

PREDISLOCATION SYNDROME OF THE LESSER METATARSOPHALANGEAL JOINT: A Distinct Clinical Entity

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The lesser metatarsophalangeal joints (MPJs) have been associated with a multitude of forefoot pathology over the years. Dating back as far as the 1800s, the literature has revealed numerous reports of varying clinical pathology of the forefoot leading to pain within the lesser MPJs. These various conditions would include: hammertoe, claw toe, mallet toe, chronic synovitis or capsulitis, and subluxation of the MPJ and its resultant sequelae. The authors have identified a specific syndrome associated with lesser MPJ pathology which seems to herald the onset of subluxation and, if left untreated, dislocation. We have termed this clinical presentation and its associated sequelae as predislocation syndrome (PDS) of the lesser metatarsophalangeal joint(s).

DESCRIPTION AND EPIDEMIOLOGY

Predislocation syndrome was identified after reviewing cases that would present periodically as an acute, sub-acute, or less commonly, a chronic inflammatory condition localized at the plantar aspect of the lesser MPJs. The second MPJ appears to be the most common site of pathology. The periarticular structures are the principal site of discomfort, in contrast to the intra-articular pathology that one might encounter in DJD or digital contracture.

The tenderness, localized plantar and just distal to the MPJ, is striking in that it is out of proportion to the clinical appearance of the problem. At the time of initial presentation, there may be no deformity identified (i.e. no significant malalignment, crepitation, grinding or hypertrophy is evident upon examination.) No contracture or marked intrinsic instability can be appreciated if the patient is in the first stages of the syndrome.

The typical patient profile is a healthy middle-aged male or female (30-50 years old) who relates an acute or sub-acute onset of pain and irritation

about the plantar aspect of the lesser MPJ. The quality and duration of the pain are strikingly disproportionate to the physical findings. The history may be benign, reflecting only a high degree of activity (e.g. routine running or aerobics), recent increase in activity, or in some cases simply frequent use of high-heeled shoes. To date, the authors have not been able to establish a specific associate of PDS with systemic medical illness or diseases such as diabetes or arthritis. It is not uncommon to find that the patient has sought medical attention for this problem in the past, which has failed to resolve their symptomatology. The patient profile may also include signs of early depression and anxiety, as the condition has significantly interrupted what was previously an active lifestyle. The patient may also seem apologetic as they describe this intolerable pain in the presence of only minor (or no) physical changes about the affected joint. The initial stage of PDS may reveal only small amounts of edema confined solely to the dorsum of the metatarsophalangeal joint.

Without close inspection, the loss of the contour of the extensor digitorum longus at the level of the joint may not be appreciated. No erythema or other secondary changes can be appreciated at this early stage. Typically, the authors have seen this condition present as a unilateral process, however, on rare occasion a bilateral case may present.

SIGNS AND SYMPTOMS

In reviewing how patients have described their pain, the most striking aspect is that the discomfort is markedly out of proportion from what is appreciated on clinical exam. The pain has been described ranging from the feeling of having a bruise in the area to a sharp and throbbing sensation. Many have described the sensation of having a soft mass or

“grape-sized” lump beneath the area of the MPJ. No physical evidence for this sensation can be found on examination. In gait analysis, one may be able to appreciate that the patient is walking on the outside of their foot, and unconsciously splinting the area of pain. This altered gait pattern has the potential for short term relief, but may well contribute to pain more proximal in the foot or ankle.

For lack of a better approach to review what the authors have witnessed clinically, the signs of PDS have been placed into stages which correlate to the extent of the clinical pathology.

Stage I:

1. Subtle, mild edema dorsal and plantar to the lesser MPJ.
2. Exquisite tenderness plantar and distal to the joint.
3. Alignment of the digit clinically and radiographically appears unchanged compared to the contralateral digit.

Stage II:

1. Moderate edema.
2. Noticeable deviation of the digit both clinically and radiographically.
3. Loss of toe purchase, noticeable in weight bearing.

Stage III:

1. Moderate edema.
2. Clinically, the deviation (sometimes frank subluxation or dislocation of the digit) is more pronounced.
3. Subluxation or dislocation is evident radiographically.

