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Interphalangeal Dislocation of Toes: A Retrospective Case Series and Review of the Literature

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ABSTRACT

Although not uncommon, dislocation of the toes, including that of the great toe, is not commonly reported in published studies. In the present report, we describe a series of 18 patients with toe dislocations managed by our department from January 2001 to December 2007. We considered the radiographic pattern of injury in our series of patients. Of the 18 patients, 10 (55.56%) had their toe dislocations treated by closed reduction with or without internal fixation. Seven patients (38.89%) with complex dislocation, defined as open dislocation or dislocation not amenable to (failed attempt) closed reduction, that required open reduction and internal fixation. One patient (5.56%) with a dislocated toe declined to undergo any form of treatment.

Although digital injuries involving the toes are common, to our knowledge, few published reports have described the results of observational findings related to pedal interphalangeal dislocation (1–5). In those reported cases, most were dislocations of the metatarsophalangeal joint of the great toe, mainly due to the postulation of its mobility and longer level arm (6). In the present report, we aimed to describe the results of a retrospective series of 18 patients who presented with interphalangeal joint (IPJ) dislocation involving the toes. To the best of our knowledge, this is the largest case series reported. We suspect that IPJ dislocation is a relatively uncommon injury because of the protection afforded by shoe gear.

We hope that through the present case series, it will arouse some attention from the orthopedic community of this seemingly rare but easily treatable injury. As revealed from our case series, these injuries, if recognized early and treated with a proper manipulation technique, can have excellent clinical and radiologic outcomes in terms of stability, overall quality of life, and patient satisfaction.

Patients and Methods

Patients with "International Classification of Diseases, Ninth Version, Clinical Modification" diagnostic code (code 838.09, dislocation of toe/great toe) were eligible for inclusion in our retrospective case series. We performed a diagnostic code search through our hospital electronic in-patient record system under the established diagnostic code 838.09 and recruited 18 patients under this code. Their in-patient and outpatient records and plain digital radiographs were reviewed and analyzed. The patients with dislocation of their foot, other than their toes, were excluded from our review.

All patients were referred to our service from the Accident and Emergency Department of our hospital. They were admitted through the Accident and Emergency Department to our orthopedic wards. After the initial acute injury phase, the patients were treated by orthopedic specialists in our orthopedic department and subsequently discharged from our wards, with instructions to follow up in our specialty clinic, initially 2 weeks after the injury and then at 1, 3, 6, and 12 months after injury. Our department's orthopedic specialists examined the toes clinically, and the physical findings were documented accordingly. Radiographs were taken to assess the congruity of the reduced joints. The clinical and radiologic outcomes of these 18 patients were retrospectively analyzed and assessed by us. After reviewing the records of all the patients, we propose 3 categories according to our observation in classifying these injuries according to the mechanism of injury: injury on passive axial loading (e.g., landing on the injured foot); active axial loading (e.g., kick injury); and crush injury (e.g., hit by a heavy falling object without adequate shoe protection).

Radiographically, all the patients exhibited a dorsolateral dislocation of the IPJs. We further subclassified the dislocations into 2 broadly different types, according to the original classification by Miki et al (7) for great toe dislocation. Both types of dislocations are caused by plantar plate traction. Different types of dislocation depend on the position of the displaced plantar plates. A type I dislocation implies that the plantar plate is displaced and tugged in between the 2 phalangeal bones. A type II dislocation implies that the plantar plate overrides the proximal phalangeal head, causing the

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Table 1
Summary of patients with interphalangeal joint dislocation of toes (N = 18)

Patient No.	Age (yr)	Gender	Side	Toe	Reduction	Fixation	Anesthesia	Injury Mechanism	Radiologic Classification
1	16	Male	Right	Great	Closed	Kirschner wire	General	Active axial loading	Type II
2	9	Male	Right	Third	Closed	Cross toe strapping	Local	Active axial loading	Type I
3	44	Male	Right	Fifth	Open	Cross toe strapping	General	Passive axial loading	Type II
4	18	Male	Right	Third	Closed	None	Local	Passive axial loading	Type I
5	19	Male	Right	Great	Closed	None	Oral analgesics	Active axial loading	Type I
6	16	Male	Right	Great	Closed	Kirschner wire	General	Passive axial loading	Type II
7	33	Male	Left	Second	Open	Kirschner wire	General	Crush injury	Type II
8	14	Male	Right	Fifth	Closed*	NA*	Local	Active axial loading	Type I
9	22	Male	Left	Great	Open	Kirschner wire	General	Crush injury	Type I
10	14	Female	Right	Second	Closed	Cross toe strapping	Local	Crush injury	Type II
11	23	Male	Right	Fifth	Closed	Kirschner wire	General	Active axial loading	Type I
12	43	Male	Right	Great	Closed	Short leg plaster of Paris	Local	Active axial loading	Type II
13	33	Male	Left	Fifth	Open	Kirschner wire	General	Passive axial loading	Type I
14	9	Male	Left	Great	Open	Collateral repaired	General	Active axial loading	Type I
15	22	Female	Right	Fifth	Closed	None	Local	Passive axial loading	Type II
16	13	Male	Left	Fourth	Closed	Kirschner wire	General	Crush injury	Type I
17	16	Male	Right	Third	Open	Kirschner wire	General	Passive axial loading	Type I
18	15	Male	Left	Second	Closed	Kirschner wire	General	Active axial loading	Type I

