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Nonsurgical Treatment of Osteomyelitis of the Hallux Sesamoids: A Case Series and Literature Review

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ABSTRACT

The aim of the present study was to determine the effectiveness of nonsurgical treatment for osteomyelitis of the hallucal sesamoids. Osteomyelitis of the hallucal sesamoids in young and healthy patients is rare and might originate from hematogenous spread or after a puncture wound. In diabetic patients with peripheral neuropathy, it often results from direct contiguous seeding from adjacent ulceration. The superiority of surgical versus nonsurgical therapy is still debated. In our institution, all patients presenting with osteomyelitis of the hallucal sesamoids are first treated nonsurgically but eventually usually require a surgical procedure. We reviewed 18 patients with a clinical and radiologic diagnosis of osteomyelitis of the hallucal sesamoids treated in our institution during a 13-year period (from January 2000 to December 2012). The inclusion criteria were a signal alteration on magnetic resonance imaging or bone lesions on computed tomography or conventional radiographs, combined with a deep ulcer with a positive probe-to-bone test. Nonsurgical therapy consisted of frequent wound treatment, immobilization, offloading in a cast or other orthotic device, and oral antibiotics. Of the 18 patients, 11 had diabetes, 16 had peripheral neuropathy, 11 had peripheral arterial disease, and 5 had immunosuppression. After a period of nonsurgical therapy ranging from 4 weeks to 9 months, 15 of 18 patients required surgical excision, internal resection, or amputation. In this patient population, we no longer consider nonsurgical therapy a viable option. Patients should be advised, before starting nonsurgical treatment, that the therapy will be long and demanding and very often results in a surgical procedure.

Osteomyelitis of the hallucal sesamoids in young and healthy patients is uncommon and might originate from hematogenous spread (1–9) or after a puncture wound (10–16). However, in diabetic patients with peripheral neuropathy, osteomyelitis of the hallucal sesamoids often results from direct contiguous seeding from adjacent ulceration (6,17).

The published data are not clear about the appropriate treatment of osteomyelitis of the hallucal sesamoids, particularly in the diabetic foot. Little evidence is available to support primary surgical therapy versus nonsurgical therapy (18–25). We searched PubMed, OvidSP, and Microsoft Academic for published studies in English, German, and French. The review for osteomyelitis of the sesamoids produced only case reports with few patients, no large series, and no evidence regarding the effectiveness of nonsurgical versus surgical treatment.

In our institution, all patients are first treated nonsurgically but eventually usually require a surgical procedure. The aim of the present study was to present the treatment outcomes in a retrospective case series of 18 patients with hallucal sesamoid osteomyelitis. We also evaluated whether comorbidities such as diabetes mellitus, peripheral vascular disease, polyneuropathy, and immunosuppression affect the prognosis of nonsurgical treatment.

Patients and Methods

For the present retrospective case series, the records of patients treated at an urban, university hospital, interdisciplinary clinic specializing in musculoskeletal injuries from January 2000 to December 2012 were electronically screened to identify patients with a diagnosis of, or suspected to have, osteomyelitis. Patients with a clinical and radiologic diagnosis of osteomyelitis of the hallucal sesamoids were selected. The inclusion criterion was a signal alteration compatible with osteomyelitis on magnetic resonance imaging (i.e., bone marrow with T_1-weighted hypointensity, T_2/short T_1-weighted inversion recovery hyperintensity, and hyperintensity in short tau inversion recovery sequences, sinus tract, and cortical disruption) (20,26) or computed tomography and conventional radiography showing disruption of the cortex, resorption, fragmentation, sequestra, narrow articular space, or subluxation (20,27,28),

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Table 1
Patient demographics