DIFFERENTIAL DIAGNOSIS

The patients that we have encountered to date have previously been treated for alternate diagnoses, with either persistence or exacerbation of their initial pain syndrome in spite of treatment. These patients often present frustrated and anxious for relief of their pain. The fear of being labeled a hypochondriac or a drug seeker has been related by a few patients. After multiple failed therapies, it is understandable that the patient may present as self conscious, with little confidence that their problem will be resolved.

The following is the list of items that would exist in the differential diagnosis of a patient presenting with these symptoms.

1. Stress fracture(s).
2. Subluxation/dislocation associated with hammertoe deformities.
3. Metatarsalgia.
4. Synovitis/capsulitis.

There are certain specific clinical and radiographic findings that will assist the physician in confidently excluding these conditions. Further discussion of these aspects is not within the scope of this paper.

RADIOGRAPHIC EVALUATIONS

The diagnosis of predislocation syndrome of one or more of the lesser MPJs is established based on subjective complaints and clinical findings. There are no radiographic parameters which can be considered the sine qua non of this entity.

The authors must emphasize that the diagnosis of predislocation syndrome requires a high degree of clinical suspicion and a focused history and physical exam. Ancillary studies merely confirm the clinical diagnosis, primarily ruling out other pathology within the differential diagnosis.

Conventional Radiographs

1. Forefoot axial.
2. Dorsal/plantar.
3. Lateral.
4. Medial oblique.

Specific findings may include one or more of the following:

1. Elongated second metatarsal.
2. +/- hypertrophy of diaphyseal cortex of the affected metatarsal.
3. Altered MPJ congruity.
4. Positive drawer sign.

Length assessment has been done by drawing a line connecting the distal articular surface of the first and third metatarsals, and then measuring the protrusion of the second metatarsal beyond this line. A positive value indicates an excessive length.

Cortical hypertrophy can be determined by measuring the medial and lateral diaphyseal cortex of the second metatarsal shaft, and comparing it to the third. Congruency is determined by the angular measurement of the bisection of the metatarsal

bone and that of the corresponding proximal phalanx. Negative values reflect medial deviation across the mid-axial line, while positive values will pass laterally. A negative value may be encountered in pre-dislocation syndrome.

A drawer sign, or vertical stress test, has been described by Coughlin. In this test, the metatarsal is stabilized while the proximal phalanx is held in a position parallel to the metatarsal, and translocated purely vertically in the sagittal plane. A vertical shift of more than 50% of the proximal phalanx on the metatarsal head is considered a positive test.

RADIONUCLIDE IMAGING

Triphasic Bone Imaging (99mTcMDP)

While increased uptake is evident on the third phase of imaging, the most pronounced increase is seen in the flow study or angiogram image phase. This pattern of uptake strongly suggests a localized inflammatory process at the level of the MPJ.

Magnetic Resonance Imaging

The interpretation of the MRI for cases of predislocation syndrome requires the skills of a highly experienced and knowledgeable musculoskeletal radiologist with a particular interest and knowledge of the anatomy of the foot. Positioning and adequate orientation of images are essential to obtaining a useful MRI study. For these reasons, we emphasize that to obtain useful MRIs, detailed communication between the attending physician and the radiologist is critical. The authors have found that PDS produces MRI findings that are consistent and specific throughout the limited case studies conducted to date.

Predislocation syndrome will produce significant edematous changes extending along the distal slips of the plantar fascia adjacent to the affected MPJs. These edematous changes may be found to extend into the associated subcutaneous structures. Thickening of the plantar plate without specific evidence of tenosynovitis of the flexor digitorum longus or brevis tendons was found. These edematous changes extend along the deep transverse intermetatarsal ligament on either or both sides of the affected MPJ. A mild capsulosynovial joint effusion within the MPJ may also be found. The synovial fluid and distention are best appreciated

on T2-weighted images along the dorsal surface of the joint, corresponding to the mild edema appreciated clinically. Sagittal imaging may further disclose a hyperextension of the MPJ of the affected digit. Since the foot is not weight bearing, this must be correlated with clinical findings. Specific involvement of the flexor digitorum longus has not been observed to date. Specific intra-articular pathology is consistently absent.

Arthrography

The use of arthrography of the second MPJ for assessing the capsular deterioration or instability has been reported. This test has not been universally accepted, and the authors have no experience with this technique in identifying predislocation syndrome. To date, its necessity has not been realized. Although potentially beneficial, it is felt that MRI in general can provide much greater detail and information regarding the pathology.

