

Dislocations of the second and third metatarsophalangeal joints after local steroid injection in patients with refractory metatarsalgia: A case report

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Eichi Ito¹ , Hiroaki Shima¹, Kosho Toge¹, Yoshihiro Hirai¹,
Seiya Tsujinaka¹, Toshito Yasuda² and Masashi Neo¹

Abstract

Local steroid injections are frequently administered to patients with refractory metatarsalgia. No reports have described dislocation of the second and third metatarsophalangeal joints after local steroid injections. A 46-year-old woman had suffered from metatarsalgia and received multiple local steroid injections for over 2 years. The second and third metatarsophalangeal joints revealed dorsal dislocations on the lateral radiograph. Therefore, collateral ligament reconstruction of the metatarsophalangeal joints was performed. Intraoperative findings suggested that the rupture of the plantar plate may have caused dorsal dislocation of both joints. Thus, unnecessary multiple steroid injections around the lesser metatarsophalangeal joint should be avoided.

Keywords

Dorsal dislocation, metatarsalgia, plantar plate, steroid injection

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Introduction

Metatarsalgia is a common condition in daily clinical practice; its causes include lesser toe deformities, metatarsophalangeal (MTP) joint synovitis, Freiberg infarctions, degenerative arthritis, systemic arthritis, and interdigital neuromas.¹ Alongside hallux valgus deformity, the condition may arise from the pressure of overloading the central forefoot, which may be attributed to hypermobility of the first ray, relatively longer metatarsals of the second or third toe, or decreased transverse arch.^{2,3} Conservative treatment is preferred, often including shoe modification, non-steroidal anti-inflammatory medication, and arch support. In cases of refractory metatarsalgia, local steroid injections are frequently administered.⁴

Reportedly, patients with interdigital neuroma have adverse effects of local steroid injections, such as skin hypopigmentation or atrophy of the plantar fat pad.⁵ There is only one report describing the dislocation of the second MTP joint after local steroid injection.⁶ Here, we report the case of a patient with dorsal dislocation of the second and third MTP joints, requiring operative treatment after multiple local steroid injections for refractory metatarsalgia treatment.

Ethical statement

All procedures performed were under the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Case

Written informed consent was obtained from the patient for her anonymized information to be published in this article.

A 46-year-old female dental hygienist with no history of rheumatoid arthritis or trauma presented with

¹Department of Orthopedic Surgery, Osaka Medical and Pharmaceutical University, Takatsuki, Japan

²Department of Nursing, Osaka Medical and Pharmaceutical University, Takatsuki, Japan

Corresponding Author:

Hiroaki Shima, Department of Orthopedic Surgery, Osaka Medical and Pharmaceutical University, 2-7, Daigaku-machi, Takatsuki 569-8686, Japan.
Email: hiroaki.shima@ompu.ac.jp





Figure 1. Non-weight-bearing radiographs at the previous clinics. No dislocation or arthritic change in the second and third metatarsophalangeal joints is observed. (a) Dorsoplantar view and (b) oblique view.

metatarsalgia of the right foot. She was diagnosed with interdigital neuroma at a nearby hospital and received a local steroid injection on the plantar aspect of the second web space. The use of an insole was also prescribed. For 2 years thereafter, steroid injections were administered to treat any exacerbation of the metatarsalgia (10 injections of triamcinolone and one of betamethasone were administered). At 1 year after the primary injection, the second and third toes became bent and developed swelling, especially at the third MTP joint; she was subsequently referred to our department.

Physical findings indicated flexible hammertoe deformities of the second and third toes. The ranges of motion of the right second and third toe MTP joints at extension were 90° and 70° , respectively, whereas the corresponding ranges at flexion were both 0° . The ranges of motion in the proximal interphalangeal joints at extension were -30° and -60° in the second and third toes, respectively; the corresponding ranges at flexion were 70° and 90° , respectively.

The initial non-weight-bearing radiographs revealed no dislocation or arthritic changes in the second and third MTP joints (Figure 1). After 2 years, dorsal dislocations of these joints were noted on a lateral radiograph (Figure 2). Although no bone cyst or sclerosis was observed on the dorsoplantar radiograph, mild hallux valgus deformity was found. Magnetic resonance imaging revealed synovial fluid retention in the second and third MTP joints, and the plantar plates of both joints were ruptured from the proximal phalanx and retracted under the metatarsal head (Figure 3).

