

Elongating Osteotomy of The Short First Metatarsal in Non-Iatrogenic Deformities

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Statement of Purpose

Plantar second metatarsal pain, capsulitis, and predislocation syndrome are common ailments for which second metatarsal osteotomies are performed when surgical treatment is needed. Surgeons often refer to patients as possessing a long second metatarsal as part of the underlying pathology. However, oftentimes the structural problem is a short first metatarsal, and the relationship between the remaining metatarsals is normal. This study demonstrates the effectiveness of relieving second metatarsal pain by elongating the short first metatarsal and correcting the abnormal metatarsal parabola.

Literature Review

Treatment for congenitally short first metatarsals and are not well documented. It is more common to see discussions of correction regarding iatrogenic shortening (1,2). Regardless of the etiology, a short first metatarsal may lead to second metatarsal capsulitis. Classically, the surgical management has focused on procedures of the second metatarsal (3). Other options discussed for iatrogenic shortening of the first metatarsal have included lengthening osteotomies as well as 1st MPJ fusions with bone grafting (1,4). When 1st MPJ fusion is avoided, distraction Scarf and Sagittal Z lengthenings seem to be the primary choices described (2,5,6). In this study, we will describe the use of the Z lengthening in dealing with a congenitally shortened first metatarsal in patients with second ray metatarsalgia.



Pre-Operative AP Clinical Picture

Case Series/Procedure

We present a case series of 3 patients, all with the chief complaint of second metatarsal capsulitis or metatarsalgia. Each of these patients had a shortened first metatarsal when evaluating the overall metatarsal parabola. We utilize an elongating Z osteotomy to lengthen the first metatarsal 5 to 7mm in order to correctly realign the metatarsal parabola and restore more normal weight bearing to the forefoot.