CONSERVATIVE TREATMENT

The effects of conservative therapy are two-fold. The reduction of pain will ultimately allow return of function, while at the same time halting the progression of the deformity. This ultimately will preserve a more normal architecture of the MPJ.

Splinting and Strapping

These methods have proven to be the most beneficial in preventing progression of the deformity and alleviating pain. These measures not only alleviate symptoms but help to confirm the diagnosis of the etiology of the pain syndrome. The patients' response to the relief they achieve with these simplistic therapies is quite remarkable.

Cross-Over Tape Method

This technique is designed to stabilize the proximal phalanx in a plantar direction at the level of the MPJ, and thus prevent any tendency towards hyperextension or dorsal migration of the phalanx. This in turn alleviates retrograde forces predisposing the joint to subluxation and eventual dislocation. The authors tend to use this as a diagnostic tool at the time of initial exam. If the cross-over tape results in immediate improvement, then an appropriate metatarsal pad is fabricated.

In virtually all cases, the authors have found the metatarsal splint pad to be the most efficacious way to reduce symptomatology while simultaneously maintaining alignment of the toe.

Pharmacologic Intervention

Systemic low dose corticosteroid treatment helps to decrease the inflammatory response to the affected area. The authors typically prescribe a Medrol Dose Pac™ in conjunction with a nonsteroidal anti-inflammatory drug (NSAID) of choice. While each of these can be employed individually, their combined use has been found to more quickly alleviate symptoms. The NSAID is typically continued for several months.

Ultrasound/Whirlpool

These modalities may prove beneficial, but are only used as an adjunct to the treatment described above. These modalities are geared toward reducing inflammation, and therefore, can be considered reasonable adjunctive therapy. Manipulative therapies are not recommended and usually not tolerated, especially in the acute phase of the syndrome.

Discussion

In the authors' experience, conservative therapy consistently brings 70-90% relief within several days. A poor response to these measures suggests an incorrect diagnosis. Clinical re-evaluation is then necessary. Unfortunately, conservative treatment is often required for months on end, and in time cannot be abandoned without a quick return of the initial symptoms. In those cases recalcitrant to conservative care, surgical management is recommended.

SURGICAL MANAGEMENT

Surgical intervention is recommended only as a last resort and in cases which have proven recalcitrant to conservative treatment modalities. When one considers that alternative therapy results in long-term usage of metatarsal padding and splintage techniques, the patient may become dissatisfied as these measures are not cosmetically acceptable. Long-term NSAID therapy may also be an unacceptable therapy, given its tendency for gastrointestinal side effects.

For patients who have already undergone subluxation or dislocation of the MPJ, surgical correction may be the only feasible treatment to eliminate discomfort and restore proper alignment and function to the toe.

The procedure of choice in appropriate surgical candidates is flexor tendon transfer, most likely in addition to "Z" lengthening of the extensor digitorum longus tendon. An extensor hood recession as well as a total MPJ capsulotomy are employed for further correction. Kirschner wire fixation, if opted for, effectively stabilizes the interphalangeal joints and the MPJ. It may be prudent to place the toe in an over-corrected position prior to fixation. When employed, these K-wires are removed at five weeks.

Compression bandaging followed by night time splintage, are important to maintain alignment of the toe following K-wire removal. A metatarsal pad is used as soon as the patient has begun to bear weight in normal shoes. Splintage of the toe in the corrected position may be necessary for the first several months.

Discussion

It is the authors' intention to share with the reader the clinical findings that have been observed among a specific population of patients. The signs and symptoms identified seem to present themselves as a syndrome, which if left untreated, will potentially result in dislocation of the lesser MPJ without hope of conservative remedy. Predislocation syndrome, as the authors have described, is a condition which presents itself with subtle clinical findings in the presence of a striking pain cycle. To date, the authors have been able to establish the progression of the deformity as a series of stages with independent clinical and radiographic presentations.

Most important to reiterate is the fact that predislocation syndrome is essentially a diagnosis of exclusion requiring a detailed history and physical exam to elucidate its existence. For a moderate amount of time and minimal expense, the patient who has been suffering from pain and significantly decreasing their activities finds near complete resolution of their pain almost in disbelief. This clinical experience can be appreciated when encountering the true predislocation patient, and until recently identified, perhaps many have evaded the eyes of the unsuspecting physician.

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