

Do Broken Toes Need Follow-Up in the Fracture Clinic?



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ABSTRACT

Most toe phalangeal fractures can be successfully treated nonoperatively without any residual deformity and are usually clinically asymptomatic. Toe phalangeal fractures are nevertheless common fracture clinic referrals. Our aim was to evaluate the injury characteristics of patients with toe fractures attending a fracture clinic and to understand how current management affects the fracture clinic workload. We retrospectively evaluated all new referrals to a subspecialized foot and ankle fracture clinic during a 12-month period at our institution under the care of 1 consultant. Data were collected regarding patient demographics, fracture type, patient outcome, and the number of clinic appointments attended, cancelled, or not attended. A total of 707 new patients (mean age 39 ± 19 years; 345 males, 362 females) were seen in 47 foot and ankle fracture clinics within the study period. Seventy-four phalangeal fractures were identified in 65 patients. A total of 135 outpatient appointments were scheduled for these patients (initial and follow-up), with 93 (69%) attended, 25 (19%) not attended, and 15 (11%) cancelled and rescheduled at the patient's request. Seventeen patients (13%) failed to attend their first clinic appointment. The results of the present study highlight that 9% of all new patient referrals to a fracture clinic were for toe phalangeal fractures. Only 2 patients required surgery for significant loss of articular congruency or deformity. No patient subsequently developed a symptomatic malunion or required toe surgery during the following 2 years. We believe that undisplaced and stable toe phalangeal fractures do not need to be referred to the fracture clinic. This would result in a reduction of outpatient appointments for toe fractures by 52%.

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Toe phalangeal fractures are one of the most common fractures of the lower extremity, constituting 3.6% to 8% of all injuries (1–4). They have been reported to have an incidence of 14 to 40 per 100,000 per year, with a male-to-female ratio varying from 1:1 to 1.94:1 (1,5,6). The distribution of the injury pattern for both open and closed toe phalangeal fractures has been shown to be unimodal, with a peak in younger age groups (mean age 35.3 years) (1,7).

Toe phalangeal fractures occur most commonly from assaults, motor vehicle accidents, sporting injuries, falls, and direct trauma (5), with the resulting force causing either direct impact crushing or axial loading stubbing injuries (8–10). Toe injuries have also been described as a result of twisting supination injuries (6) and the most lateral fifth toe is also at risk of horizontal plane abduction injuries (bedroom or nightwalker's fracture) (8). High-energy hyperflexion and

hyperextension forces are often associated with joint dislocations or metatarsophalangeal joint capsular injuries (turf and sand toe) (8), which can be characterized by the absence of a fracture despite significant clinical signs of injury.

The hallux, with its pre-eminent importance in gait, is reported to represent the greatest proportion (38%) of all toe phalangeal fractures (6). Some studies have, in addition, grouped hallux phalangeal fractures separately from those of the lesser toes (10) or have reported hallux-specific stubbing fractures and fracture-dislocations of the interphalangeal joint (11).

Currently, no clear evidence-based guidelines have been established for determining how much deformity is acceptable for closed digital fractures. Additionally, no evidence exists that delineates the most appropriate fracture intervention and whether such intervention improves patient outcomes (12). In contrast, open phalangeal fractures, intra-articular, physeal fractures, and fractures/dislocations with gross clinical deformity require specialist assessment either at an emergency department (ED) or clinic, because these could require surgical intervention.

The purposes of the present study were to evaluate the injury characteristics of digital fractures referred from the ED to a

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subspecialized foot and ankle fracture clinic, to assess how the current referral protocol and management of these fractures affect the fracture clinic workload within our institution, and to determine the incidence of these injuries that require surgical intervention.

Patients and Methods

We retrospectively evaluated a prospectively collected database for all new referrals from the ED to the subspecialized foot and ankle fracture clinic of 1 consultant from January 2012 to January 2013 at our institution. We used the electronic patient record system to collect data regarding patient demographics and home location. Picture Archiving Communication System radiographs were used to determine the fracture pattern (i.e., transverse, oblique, spiral, comminuted, avulsion), level of fracture (i.e., distal, diaphyseal, proximal), degree of displacement (i.e., 0, <2 mm, 2 to 5 mm, and >5 mm) (6), and the degree of angulation (i.e., nonangulated, 1° to 10°, 11° to 20°, >20°). The initial ED management, subsequent fracture clinic treatment, and patient outcome were recorded. This information was collected from clinic letters, and the number of clinic appointments attended, cancelled, not attended, or rescheduled were also recorded.

Results

In the tax year April 2012 to April 2013, 121,049 patients were seen in the ED of our institution. A total of 707 new patients (mean age 39 ± 19 years; 345 males, 362 females) were seen in 47 foot and ankle fracture clinics within the 12-month period of the 2012 calendar year. Of the 707 new patients, 82 (12%) had been referred from the ED to a fracture clinic with toe injuries. Of these 82 patients, 8 had sustained either dislocations that had been reduced or had had no obvious injury identified; 74 phalangeal fractures were identified in 65 patients (mean age 34 ± 15 years; 33 males, 32 females). Of these 65 patients, 9 were pediatric patients (<16 years old).