* Patient opted for conservative management after failed attempt at closed reduction.

typical clinical appearance of a shortened and hyperextended IPJ. These 2 types of dislocation are not mutually exclusive and can be interchangeable on repeated reduction attempts.

Results

A total of 18 patients with IPJ dislocations of the toes were identified and are summarized in Table 1. Of the 18 patients, 8 (44.44%) sustained their proximal IPJ (PIPJ) dislocation on landing and 6 (33.33%) sustained an injury as a result of kicking an object. Only 2 patients (11.11%) were injured by a crush injury; 2 other patients (11.11%) had an unknown injury mechanism. These 3 different classifications have a similar type of mechanism of injury. In our experience, we found that most patients (N = 14 [77.77%]) had an hyperextension injury to their PIPJs. It was not shown in our series that the 3 different injury mechanisms had any direct association with the radiologic appearance.

The dislocation of 10 patients (55.56%) could be reduced using closed methods. Of these 10 patients, 6 (33.33%) underwent closed reduction without the need for general anesthesia. Of these 6 patients, 5 required local anesthesia. In our series, all 5 patients received a digital block with plain lidocaine. The sixth patient (5.56%) underwent reduction with simple oral analgesics. The remaining 4 patients undergoing closed reduction required general anesthesia. Of the 18 patients, 7 (38.88%) required open reduction, and most (6 of the 7) had an open wound, which inevitably would require reduction of the dislocation using the open method. Only 1 patient (5.56%) had the PIPJ reduced by open methods because of failed closed reduction.

One patient (5.56%) who had his fifth PIPJ dislocated (patient 8) had closed reduction fail twice. He was offered open reduction but his parents declined.

After reduction, nearly all patients (15 [83.33%] of 18) had their foot immobilized or fixed using either Kirschner wire (K-wire) or splinting. All the patients who required operative intervention under general anesthesia also underwent adjuvant surgical procedures to maintain the reduction. Of the 18 patients, 9 (50%) received K-wires, and 1 patient (5.56%) with a stable PIPJ after reduction was immobilized with cross toe strapping and 1 (5.56%) had the collaterals and avulsed fragments repaired.

The great toes and little toes were involved most often, contributing more than 60% of the patients. In our series, 10 (55.55%) of the 18 patients were successfully treated with closed reduction alone. Seven patients (38.89%) required open reduction. Six patients (33.33%) requiring surgical procedures other than simple closed reduction had concomitant injuries, such as an open wound. In only 1 of the 7 patients who required open reduction was the reduction because of reduction failure using closed methods. One patient (5.56%) refused any form of treatment. Most patients (N = 15 [83.33%]) underwent fixation with K-wire or splinting to improve the stability. No patients were lost to follow-up. All patients had normal aligned toes clinically without any sign of instability on examination.

In an effort to further clarify our treatment regimen, 2 case reports from our series of 18 patients are described in detail, below.

Case 1

A 15-year-old student sustained a left foot injury on landing during rope skipping. He complained of pain, swelling, and deformity over the left second toe. The patient had been wearing a pair of sport shoes at the time of injury. He first presented to the Accident and Emergency Department and was diagnosed with a left second toe PIPJ dislocation. Closed reduction was performed but failed.

On admission to the orthopedics ward, the physical examination revealed marked swelling over the left second toe, with dorsal subluxation of the PIPJ. The subdermal venous plexus refill time was normal, and no neurologic deficit was detected. He had no external wound (Fig. 1*A*).

The radiographs demonstrated a dorsolateral dislocation of the PIPJ of the left second toe without any associated fracture (Fig. 1*B*). Closed reduction with the patient under local anesthesia with a digital block was performed under fluoroscopic guidance. The joint was successfully reduced, but redislocation occurred spontaneously after release of the traction force. Another closed reduction was performed with the patient under general anesthesia, supplemented with axial K-wire fixation, which was uneventful (Figs. 2 and 3).

He was followed up in our clinic 3 weeks after surgery. He was able to perform full weight bearing walking without pain. Radiographs of his left second toe showed good alignment with congruent PIPJs. Stability was tested after removal of the K-wire. The PIPJ was stable to both dorsiflexion/plantarflexion and varus/valgus stress. Full active and passive range of motion was detected and was comparable with that of all other toes.