Surgery was performed for the second and third MTP joints and the hallux valgus deformity. The plantar plate disappeared, and the flexor digitorum tendon was exposed at the second and third MTP joints intraoperatively; the medial and lateral collateral ligaments (CLs) and the capsule were preserved and were sufficient for reconstruction. After cross-drilling the metatarsal head, the CLs were re-attached using non-absorbable sutures, and temporary fixation was achieved with a Kirschner wire.⁷ In addition, proximal oblique shortening osteotomies of the second and third metatarsal bases were performed.⁸ For the hallux valgus deformity, a distal soft tissue procedure and proximal osteotomy of the first metatarsal were performed, according to our operative indications.⁹

A short leg cast and non-weight-bearing walking were prescribed and continued for 3 weeks. At 4 weeks, partial weight-bearing in a short leg plaster shell, with active and passive range-of-motion exercises, was encouraged. At 7 weeks, the patient was instructed to wear shoes with arch supports, and full weight-bearing walking was allowed.

Correction of the deformity was achieved after the operation; however, pain in the third MTP joint recurred. A collapse of the third metatarsal head was observed at 5 months postoperatively (Figure 4), and pain in the foot during walking gradually became worse. Therefore, resection arthroplasty because of necrosis of the third metatarsal head was performed at 15 months after the primary operation. At 1 year after reoperation, metatarsalgia improved, and visual analog pain score decreased from 8.6 points preoperatively to 1.8 points postoperatively.

Postoperatively, the ranges of motion in the right second and third toes at the MTP joints for extension were 40° and 20° , respectively, while the corresponding ranges for flexion were 10° in both toes. Neither re-dislocation of the MTP joint nor recurrence of hallux valgus was observed (Figure 5).

Discussion

The causes of MTP joint dislocation include hallux valgus, trauma, chronic arthritis, and rheumatoid arthritis.¹ Only two cases of the second MTP joint dislocation developing after local steroid injection have been reported.⁴ Both patients received one or two local steroid injections into their soles for metatarsalgia treatment, and second MTP joint dislocations were found within 1 month. Here, the patient received 11 local steroid injections into the sole for refractory metatarsalgia. According to the patient, deformities of the second and third toes were observed 1 year after the initial injection. However, it is impossible to ascertain how many injections caused the dislocations because there was no radiograph. Therefore, it is important to examine the radiograph when metatarsalgia does not improve with steroid injection.

Reis et al. reported that methylprednisolone acetate injections could cause attenuation of the plantar capsule; therefore, the unresisted pull of the extensor digitorum longus

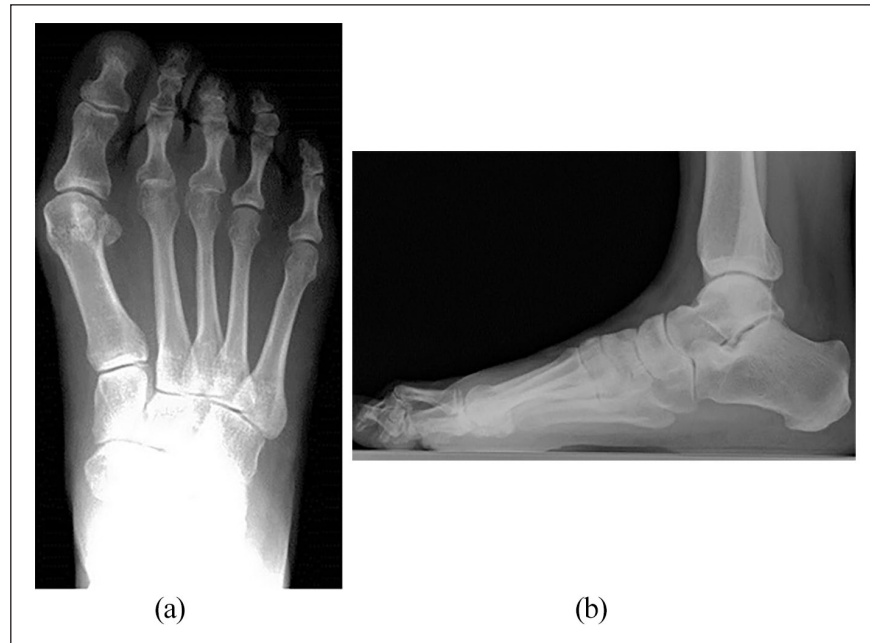


Figure 2. Weight-bearing radiographs at our hospital. (a) Dorsoplantar view: mild hallux valgus deformity is presented. (b) Lateral view: the second and third metatarsophalangeal joints reveal dorsal dislocation.