One fracture was open, sustained as a result of a direct crush while carrying furniture. This was an undisplaced, comminuted hallux distal phalangeal fracture associated with a subungual hematoma that had been trephined in the ED. A 1-week course of oral antibiotic (co-amoxiclav [Augmentin®] 625 mg 3 times daily) had been given from the ED, and no subsequent infection developed. The injury was treated with a stiff-soled shoe for 4 weeks, with weightbearing as tolerated. Thirty-two fractures had intra-articular involvement. The most commonly fractured phalanges were those of the hallux (56%), with the proximal phalanx more frequently involved (33% of all phalangeal fractures), followed by fractures involving the proximal phalanx of the fifth toe (Fig. 1).

Regarding fracture displacement, 49% were undisplaced, 42% were displaced <2 mm, and 9% were displaced 2 to 5 mm. Two pediatric fractures involving the growth plate were identified, both were undisplaced. When considering angulation at the fracture site, 4% showed an angulation of $\geq 20^\circ$, 5% were between 11 and 20° , 14% were between 1 and 10° , and 77% of fractures were not angulated. Fracture patterns demonstrated included 26% transverse, 15% oblique, 19% spiral, 25% comminuted, and 15% avulsion type. Fracture levels were as follows: 27% were distal, 38% were diaphyseal, and 35% were proximal.

A total of 135 outpatient appointments (OPA) were scheduled for these patients (initial and follow-up). Of the 135 scheduled OPAs, 93 (69%) were attended, 25 (19%) were not attended, and 15 (11%) were cancelled and rescheduled by the administration team at the patient's request. Seventeen patients did not attend their first clinic appointment (13%), and of these, only 2 patients lived further than a 5-km radius from our institution.

All phalangeal fractures had been referred from the ED with buddy strapping to the adjacent toes. This was always removed at the first clinic appointment to assess the weightbearing clinical appearance, unless the ED practitioner had documented a significant clinical deformity on presentation that required reduction before obtaining a plain radiograph. None of the patients in the fracture clinic were noted to have a clinical deformity on weightbearing. Patients in whom

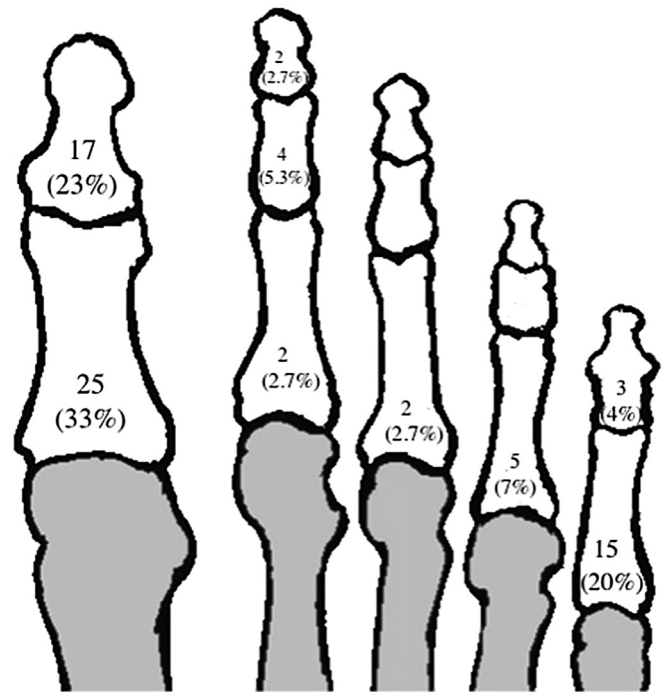


Fig. 1. Frequency of each fracture seen. (From Van Vliet-Koppert ST, Cakir H, Van Lieshout EM, De Vries MR, Van Der Elst M, Schepers T. Demographics and functional outcome of toe fractures. *J Foot Ankle Surg* 50:307–310, 2011.)

a clinical deformity had been reduced were advised to continue with buddy strapping for ≤ 4 weeks, followed by wearing an elastic sock. Patients with no clinical deformity were advised to use a well-fitting elastic sock and an accommodating shoe for 4 to 6 weeks and were given verbal guidance about returning to normal shoes and activity.

From our cohort, only 2 patients underwent operative fracture fixation for a stubbing-type displaced Y-shaped intra-articular split of the head of the proximal phalanx of the hallux. This required open reduction and internal fixation with a single 3-mm headless compression screw and 2-mm twist-off screw (Fig. 2). The second patient had a closed night-walker fracture of the base of the proximal phalanx of the fifth toe, and the valgus deformity was not correctable after 2 closed manipulations. This required closed reduction and internal fixation with a single 1.6-mm Kirschner wire (Fig. 2). No patient subsequently developed a symptomatic malunion or required toe surgery during the next 2 years.

Discussion

Toe phalangeal fractures are common injuries in the foot that rarely require surgical intervention. In the present study, we have demonstrated that approximately 9% of all new referrals from the ED to a subspecialized fracture clinic were for phalangeal fractures of the toes. However, these generated a clinic nonattendance rate of nearly 20% and a surgical intervention rate of <2%.

Fractures of the phalanges of the hallux and proximal phalanx of the fifth toe constituted 76% of all toe fractures observed in our series. Of these cases, only 1 patient required surgery for significant loss of articular congruency based on a stubbing-type pattern (11). This injury pattern has been poorly reported and, although it can appear innocuous on limited radiographic sequences, dorsoplantar, oblique, and lateral images are required to demonstrate joint incongruity and alignment. The patient in our series achieved union with a congruent joint but did require a joint injection and manipulation to improve the range of movement.

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