

MIS Correction of 2nd Plantar Plate Tears

This procedure has yielded good results for the author.

BY DON PEACOCK DPM, MS

Introduction

A common complaint among podiatric surgical patients is pain in the second metatarsophalangeal joint. The flexible foot type patient often presents with inflammation at the 2nd MPJ and instability. This can lead to plantar pain in the distal 2nd MPJ. In more advanced cases, the second toe crosses either under or over the hallux (Figure 1a and 1b). In some cases, complete dislocation can result (Figure 11). In traditional residency training, podiatric surgeons are taught several ways to handle this deformity. In the author's opinion, most of these techniques lead to less than desirable outcomes and the potential for considerable complications.

The deformity can be isolated or associated with hallux valgus, hallux rigidus, hammertoe deformity, or neuroma of the second inter-metatarsal space. The biomechanics are complicated and the ensuing plantar plate tear adds to the instability. Patients can also present with other concurring deformities such as equinus, associated neuritis, cavus foot, Freiberg's, and overuse etc. The list can go on and on. This surgical write-up is not intended to supersede other techniques or to show a procedure applicable to all patients. This article highlights how the author used a simple MIS technique and successfully treated this deformity in a single patient. The



Figure 1 a and b: A severe crossover toe deformity corrected by simple MIS osteotomy of the 2nd proximal phalanx. Ironically, this patient experienced no pain in the 2nd MPJ. Her pain was in the PIPJ dorsally, occurring while ambulating in shoes. The deformity was corrected by a percutaneous lateral wedge osteotomy of the second proximal phalanx.

In a hypermobile foot, there is a tendency for the 2nd MPJ to acquire a medial force with the plantar tendons shifting medially as well. This places a bowstring force on the 2nd toe, resulting in bending of the 2nd toe and shifting the 2nd metatarsal laterally. Outright dislocation of the 2nd MPJ can occur as the deformity progresses. Once these forces begin, the collateral ligaments located medially and laterally desperately try to resist additional strain. If these structures are

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main purpose of this presentation is to show a less invasive way to treat plantar plate tear that has yielded good results for the author.

Anatomy/Function

The plantar plate and the collateral ligaments stabilize the 2nd MPJ joint. The plantar plate originates on the metatarsal head proximal to the articular surface, and inserts on the base of the proximal phalanx. Disruption through biomechanical strain can weaken the stabilizing effect the plantar plate has on the 2nd MPJ.

overpowered, dislocation or pre-dislocation (plantar plate tear) deformity occurs at the 2nd MPJ.

Biomechanics

It is thought that the lateral collateral ligament fails first, leading to medial deviation of the second toe. As this occurs, the plantar plate and its flexor tendon attachments displace medially. Once the flexors and plantar plate are displaced, they no longer oppose the pull of the extensor tendons. The end result is

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collateral ligament and plantar plate weakening, leading to dorsomedial subluxation of the proximal phalanx on the metatarsal head.

Patient's Presenting Complaint

Plantar plate tear usually presents



Figure 2 and 3: Photographic representation of the medial drift seen in the 2nd left toe.

as pain and inflammation of the 2nd MPJ joint which worsens with activity. In the beginning stage, there is no deformity noted. As it progresses, the second toe drifts medially and may cross either under over the hallux and or dislocate from the 2nd MPJ. Ironically, as the deformity reaches its end, some patients feel relief in symptoms. Palpation of the 2nd MPJ plantar will usually result in tenderness at the 2nd MPJ. The drawer test can confirm instability in some patients. Comparison to the normal foot is usually helpful.

Imaging

Radiographs may be normal in the early stages of the disease. The second MPJ joint may appear distended. In later stages, there is dorsal and medial subluxation of the 2nd MPJ joint. Ultrasound is a use-



Figure 4: Pre-operative x-ray showing medial drift of the second metatarsophalangeal joint.

ful complicating the issue are patients with severe deformity and even cross-over toe that have no symptoms of plantar plate tear. Morton believed

Plantar plate tear usually presents as pain and inflammation of the 2nd MPJ joint which worsens with activity.

ful image technique to detect plantar plate tear and can directly evaluate the integrity of the plantar plate.

Controversy

The cause of plantar plate tear has been debated for years. Com-

that a long 2nd metatarsal was the etiology of the deformity. However, methods of measuring the 2nd metatarsal length as it relates to plantar plate tear have conflicted the data.

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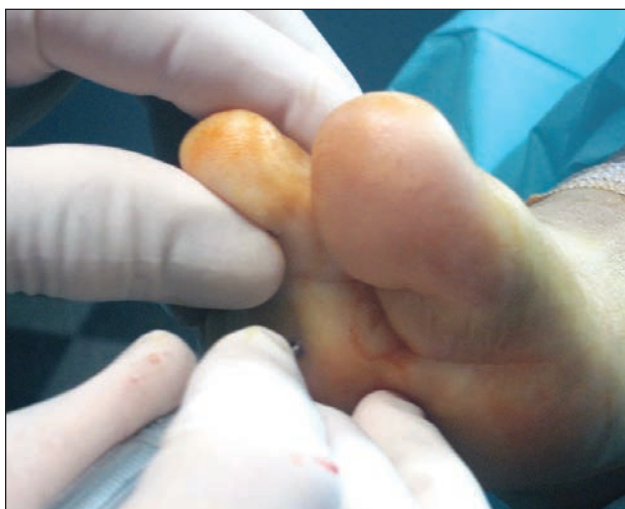


Figure 5: Plantar approach to proximal phalanx osteotomy as described by Dr. Stephen Isham.