Risk Factors	Total Cohort (n = 18)	Successful Nonsurgical Therapy (n = 3)	Failed Nonsurgical Therapy (n = 15)	*p* Value
Age (yr)	70.8 ± 10.1	66.3 ± 17.0	71.7 ± 8.8	.64
Gender				
Male	14 (78)	1 (33)	13 (87)	.21
Female	4 (22)	2 (67)	2 (13)	
Medial sesamoid involved	11	3	8	.39
Lateral sesamoid involved	1	0	1	1
Both sesamoids involved	6	0	6	.50
Comorbidities				
None	1 (6)	0 (0)	1 (7)	1
1	3 (17)	2 (67)	1 (7)	.02*
≤1	14 (78)	1 (33)	13 (87)	.09
Diabetes	11 (61)	1 (33)	10 (67)	.67
Polyneuropathy	16 (89)	3 (100)	13 (87)	1
PVD	11 (61)	1 (33)	10 (67)	.67
Immunosuppression	5 (28)	1 (33)	4 (27)	1
Kidney disease	5 (28)	1 (33)	4 (27)	1
Autoimmune disease	3 (17)	0 (0)	3 (20)	1
Smoking	4 (22)	1 (33)	3 (20)	1
History of HIV	0 (0)	0 (0)	0 (0)	1
History of osteomyelitis in ipsilateral foot	4 (22)	0 (0)	4 (27)	.80
History of osteomyelitis in contralateral foot	5 (28)	1 (33)	4 (27)	1
History of nontraumatic amputation of part of the foot	3 (17)	1 (33)	2 (13)	1

Abbreviations: HIV, human immunodeficiency virus; PVD, peripheral vascular disease.
Data presented as mean ± standard deviation or n (%).
* Statistically significant difference.

combined with a deep ulcer located over the plantar aspect of the metatarsophalangeal joint of the hallux (i.e., grade III according to Wagner [29] or Lavery et al [30]), and a positive probe-to-bone test (31).

All patients received frequent wound treatment (i.e., 1 to 2 times weekly) by specialized nurses and respective off-loading and were immobilized in a total contact cast or other orthotic immobilization device. They received oral antibiotics, either empirical or determined by the findings from a deep wound swab and antibiotic testing, for a minimum of 6 weeks (32). Nonsurgical treatment was halted in cases of spreading infection or nonhealing ulcers.

The gender and age of the patients, the mechanism of infection, cultured bacteria, and type of surgery performed, if required, were recorded. The most common comorbidities that could affect the outcome of the nonsurgical treatment were also recorded and included diabetes mellitus, polyneuropathy, peripheral vascular disease, and immunosuppression.

At the time of the present study, our institution determined that investigational review board/ethical committee approval was not required for retrospective medical record reviews that have no influence on the treatment of the reviewed patients.

Descriptive statistics were used to evaluate the patient demographic data. The probability of the null hypothesis between the successful and failed nonsurgical therapy groups for each of the independent variables was calculated using the Wilcoxon test for age and the Fischer exact test for the other variables. The level of significance was set at $p \leq .05$.

Table 2
Cause of infection according to bone culture findings (n = 15)

Bacterium Found on Bone Biopsy	n (%)
Acinetobacter	2 (13)
Coagulase-negative staphylococcus	6 (40)
Enterobacter cloacae	3 (20)
Enterococcus	2 (13)
Pseudomonas aeruginosa	1 (7)
Stenotrophomonas maltophilia	1 (7)

Results

Eighteen cases of confirmed osteomyelitis of the hallucal sesamoids, in 14 males and 4 females, from 2000 to 2012 were identified at our institution (Table 1). The mean age of the patients was 70.8 ± 10.1 years. The most common comorbidities were polyneuropathy (n = 16), diabetes (n = 11), and peripheral vascular disease (n = 11). Of the 18 patients, 78% had ≥2 comorbidities. The medial sesamoid was the most frequently involved in 11 of 18 patients (61%), and all 3 successful cases of nonsurgical therapy involved the medial sesamoid. The probability of the null hypothesis between the successful and failed nonsurgical therapy groups showed the same distribution in both groups without statistical significance. Only the group of patients with a single associated comorbidity showed a statistically significant difference ($p = .02$) but resulted from the small sample size.

Fig. Clinical image after superficial wound debridement.