

Definition

Metatarsalgia presents as pain in the plantar aspect of the foot. It can be either a primary or secondary condition. When primary in origin, it is typically due to abnormal biomechanical forces placed on metatarsal heads such as standing or ambulating in excessive pronation, pes planus (flatfoot), obesity, or when wearing shoes lacking in appropriate padding [1]. Primary metatarsalgia may also occur after initiation of high-impact activity such as jumping or after wearing a new pair of shoes. Conditions such as gout, rheumatoid arthritis, trauma, or stress fractures can cause secondary metatarsalgia [2].

Diagnosis

Patients typically describe an insidious onset of forefoot pain when engaged in weight-bearing activities of longer durations. In long-standing cases, the pain may occur after short durations. A common description of the pain is that of “walking with a pebble in his/her shoe.”

Overall inspection of the foot may be unrevealing. Foot strength, sensation, and pulses should all be intact. The foot may demonstrate a condition that predisposes metatarsalgia such as pes planus, hammertoes, tight heel cords, or a longer second metatarsal in relation to the first (Morton foot). In secondary metatarsalgia there may be evidence of gout or rheumatoid arthritis, so the examiner should be inspecting for diffuse swelling, stiff metatarsophalangeal joints, or multiple areas of tenderness throughout the foot and in general.

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It is important to observe the patient’s feet while both non-weight bearing and weight bearing. When standing, the examiner should note presence of varus or valgus deformity as this can account for the abnormal distribution of forces on the patient’s feet leading to development of metatarsalgia [2]. For the same reason, part of the exam must include observing the patient’s gait to identify postural abnormalities, leg length discrepancy, or excessive pronation, any of which can contribute to the condition [2, 3].

If there is suspicion for a condition causing metatarsalgia such as rheumatoid arthritis or gout, workup should include tests to help diagnose these conditions including uric acid levels, rheumatoid factor, anti-CCP antibodies, or inflammatory markers such as ESR or CRP.

Differential Diagnosis

- Intermetatarsal bursitis
- Morton’s neuroma
- Stress fracture
- Freiberg infraction (metatarsal head avascular necrosis)
- Sesamoiditis
- S1 radiculopathy

Physical Exam Findings

- Inspection with no overt deformities
- May show pes planus, hammertoes, tight heel cord, or Morton toe
- Normal range of motion, strength, and pulses in the foot
- Gait may be normal or antalgic (especially if patient is observed for longer period)
- In secondary metatarsalgia: may see exam findings consistent with rheumatoid arthritis, gout, or prior trauma

Imaging

- Metatarsalgia is primarily a clinical diagnosis, so imaging is typically only considered when examiner suspects a different diagnosis from the differential.
- Plain radiographs may be ordered to rule out fracture.
 - For x-rays, patients should be imaged while weight bearing in AP and lateral views [3].
- Technetium bone scan may be ordered if stress fracture is suspected.

Treatment

- Conservative
 - NSAIDs for initial symptom relief.
 - If pronated feet are the predisposing factor, consider custom orthotics.
 - If hallux rigidus (arthritis in the first metatarsophalangeal joint) is the predisposing factor, rocker-bottom soles or steel shanks will aid in stabilization.
 - A metatarsal pad may be placed in shoes proximal to metatarsal heads to allow for widening of the metatarsal arch [4].
 - Modification of activities is key; emphasize the need to avoid running and jumping exercises.
 - Recommend avoiding high-heeled shoes; instead promote shoes with enough cushioning and if possible extra depth.
- Rehabilitation
 - Goal of therapy is to correct any postural issues that are contributing to metatarsalgia [3].
 - Stretching, strengthening, and/or heel lifts may be used for postural adjustments and tight heel cords.
 - After application of custom orthotics for pronated feet, a course of physical therapy may help patient retrain their gait to avoid exacerbating the metatarsalgia.
 - Strengthening exercises focused on the intrinsic muscles of the foot are undertaken to improve alignment; these exercises may seem ineffective if the patient performs them to the point of fatigue.
 - Stretching of Achilles tendon and other lower extremity muscles should also be promoted to improve posture.
- Surgery
 - When conservative treatment fails to relieve the pain with ambulation, surgery can be considered.
 - Procedures undertaken include resection of involved metatarsal heads and proximal phalanges.
 - Resolution in pain is inconsistent with surgical intervention.

Return to Play

- Individualized approach is preferred.
- In general, the longer the patient has had symptoms, the longer they will be out from sports.
- Can exercise during acute episode, but it is recommended to avoid any activity or sport that worsens the pain initially (e.g., may need to avoid basketball, but athlete can swim if pain-free while swimming).
- Recommend setting up goals for patient to achieve so he/she is aware of safe return to play.
- First goal should be full range of motion and strength in affected foot.
- Next goal is to jog straight without limping or having pain.
- Usually it is safe to return to full play when patient is able to do activities involving fast changes in direction such as 90-degree cuts or 10-yard figure of eights [5].

When to Refer

- When patient fails conservative treatment
- If symptoms persist despite significant rest or break of sport
- If there is concern for either vascular condition or radiculopathy

Referral

- Physiatrist
- Orthopedic
- Sports medicine
- Podiatrist

References

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4. Kelly A, Winson I. Use of ready-made insoles in the treatment of lesser metatarsalgia: a prospective randomized controlled trial. *Foot Ankle Int.* 1998;19(4):217–20.
5. Rouzier P. *The sports medicine patient advisor.* 2nd ed. Amherst: Sports Med Press; 2004. p. 263–4.