

Tarsometatarsal Joint Arthritis

OVERVIEW

Tarsometatarsal arthritis is a degenerative condition affecting one or more of the small joints in the middle of the foot (midfoot). It usually affects older patients. However, with a history of prior trauma or inflammatory arthropathies (such as Rheumatoid Arthritis), younger patients can be affected as well. It can cause a variety of clinical symptoms from mild discomfort to severe, disabling pain with each step.

ANATOMY

There are five tarsometatarsal (TMT) joints in the foot. These are divided into three columns. The medial column is formed by the 1st metatarsal bone and the medial cuneiform. The middle column is formed by the 2nd and 3rd metatarsals aligning with the middle and lateral cuneiforms respectively. The lateral column is formed by the 4th and 5th metatarsals and the cuboid. While these joints do not have the extensive range of motion which is present in other joints, they nevertheless can be a source of pain when degeneration of the cartilage is present.

BIOMECHANICS

With each step of walking the TMT joints are active and loaded. With normal gait, transfer of weight from the heel to the toes allows the feet to propel the body forward on the ground. This load transfer is predicated on having a stable lever in the foot. This stable lever is formed by the medial and middle (first three) TMT joints since they have considerably less inherent motion than the 4th and 5th TMT joints. The latter two TMT joints allow for push off and adaptation walking on uneven ground.

PATHOGENESIS

The most common cause of TMT arthritis is from prior trauma. This can be a Lisfranc injury where the ligaments supporting the TMT joints are ruptured resulting in instability and/or change in contact pressures across the joint even after surgery to stabilize the joint. Other examples of trauma include fractures at the base of the metatarsals which extend into the TMT joints and sprains or other twisting injuries resulting in occult cartilage damage initiating cartilage wear.

Non-traumatic causes of TMT arthritis are also present. An acquired flatfoot deformity, when present for a prolonged period of time, can sometimes result in arthritis at the tarsometatarsal joints. A specific type of Charcot arthropathy can result in joint destruction and subsequent arthritis in the TMT joints. Systemic inflammatory arthropathies such as Rheumatoid Arthritis can affect the TMT joints as well.

CLINICAL PRESENTATION

The typical patient will complain of a dull pain or discomfort of varying intensity in the dorsal midfoot which is present with walking and weightbearing activities and is relieved with rest. Symptoms usually have an insidious onset with no history of a recent acute, inciting injury. Often, pain may have been present for several weeks prior to the patient seeking any medical attention for the issue. Patients may also present with a primary complaint of a painful bony prominence on the dorsal midfoot causing pain with compression from footwear. In severe cases, there may be complaints of foot deformity with a history of progressive loss of arch.

CLINICAL EXAM

Physical examination can reveal several findings. With observing and analyzing the patient's gait, pain will often present in midfoot when they are pushing off on the affected foot to go forward. Pain in affected area can also be recreated by having the patient stand on one leg at the symptomatic side and get up on their tiptoes using the wall for support. With deep palpation, there may tenderness over the midfoot at the TMT joints. There can be pain with forefoot abduction stress testing. A "piano key" test is a useful maneuver in which the examiner uses one hand to stabilize the midfoot while using the other to apply a dorsal stress to the distal metatarsal. If pain is present with stressing of the specific metatarsal, there is arthritis present at that specific TMT joint.

STAGING

There is no staging system which is specific tarsometatarsal joint arthritis. In general, the condition can be classified as mild, moderate or severe depending on the patient's symptoms and/or radiographic findings.

IMAGING STUDIES

Weight-bearing AP, lateral and oblique foot radiographs are the standard first-line imaging studies obtained. Typical findings on the AP view can include joint space narrowing between the 1st, 2nd and 3rd metatarsal bases and their respectively articulations with the cuneiforms. On the oblique view, narrowing between the 4th and/or 5th metatarsal base and cuboid is seen. The specific findings will vary depending on the specific joints involved. Other findings may include dorsal osteophytes on the lateral view at 1st and 2nd TMT joints, decreased medial cuneiform-ground height on the lateral view and loss of parallelism between the long axis of the calcaneus and talus on both the AP and lateral views. The latter two findings are a result of arch collapse which is often seen in severe cases.

Further detailed evaluation of the TMT joints in the midfoot can be made using advanced imaging studies such as CT or MRI. These modalities may exhibit findings that are otherwise obscured on plain radiographs due to overlap of the bones. MRI is more sensitive for joint changes which are seen especially in early arthritis. However, it is a more expensive test. Oftentimes, the advanced imaging studies are used to confirm the specific TMT joints involved prior to operative treatment.

TREATMENT

Treatment of TMT arthritis begins with non-operative measures. Non-steroidal anti-inflammatory (NSAID) medications are a first-line treatment with the goal of alleviating the associated midfoot pain. These medications do have the potential of adverse effects in the gastrointestinal and/or renal systems with long term use. The other standard non-operative treatment option is the use of stiff shoes with a rocker bottom modification. This can be accomplished by placing a carbon fiber insole orthotic in the shoe, therefore effectively

stiffening the shoe. Taken in concert with the rocker-bottom sole, it provides a means for bypassing the typical TMT joint motion and loading which occurs with each step during gait. Selective steroid injections into the affected TMT joints are another non-operative treatment option. However, their efficacy and effectiveness specific to TMT arthritis has not been extensively studied.

When the patient does not have significant relief with non-operative treatments or use is not well-tolerated, operative treatment is offered. For arthritis involving the first three TMT joints, operative treatment is a selective midfoot fusion (arthrodesis). This surgery consists of fusing of all the involved TMT joints and intercuneiform joints and possibly the naviculocunieiform joints. Postoperatively, the patient may not be allowed to fully weight-bearing on the foot for several weeks depending on the specific protocol used.

For lateral column TMT arthritis, surgical treatment options are not as clear. There is considerable opinion that motion sparing procedures (e.g. joint resection with tendon interposition) are preferable because the 4th and 5th TMT joints are comparatively more mobile with regular gait than the medial and middle columns. Therefore, any arthrodesis involving these joints would have potential for deleterious functional outcomes and pain in other areas of the foot. However, there have been studies showing good results with arthrodesis of the lateral column TMT joints.

CONCLUSION

Tarsometatarsal joint arthritis can lead to disabling pain and discomfort in the midfoot which is exacerbated with walking. Subsequent decreased activity levels can lead to other adverse general health effects. Treatment options, both non-operative and operative, are effective. Treatment options can be tailored depending on the patient's age, activity level, medical history and severity of the degenerative process. It is important to recognize this condition as a potential, progressive cause of chronic midfoot pain.

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