exacerbated by gout. The patient was a 42-year-old male who had a history of gout since he was 15-years-old. He was on vacation in Spain for 1 month and developed an acute gout attack. He states he was hospitalized for treatment and underwent surgery to remove gouty tophi on the first metatarsal head of both feet and fifth metatarsal head of the right foot. During his recuperation outside the US, his surgical wound has not healed and has essentially remained the same since the surgery. The patient returned to the US for wound care on both feet. The patient was taking Augmentin 875 mg and Ciprofloxacin 500 mg for antibiosis, and Diclofenac 100 mg for pain management. The patient denied any fever or worsening local erythema. The patient stated his pain was well controlled.

The surgical wound to the medial aspect of the right first metatarsophalangeal joint was noticeably dehisced, with the open area measuring 3.5 cm x 1.5 cm. The wound was loosely held together by 15 surgical skin staples. The periwound skin was severely macerated. The wound bed was mixed fibrous and with white caseous material. Extra white material was expressed with deep compression of the right foot. The surgical wound to the medial aspect of the left first metatarsal measured 5 cm x 3 cm with 20% fibrotic and 80% granular base with greenish purulent drainage. The surgical incision over the left first ray was well coapted and maintained with 8 staples. Hypergranulation of the wound bed was noted to the proximal half of the left first metatarsal wound. In addition, a partial-thickness wound measuring 0.5 cm x 0.5 cm was noted on the dorsal aspect of the left fifth metatarsal with mild purulent drainage.

Three weight-bearing radiographs were taken of both feet: dorsal-plantar, lateral oblique, and lateral. There was cortical erosion through the medial aspect of the distal one-third of the first metatarsal head of both feet and the fifth metatarsal head of the right foot. The bone defects within the metatarsals were extra-articular. Joint space narrowing and subchondral sclerosis was present at the first metatarsophalangeal joint, bilaterally. There was decreased bone density in the affected areas and moderate soft tissue swelling over the midfoot bilaterally (Figures 1 and 2).

Our initial plan was localized wound care consisting of sharp debridement of non-viable tissue and then alcohol wet-to-dry dressing techniques. A local culture swab and biopsy of all wounds were taken. Culture and sensitivity testing revealed active *pseudomonas aeruginosa* infection that was susceptible to both penicillin and fluoroquinolone. Therefore, we continued with our current course of treatment. Biopsy confirmed that the caseous white material was gouty tophi. The patient's primary physician in Miami placed the patient on tight uric acid control with diet modification and gave him a prescription for febuxostat anti-gout medication (Figure 3).

Local wound care demonstrated only moderate reduction in total wound surface area within the first 4 weeks; therefore cadexomer iodine in gel form was applied in combination with regular sharp wound debridement and alcohol wet-to-dry dressings. The staples were maintained to the coapted wound areas to prevent exacerbation of the wound during this period. It was not until the patient had 1 month of tight uric acid level control that gouty tophi no longer appeared in the wound bed. Maceration continued along the periwound areas to both feet, and therefore the patient was switched from ciprofloxacin to levofloxacin (Figure 4).

The patient did not achieve a total percent surface area reduction of greater than 50% until 2 months after his first visit and with the addition of cadexomer iodine gel and levofloxacin (Figure 5). By week 11, hydrofera blue was added to the patient's dressing combination. This addition assisted in closing the ulcer on the right foot and accelerating healing to the left foot (Figure 6). The left foot ulcer reduced by more than 50% after 2 weeks of hydrofera blue therapy, and by week 17, the patient's ulcers were all closed (Figure 7).



Figure 1A. Lateral oblique radiograph of the left foot.



Figure 2. Left foot, lateral view

LITERATURE REVIEW

Gout is a disorder of purine metabolism that results in monosodium urate crystal deposition in and around the joints (1,2). At physiological pH levels, uric acid, the ultimate metabolite of purine metabolism is found as intravascular urate (1). As serum levels rise above 0.38 mmol/liter it can precipitate to form monosodium urate crystals. Several other factors such as temperature and the quality of extracellular matrix proteins also influence the accumulation and potentiation of gout tophi formation in joints (1).

Gout has exhibited an increased incidence and prevalence worldwide in recent decades (3,4). Typically, gout commonly manifests in the first metatarsophalangeal



Figure 1B. Lateral oblique radiograph of the right foot.



Figure 3. Caseous white material left foot.

joint. Active gouty arthritis in patients usually presents as joint pain, swelling, loss of normal joint function, and even permanent disability (3). The pathophysiology of gouty arthritis acute attacks is described as intra-articular joint space deposition of monosodium urate crystals that stimulate a painful immune response via antigen presenting cells (1). The crystals can aggregate beneath the skin and form the classic bulging tophi seen in the clinical setting. Soft tissue breakdown is of concern, as tophi may produce persistent discharge and chronic ulceration. There is increased concern in weight-bearing areas as lesions can become encapsulated,



Figure 4A. Post sharp wound debridement left foot.



Figure 5. Ulcer reduction greater than 50% on the left foot.

Figure 4B. Clinical view, initial visit right foot.



Figure 6. Week 11 hydrofera blue added to the left foot.

potentiating the possibility of additional tissue breakdown and delayed healing (3).