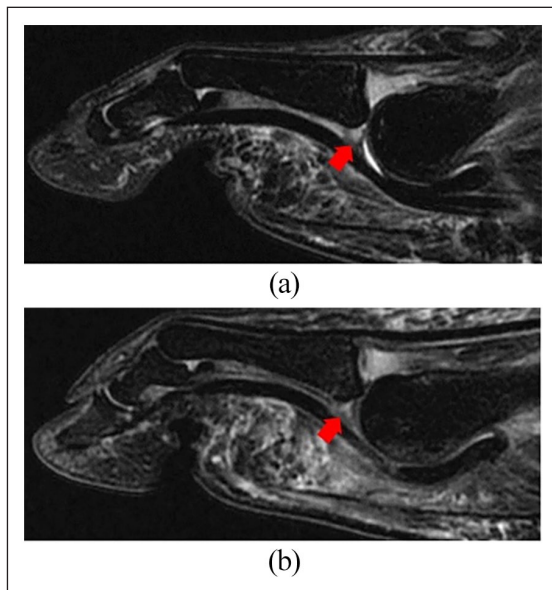


Figure 3. Magnetic resonance imaging indicating rupture of the plantar plates. (a) Second metatarsophalangeal joint T2-weighted fat suppression image. (b) Third metatarsophalangeal joint T2-weighted fat suppression image. Arrowhead: location of the plantar plate.

may result in dorsal dislocation of the toe.⁶ Intraoperative findings in the present case revealed that the plantar plates of the second and third MTP joint had been ruptured and retracted under the metatarsal head; thus, flexor digitorum tendons could be detected from the dorsal aspect. It was



Figure 4. Plain radiographs obtained 5 months postoperatively. A collapse is observed at the third metatarsal head.

suggested that multiple steroid injections into the plantar aspect of the forefoot weakened the plantar plates, which stabilized the MTP joints. Subsequently, the second and third MTP joints were thought to have been dislocated because of an additional overload on the plantar aspect concomitant with the hallux valgus deformity.

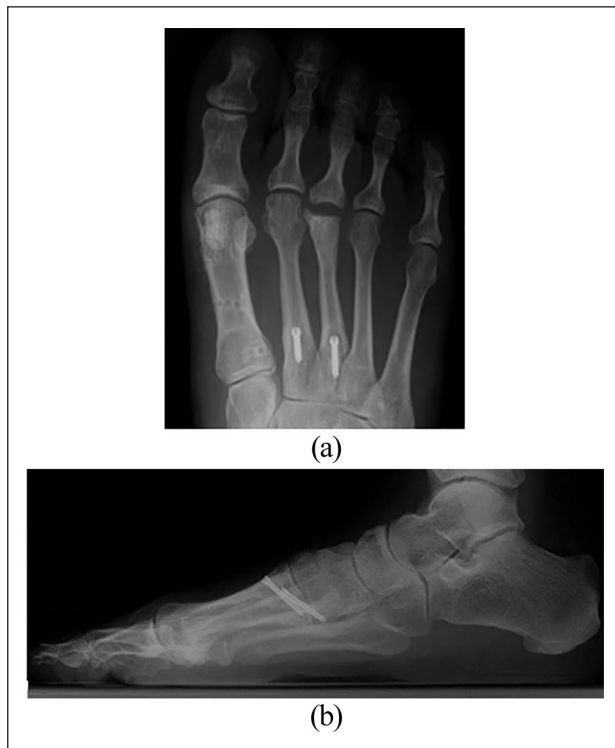


Figure 5. Weight-bearing radiographs obtained at 1 year after surgery. No re-dislocation of the metatarsophalangeal joint nor recurrence of hallux valgus is observed. (a) Dorsoplantar view and (b) lateral view.

Local steroid injections into the tendon might weaken its structure and increase the probability of tendon rupture.¹⁰ Infiltration of hydrocortisone into rabbit calcaneal tendons reportedly caused necrosis of collagen at the infiltration site. Furthermore, local corticosteroid injections into the retrocalcaneal bursa in rabbits adversely affected the biomechanical properties of the Achilles tendon. Here, no obvious rupture of the flexor tendon was observed because the steroid was not injected directly into the tendon. However, flexor tendon degeneration because of a steroid injection around the lesser MTP joint occurred and contributed to the dislocations. Therefore, multiple steroid injections around the MTP joint should be avoided.

Successful results of MTP joint dislocation repair with the plantar plate have been reported recently.¹¹ However, the plantar plate could not be found in the present case, and the flexor tendon was exposed at both MTP joints. In such cases, repair of the plantar plate is impossible.¹² The CL is continuous with the plantar plate and contributes to MTP joint stability to a greater degree than the plantar plate. Hence, CL reconstruction was performed for lesser MTP joint dislocation.⁵ At 2 years after the initial procedure, the second MTP joint was preserved without recurrence. However, resection arthroplasty was required for the third MTP joint. Although

it is unknown whether the necrosis of the third metatarsal head was caused by surgery or steroids, it may be worth trying to reconstruct the CL in cases involving loss of the plantar plate.

Conclusion

To the best of our knowledge, this is the first case report to describe dorsal dislocations of the lesser MTP joints after multiple local steroid injections for refractory metatarsalgia, for which operative treatment was required. The rupture of the plantar plate because of multiple local steroid injections may have caused dorsal dislocations of the second and third MTP joints. Therefore, multiple steroid injections around the MTP joint should be avoided whenever possible.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

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Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

ORCID iD

Eichi Ito  <https://orcid.org/0000-0003-3195-4678>

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