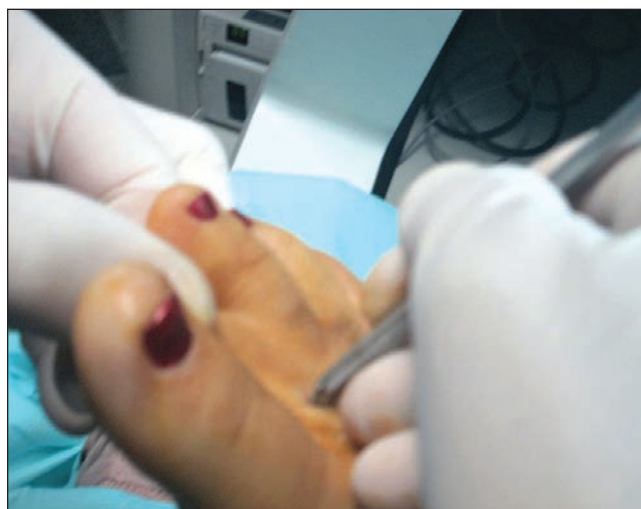


Figure 6: Photographs showing lateral release of the tight medial structures including the metatarsophalangeal capsule of the second toe. An extensor tenotomy was also performed in the EDL tendon through the same incision.

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Surgical Treatments

Surgical treatments are also debated in the literature. The use of

sensus of how to treat this common deformity with results questionable with respect to long-term resolve for patients.

The author presents a case in-

the 2nd proximal phalanx and middle phalanx along with soft tissue manipulation, resulting in complete resolve of symptoms and anatomical alignment of the deformity. The pain has never returned following the surgical intervention. The patient described her pain as debilitating prior to the surgical intervention. She has informed us that the results have been life-changing.

There is yet to be a true consensus of how to treat this common deformity with results questionable with respect to long-term resolve for patients.

various soft tissue and bony procedures alone and in combination with other procedures have been reported. There is yet to be a true con-

volving medial drifting of the 2nd MPJ and severe pain plantar 2nd MPJ for six months. The deformity was surgically corrected by osteotomy of

Case: Plantar Pain in the Second Metatarsal

The patient is a 53-year old female who presented with chronic plantar pain in the 2nd MPJ right

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Figure 7: Photographs showing the proximal incision for the osteotomy of the proximal phalanx and the distal incision over the distal interphalangeal joint to perform the FDL tenotomy.



Figure 8: Depicts the incision for performing the dorsal capsulotomy at the second metatarsophalangeal joint dorsally. An additional percutaneous incision is seen in the medial area of the PIPJ where a medial capsular release was performed.



Figure 9: Post-operative photograph showing better alignment of the second toe at eight weeks.



Figure 10: AP x-ray showing healing of the underlying osteotomy in the proximal phalanx and the middle phalanx at six weeks.



Figure 11: Complete dislocation of second metatarsophalangeal joint seen as the deformity increases.



Figure 12: An example of MIS correction of a dislocated second metatarsophalangeal joint seen in figure 11. This was corrected by minimally invasive techniques, including osteotomy of the proximal phalanx in the second, third, and fourth toes, as well as osteotomy in the second, third, and fourth metatarsals. A double osteotomy, termed the Haspel technique, was performed in

the second metatarsal. The dislocated second MPJ has remained in alignment for five years.

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foot for one year. The patient described the pain as debilitating. She had already tried conservative care including injections, orthotics, NSAIDs, and rest. None of these modalities helped her condition.

Surgical Intervention

Clinical evaluation revealed pain at the base of the 2nd MPJ with palpation. The 2nd toe was angled medially presenting as the usual pre-dislocation syndrome described in the literature (Figures 2 and 3). Weight-bearing radiographs revealed medial drifting of the 2nd MPJ

MIS techniques can be used for the correction of plantar plate tear in the 2nd metatarsophalangeal joint.

(Figure 4). The deformity was corrected by utilizing minimally invasive techniques.¹ The Isham hammertoe correction technique was used on the second toe with a slight modification.² The modification involved a medial percutaneous capsulotomy of the PIPJ. A standard plantar percutaneous incision was made at the plantar MPJ, and an osteotomy was performed in the proximal phalanx with wedging motion, allowing the toe to shift in a more rectus position (Figure 5). A percutaneous flexor tenotomy was performed at the plantar DIPJ taking care to not disrupt the brevis attachments (Figure 7). A percutaneous extensor tenotomy was then performed as depicted on the photograph (Figure 6). An additional osteotomy was performed in the middle phalanx to allow for better rectus position (Figure 8). Figures 9 and 10 show the x-ray results and the clinical results at eight weeks. The patient has remained pain-free for four years.

Conclusion

MIS techniques can be used for the correction of plantar plate tear in the 2nd metatarsophalangeal joint. These techniques are not limited to drifting in the second toe associated with plantar plate tear. Similar techniques can be used to treat not only pre-dislocation but also complete dislocation of the second metatarsophalangeal joint. Figures 11 and 12 show the results of applying similar MIS techniques to a complete dislocated second MPJ. **PM**

References

- ¹ S. Frey, et al, Percutaneous Correction of second toe proximal deformity: PIPJ release, FDB tenotomy and proximal phalanx osteotomy. 101: 753, 2015.
- ² Isham S, Nunez O, Isham Hammertoe Procedures for the Correction of Lesser Digital Deformities: 171, 2010.



Dr. Peacock has been in private practice for 18 years in Whiteville, NC. He was traditionally trained in a podiatric surgical residency. He is an assistant professor in the Academy of Ambulatory Foot and Ankle Surgery and is a diplomate of the American Board of Podiatric Surgery. Dr. Peacock has an interest in expanding the scope and acceptance of MIS foot surgery in the podiatric medical community. He believes that MIS procedures can be used as a valuable part of a traditional foot surgeon's arsenal of tools.