Virtual Amputation in Diabetic Foot Infection with Osteomyelitis

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Clinical Image

Osteomyelitis is a common complication and present in approximately 20% of diabetic foot ulcer cases, and was reported as high as 79% in some other case series [1-3]. It is responsible for most of the non-traumatic amputation of the lower limb [4].

Amputation of a digit in the foot causes a change in the biomechanics of the amputated limb. This potentially creates higher pressure areas and new bony deformities that leads to another ulcer and subsequently leads to amputation, especially with first ray amputation [5,6]. A study by Izumi and associates found that there is an increased risk of reamputation of the same limb within 6 months after the initial amputation [7].

Diabetic foot infections have a spectrum of clinical presentation, varying in severity and this present a great challenge in the management. There is difficulty in identifying the optimal treatment for specific patient with different clinical presentation. The debates focus around the roles of antibiotic therapy only, combined antibiotic therapy with limited debridement or a more radical surgery such as amputation.

Aragón-Sánchez classified osteomyelitis in diabetic foot ulcer in order to guide the optimal method of treatment [8]. His system comprised 4 classes of osteomyelitis that assess the presence of ischemia and soft tissue involvement (Figure 1).

He observed 82.2% of total 94 patients who presented with infected diabetic foot ulcer, had osteomyelitis. There was no amputation performed in class 1. However, 37.5% of class 2 (n=16), 82% of class 3 (n=17), and all 23 patient in class 4 had amputation (Table 1). This confirmed the positive correlation between presence of soft tissue involvement and ischemia with higher rate of amputation. The findings also support the notion that presence of osteomyelitis does not necessitate amputation. However, the weakness of this classification is that the presence of soft tissue involvement can only be confirmed intraoperatively.

Virtual amputation falls under the category of conservative surgery. It is defined as any procedure in which bone and non-viable soft tissue are removed without amputation of any part of the foot is undertaken [2,8]. The procedure is aimed at preserving the physical appearance of foot while

Figure 1: Radiograph of the left foot – evidence of osteomyelitis of proximal phalanx second toe and distal end of the second metatarsal bone.
removing the infection load (Figure 2). This is coupled with antibiotic therapy to achieve remission in infection. The antibiotic duration should be tailored according to wound condition and culture with infective markers as guidance to predict remission of acute infection (Figure 3).

![Figure 2](image1)

**Figure 2:** (A) The wound bed after removal of proximal phalanx and head of second metatarsal bone. (B) Proximal phalanx of the toe.

![Figure 3](image2)

**Figure 3:** (A) Wound at two weeks. (B) Wound at one month.

The end result is minimal disruption in the biomechanics of the foot, therefore avoiding the creation of another high-pressure point within the same foot, which in turn creates another ulcer. Furthermore, the psychological effect on patient is greater in a positive way as patient is able to keep the normal appearance of the foot.

Proper wound care and bandaging while waiting for the wound to heal in a normal axis following the other toes. A proper “guided healing” of the virtually amputated toe should be in line of the management plan to maximize the benefit of this procedure.

### References


<table>
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<th>Description</th>
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**Table 1:** Osteomyelitis grading system in diabetic foot ulcer.