Lesser Toe Metatarsophalangeal (MTP) Joint Instability

OVERVIEW

Pain in the lesser toes is a common problem and can have a number of causes. One of the causes can be lesser toe MTP joint instability. Early stages of MTP joint instability can present as pain or subtle deviation of the toes. Late stages can present as one toe crossing over another. An improved understanding of this complex disease has resulted in improved treatment options. Depending on the symptoms and severity, treatment can range from taping or shoe inserts to surgery and repair of the pathology. Research is ongoing to determine the best way to treat this complex disease process.

ANATOMY

Lesser toe MTP joint instability is thought to be at least in part due to a tear in the plantar plate of the MTP joint. The plantar plate is a structure that originates on the metatarsal head just proximal to the metatarsal articular surface and inserts onto the plantar base of the proximal phalanx. Its function is to stabilize and cushion the joint during weight bearing. Dissection of the second MTP joint has shown that the plantar plate is the major stabilizing structure of the lesser toe due to its central location and multiple attachments. See Figure 1.

BIOMECHANICS

During normal walking, the MTP joint extends during the toe-off portion of gait. The plantar plate provides passive resistance, and the foot muscles provide active resistance to this dorsiflexion force which propels the body forward. With plantar plate deterioration, these mechanics are altered. Additionally, the foot muscles are affected and lose their ability to plantarflex the MTP joint normally.

PATHOGENESIS
MTP joint instability has been associated with many things including a long second metatarsal, injury, inflammation, bunion deformity, flatfoot, hammertoe, arthritis, neuromas, and sometimes the cause may not be apparent. These pathologic processes likely alter the loading characteristics of the lesser toes and therefore contribute to instability patterns. While MTP joint instability is frequently seen in older sedentary women, it has been reported in younger male athletes as well. Since MTP joint instability is most often seen in older females, this has led some to suggest that the long term use of high-fashion footwear may be a cause. Two thirds of patients have second toe involvement and one third of patients have either third or fourth toe involvement.

CLINICAL PRESENTATION AND EXAM

Determining the primary cause of toe pain can be difficult. The most common physical examination finding in patients presenting with MTP instability is tenderness on the bottom of the base of the second toe. Initially, the swelling associated with the tears may be seen without associated deformity. With time, deformity develops with continued tearing of the plantar plate and collateral ligaments. The toe often loses the ability to grip the ground. See Figure 2. The development of a gap between toes or deviation of a toe is a frequent finding. A deformity is seen in later stages. As the deformity progresses, the involved toe may cross over or under the neighboring toes. Chronic pain and malalignment often lead to the development of an associated hammertoe deformity. Other clinical findings that may be associated with MTP joint instability include toe swelling, swelling on the base of the MTP joint, nerve pain, and deformity.

IMAGING STUDIES

Standard x-rays should be used to assess the lesser toe joints carefully for alignment as well as any arthritis in the joints. All x-rays must be taken in the weightbearing position. Additional imaging may be considered when evaluating MTP joint pathology including arthrography, ultrasound, and MRI. See Figure 3.

TREATMENT
Early detection of MTP instability is difficult. Because of the slow onset of the pain and deformity, delay in the evaluation and treatment is quite common. Frequently, patients become concerned only after noticing worsening deformity and the presence of a hammertoe. Non-operative treatment measures may reduce pain, but rarely will this alter the progression of symptoms or malalignment. There are several conservative treatment options. Avoiding high heeled shoes and using a roomy toe box may reduce pressure on the symptomatic digit. A stiff shoe insert or a metatarsal pad may relieve stress on the joint during activity. See Figure 4. Taping the affected toe in the early stages may increase the stability of the joint but is often unsuccessful once deformity is present and may cause ulceration or toe swelling in the long term. See Figure 5. Some clinicians use non-steroidal anti-inflammatory drugs (NSAIDS) to manage discomfort but these should be used with caution, especially in older patient populations. Selective corticosteroid injections may be considered but they can potentially mask symptoms allowing for future worsening of the pathology. All of these measures may temporarily relieve symptoms but they will not permanently correct the deformity. When non-operative treatment has failed, patients may consider surgical treatment which has included simple synovecctomy, soft tissue capsular or tendon release, tendon transfers, bony decompression, or direct repair of the plantar plate as well as any other deformities such as a bunion or hammertoe deformity.

CONCLUSION

Since the original description of the lesser MTP joint deformity in 1987, there has been an evolution in the evaluation and treatment of lesser toe MTP joint instability. After exhausting non-operative treatment, surgical repair may be an option.

Legend

Fig. 1

A) anatomy of the MTP joint B) MRI of plantar plate tear (white arrows) and C) MRI after plantar plate repair.
Fig. 2
The lesser toes normally have the ability to make contact with the ground such that when an examiner attempts to remove a tissue from beneath the toe, the tissue tears. With instability, sometimes the toe loses its ability to make contact with the ground.
Fig. 3
X-ray of a patient with a bunion deformity and 2nd toe instability.
Fig. 4
Metatarsal pad and insert

Fig. 5
Taping technique for a lesser toe deformity. Care must be taken not to strangulate the toe.