Typically, gouty arthritis is comprised of multiple small sites of ulceration, although larger single sites may be present. Rome et al examined the way to describe wound characteristics and the effect on foot pain, disability, and health-related quality of life in patients with foot ulceration associated with gout. In their sample, they found that the majority of gout-related foot ulcers measure less than 0.5 cm², but can present in multiple sites within a single patient and during a single acute episode (3). Calcified tophi may deposit and cause trauma to the wound bed, acting like a foreign body. The presence of tophi further stimulate the inflammation cascade, causing increased exudate versus other types of ulcers in the foot. The complications from a worse inflammatory condition can cause localized ischemia and prevent granulation tissue from forming (3).

Another area of concern in gouty ulcers is microbial infection. The mechanism of injury in gouty ulcers may expose joint capsules and bone to the open environment (1).



Figure 7A. Week 17 ulcer is closed on the left foot.

There is an increased risk of osteomyelitis with gout-related ulcers in the foot (1). This may be an underappreciated sequela to gouty attacks and should be investigated further (5). Early recognition of ulcerated gout can avoid further invasion to adjacent structures and aid with healing. Diabetic patients that present with a red, hot, swollen foot with a non-healing ulcer should not only be evaluated for Charcot neuropathy but also for gout arthropathy because of the risk of osteomyelitis (5).

Special attention must be given to patients with gout-related wounds. Not only is the pathophysiology different versus other more commonly-seen foot ulcers, but epidemiologically, gout patients also present with several comorbidities (6). The top comorbidities include hypertension (74% of patients), chronic kidney disease stage 2+ (71% of patients), and obesity (53%) and diabetes mellitus (26%) among a representative sample of men and women (6). Zhu et al demonstrated there was a corresponding increase in these comorbidities with rising levels of hyperuricemia (6).

Presently, the most widely used classification criteria for gout is the American College of Rheumatology (ACR) criteria established in 1977. This system was intended to identify the acute arthritis of gout and not necessarily the inter-critical gout (2). Although positive tests for monosodium urate crystals are considered sufficient for the classification of gout, the ACR criteria does not provide classification for those presenting with gout without crystal deposition (2,4). A new classification criteria is being established by the European League Against Rheumatism (EULAR), which will classify gout using several imaging



Figure 7B. Week 17 ulcer is closed on the right foot.

modalities that did not exist when the original ACR system was established (2).

The primary treatment for gouty tophi is allopurinol, a xanthine oxidase inhibitor (7). The primary goal is to reduce the concentration of uric and decrease the size of the tophus. The tophus may become large enough to erode the epidermis and produce an ulcer that can inhibit proper shoe wear (7). Therefore, treatment is chiefly aimed at preventing ulceration and infection. An article by Kemp et al studied the use of a vacuum assisted wound closure (VAC) device to manage chronic tophaceous gout as an alternative to common surgical debridement (7). Research has indicated that wound VACs are able to decrease surrounding soft tissue edema, promote granulation tissue, and contract open wounds to help resolve an ulcer (7). The patient in their case study had the wound VAC dressing changed 3 days per week for 5 months, which resulted in wound healing without recurrence. Surgical intervention is rarely required for gout and is typically indicated mostly for chronic gout patients with deformities, severe pain, and joint destruction (8).

People with gout are prone to having other foot problems (9). A cross-sectional study in the UK by Roddy et al showed an association of foot pain, hallux valgus, and disability in patients with gout. Their work suggested that foot problems in gout patients may be more severe than in the general population. The study also found that over one-third of gout patients had unilateral or bilateral hallux valgus, one-fifth had experienced pain, and two-thirds reported disabling symptoms, suggesting a correlation of gout with pedal abnormalities (9). Management of gouty ulcers requires proper footwear. Formation of ulcers has been linked to improper footwear (10). Stewart et al conducted a study on 36 patients with gout and determined that good footwear can decrease heel and lateral forefoot pressure while increasing midfoot pressure. Patients with diabetes mellitus and rheumatoid arthritis tend to have different locations of increased weightbearing pressure than patients with gout. Gout patients may exhibit patterns of rising heel and midfoot pressures, while pressure below the hallux is reduced (10). This suggests that adjusting plantar pressure points with good footwear can relieve foot pain and aid with the healing process. Furthermore, by addressing the quality of the footwear, patients may sooner return to normal daily living activities with improved quality of life.

DISCUSSION

It is the authors' hope that this case presentation will shed light on the possibility of gout complicating surgical outcomes in terms of wound healing. Our patient demonstrated a unique surgical complication. Although surgical wound dehiscence is not uncommon, in our practice we have never treated a wound dehiscence as a sequela of an acute gouty attack. Our patient while on vacation did not control his uricemia and therefore developed significant accumulations of gouty crystals in the lower extremity. Surgical intervention via removal of gouty tophi resolved the initiating factor. The systemic disease however was still present and insufficiently controlled. His hyperuricemia and tobacco use made him much more likely to develop surgical wound complications versus the average patient.

Literature review revealed that in cases of orthopedic surgery, there is an increased risk of wound dehiscence in patients closed with skin staples versus suture material (11). In patients with multiple co-morbidities, we recommend avoiding skin staples and choosing suture material to reduce the risk of skin dehiscence. Further complicating the patient's multiple ulcers was the presence of a heavygrowth pseudomonas infection. Our patient did not see rapid wound closure until a combination of high-potency fluoroquinolones, cadexomer iodine gel, and gentian violet/methylene blue combination dressings were applied in conjunction with weekly sharp debridement of nonviable tissue. This suggests that patients with multiple comorbidities require very aggressive early management to prevent lengthy treatment courses and to improve outcomes.

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