

## Education-Family Physician Corner

# Conservative Surgery for a Diabetic Foot Infection

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**Diabetic foot ulcers (DFU) are commonly complicated with osteomyelitis. Diagnosing osteomyelitis can be challenging. However, positive findings on clinical examination and X-rays may facilitate the diagnosis. Recent guidelines suggest that selected cases of diabetic osteomyelitis can be treated with conservative surgery and antibiotics.**

**A successful treatment was achieved through conservative surgery for fifty-nine-year-old male with type 2 diabetes. The patient presented with infection resulting from failure of antibiotics treatment, advanced dressing and offloading. The patient underwent conservative surgery of excision of the infected bone and soft tissue and was on antibiotics. The combination of conservative surgery with antibiotics can be used in selected cases to avoid risk of amputation and maintain functionality of the foot and its biomechanics.**

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Diabetic foot infection (DFI) and osteomyelitis are common causes for hospital admissions and carry a significant risk of morbidity and lower extremity amputation<sup>1,2</sup>.

Approximately 1-4% of patients with diabetes develop foot ulcers annually<sup>3</sup>. Studies have revealed that patients with an ulcer have osteomyelitis between 20% to 60%<sup>4</sup>. Many lower-extremity amputations are preceded by foot ulcer<sup>5</sup>. Five-year mortality rates of 45% for neuropathic ulcers and 47% for post foot amputations have been found<sup>3</sup>.

Frequent point of entry for the bacteria is an ulcer or surgical wound<sup>6</sup>. Bacteria can reach the cortical bone by initial involvement of the soft tissue<sup>7</sup>. The diagnosis of diabetic foot osteomyelitis can be a challenge and may require imaging studies in some cases. However, the diagnosis of osteomyelitis is achieved through bone biopsy and microbiological bone culture<sup>7</sup>.

Professionals and healthcare specialists may have differing experiences and opinions on diagnosis, the choice of antibiotics, route, duration and mode of surgery<sup>4</sup>. The option of management depends on the anatomical site of infection, lower limb perfusion, severity of the soft tissue involved and bone destruction, systemic signs of infection and the clinician's and patient's preferences<sup>4</sup>.

Management of diabetic foot osteomyelitis with antibiotic and conservative surgery has the same outcome<sup>8,9</sup>. Still, surgery remains the best initial option in many cases as any delay in operating can lead to a more proximal level of amputation<sup>8,9</sup>. Deep foot infections rarely respond to antimicrobial therapy alone and generally require surgical procedures for pus drainage and removal of necrotic tissue<sup>8,9</sup>. Antibiotic treatment may increase the risk of proximal amputation<sup>10</sup>.

The aim of treating DFIs should be to conserve as much of the foot as possible, to make the foot stable, restore its functionality and avoid re-ulceration or recurrence. In DFI, consider the following: What is the severity of the infection? Can it be managed with antibiotics or does the patient need surgery? Should the patient be operated as an emergency?<sup>8</sup>.

The aim of this presentation is to report a case of a successful excision of the infected bone and soft tissue for a male patient with type 2 diabetes.

## THE CASE

A fifty-nine-year-old male with type 2 Diabetes Mellitus on oral hypoglycemia for the past 14 years with history of hyperlipidemia and hepatitis C, smoking, pan-metatarsal head resection of the left foot 2 years ago and right 4<sup>th</sup> metatarsal head resection 3 months ago. In addition, he had sensory neuropathy detected by a 10g monofilament (Semmes-Weinstein), tuning fork test and absent distal pulse, ABI 0.7 and PCO<sub>2</sub> 42mmHg.

The patient presented with neuropathic plantar foot ulcer around the right 2<sup>nd</sup> metatarsal head. There was no sign of infection and probe to bone test was negative, see figure 1. The patient was managed conservatively with foam absorbent dressing, offloading with foot ankle orthosis.

The ulcer showed no sign of healing; the right 2<sup>nd</sup> metatarsal head was exposed, with surrounding erythema and minimal purulent discharge. Plain radiographs revealed disrupted cortex and lytic lesion, see figure 2. The patient was advised surgery, but he was reluctant. The patient was managed with charcoal dressing with silver, antibiotic levofloxacin 500 mg orally every 24 hours, clindamycin 300 mg orally every 6 hours and offloading with felted foam + foot ankle orthosis.

Later, the patient presented with fever of 39°C, tachycardia 110 BPM, the foot was swollen, warm and erythematous. The purulent discharge was seen from the ulcer, both right 2<sup>nd</sup> metatarsal head and ruptured tendon were exposed through the ulcer. Leucocyte count was 15,000 mcL, see figure 3.

Surgery was performed which included necrotic tissue debridement, the abscess was drained, resection of the 2<sup>nd</sup> metatarsal phalange joint using the oscillating saw. Infected bone was sent for culture and sensitivity. The wound was lavaged with normal saline and sealed with charcoal dressing and silver.

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**Figure 1: Diabetic Foot Wound on the Initial Presentation to the Clinic**



**Figure 2: Radiography Revealing Slight Lytic Changes in the Head of Right 2nd Metatarsal**



**Figure 3: The Foot is Swollen, Warm and Erythematous, Right 2nd Metatarsal Head and Ruptured Tendon Exposed Through the Ulcer**



**Figure 4: Wound on Day Four Postoperatively**



**Figure 5: Healing One Month after the Surgery**



**Figure 6: Healing on the 2nd Month Post-Surgery**



**Figure 7: Healing 90 Days Post-Surgery**

The bone culture was *Corynebacterium* spp. Figure 4 showed the wound four days postoperatively.

Ten days postoperatively debridement of necrotic tissue, excision of exposed metatarsal bone and negative pressure wound therapy was performed under ankle block. However, due to the peripheral vascular disease, the healing was delayed, see figures 5-7. The patient made a complete recovery in four months.

## DISCUSSION

Amputation could be associated with severe biomechanical changes compared to conservative surgery. Surgery is favored by some over antibiotic treatment because it can deal effectively with bone necrosis<sup>9</sup>. Surgery is indicated if the bone is visualized through the ulcer or radiography showed bone sequestration and soft tissue necrosis<sup>10</sup>.

Osteomyelitis is associated with a bone deformity and should be carefully evaluated. It may cause adverse biomechanical changes which could cause re-ulceration, further infection and amputation. Surgery in these cases could be curative, such as removing the infected bone, and prophylactic, such as removing the bone deformity.

An additional advantage of the surgical procedure is the removal of bone prominences to eliminate areas of excessive pressure, bone biopsy for microbiology and pathology<sup>10</sup>. Conservative surgery shortens the duration of antibiotic therapy with a high rate of limb salvage, and it may even reduce biomechanical alterations of the diabetic foot compared to amputation<sup>17</sup>.

Off-loading played a major role in the wound healing process. It facilitates wound healing by preventing further trauma; it reduces any shearing force and relieves pressure on the ulcerated area<sup>7</sup>.

## CONCLUSION

**A combination of conservative surgery and antibiotics has a positive outcome as it reduces the risk of failure of antibiotic in the management of osteomyelitis. It also maintains foot function and improves general quality of life. It is important to inform the patient regarding the severity of patient's condition, outcome and compliance with follow-up, antibiotics and offloading.**

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