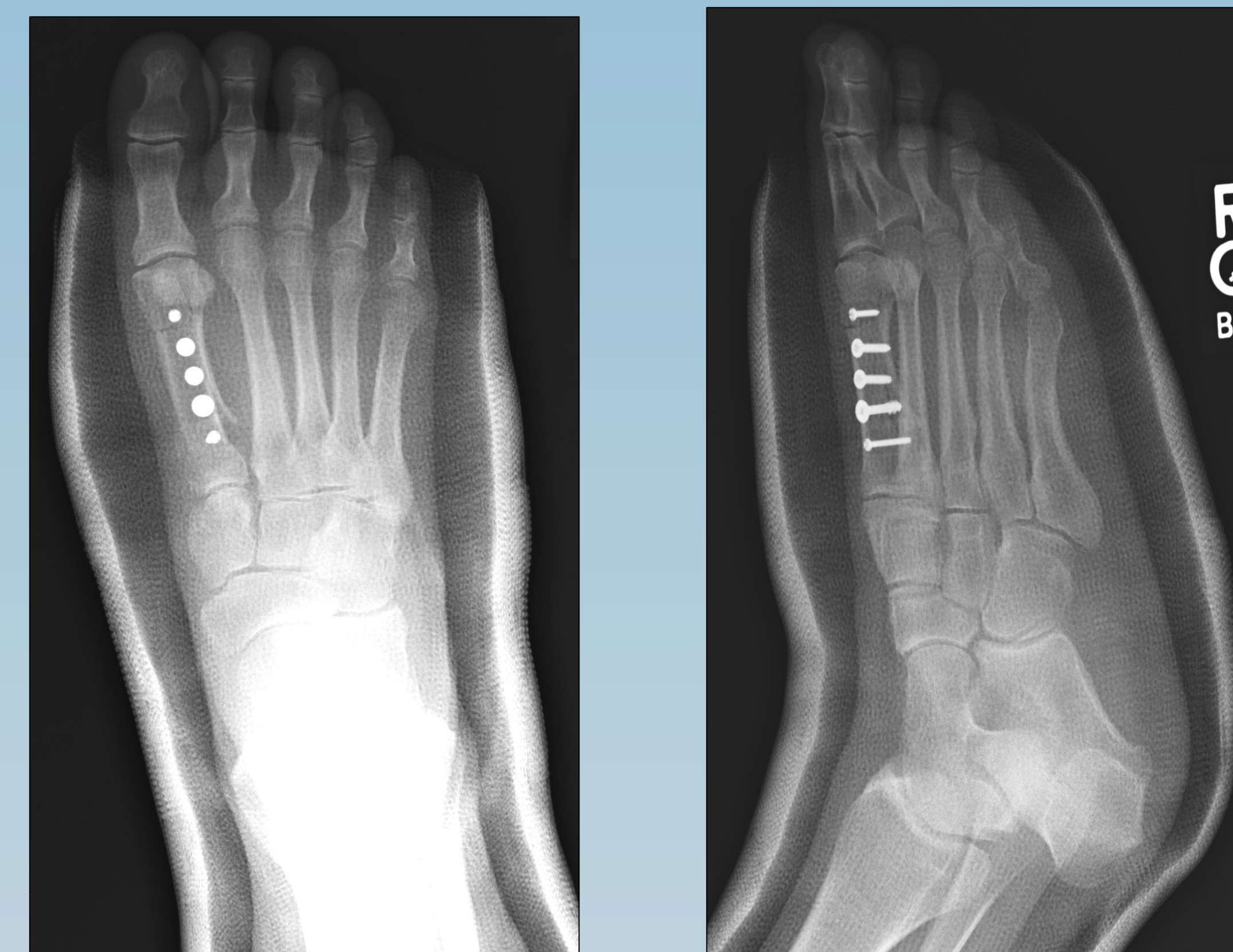


Pre-Operative AP, MO, and Lateral Radiographs

The patient is in the supine position. Hemostasis may be achieved with either a tourniquet or local anesthesia with epinephrine. A linear incision is made over the first metatarsal from the metatarsal-cuneiform joint to the first MPJ area. After dissection through the subcutaneous tissues, the periosteal incision is made longitudinally along the first metatarsal. Periosteum is reflected, and the first metatarsal-cuneiform joint and the first metatarsal-phalangeal joints are both identified. Two 0.045 K-wires are employed as axis guides.

Case Series/Procedure Continued

The distal osteotomy should avoid the sesamoids, proximally the axis is 1 cm distal to the metatarsocuneiform joint. A Sagittal Z osteotomy is then performed using power instrumentation. The distal portion of the osteotomy is then distracted to the desired length. Temporary fixation is applied and fluoroscopy used to check for approximate length gain. Typically 5 to 7 mm of length is gained at this point from distraction. Temporary fixation is replaced with two screws. Sizes of the screws depend on the individual patient anatomy. Freeze dried tricortical iliac bone graft is then cut and shaped to fit into the gaps created from distraction of the osteotomy. The grafts are then secured with two 2.0 mm cortical screws. Layer closure is then performed. A below-knee Jones compression cast is applied to the lower extremity. The patient will remain non-weight bearing for 6 weeks until they can be transitioned to a surgical shoe and eventually to a regular shoe.



Post-Operative AP, MO, and Lateral Radiographs

Analysis & Discussion

Assessing the metatarsal parabola is an important tool for proper surgical planning in patients with chronic lesser metatarsal symptoms. It has been the experience of the authors that when there is structural aberration of the metatarsal parabola, often the relationship between the second and fifth metatarsals is normal and it is the first metatarsal which is short as opposed to a long second metatarsal. In this case study, 3 patients, all with a chief complaint of second metatarsal capsulitis or metatarsalgia, underwent a lengthening Z osteotomy. Each patient gained 5 to 7 mm of length at the first metatarsal. Lengthening the first metatarsal via osteotomy corrected the problem of the short first metatarsal and eliminated the symptoms of metatarsalgia. This study demonstrates the importance of recognizing the malalignment of the parabola by correcting the true structural deformity.

References

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