

Morton's Neuroma, Morton's Syndrome

Different Diagnoses Require Separate Orthotic Modifications



By Séamus Kennedy, BEng (Mech), CPed

Few words in biomechanics cause as much confusion as the term "Morton's." "Morton's" is simultaneously two different foot diagnoses—and also potentially three separate orthotic modifications! The primary misunderstanding stems from the fact that two esteemed doctors applied their names to unique foot pathologies.

Morton's Neuroma

Thomas G. Morton studied neuralgia of the forefoot, and bequeathed his name to the entrapment neuropathy of interdigital nerves. Morton's neuroma is a painful condition that occurs most frequently at the distal end of the third intermetatarsal space, but it can be also found in the other interspaces. The entrapped and damaged nerve causes aching and burning of the forefoot. The symptoms of Morton's neuroma are aggravated by wearing shoes that are too tight or narrow in the forefoot.

The most conservative treatment is to apply a metatarsal pad beneath the affected webspace. By supporting the transverse arch and spreading the metatarsal heads, the pinching on the nerve will be reduced. Alternatively providing a drop or relief under the met head may be sufficient to reduce the pressure. Torpedo-shaped "Neuroma Plugs" are also sometimes used, but their placement needs to be very accurate in order to get results.

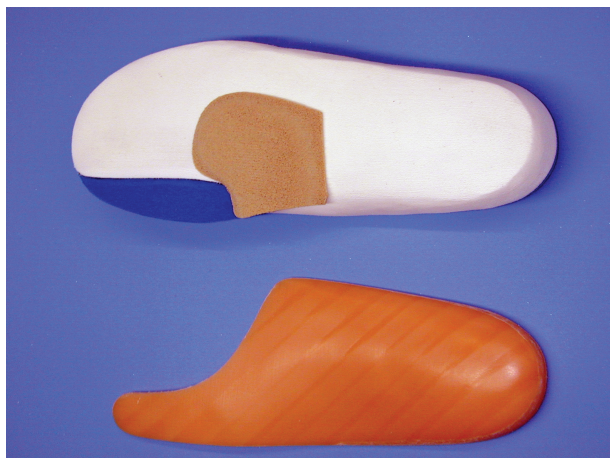
It is important that the patient wear wider shoes if a met pad or foot orthotic is provided; otherwise, the pain will only worsen as you have added bulk to an already tight fit. Other medical treatments include local injection of sclerosing solutions or surgical excision of the neoplasm.

Morton's Syndrome:

Meanwhile another physician was busy inspecting short first toes. Dudley Morton lent his name to Morton's syndrome. This is characterized by a short first metatarsal bone causing

excessive weight to be borne by the second metatarsal head. It is usually a hereditary condition and will result in callus formation under the second and third metatarsals. Pain and tenderness are usually felt at the *base* of the first two metatarsal bones and at the *head* of the second.

Conservative treatment of Morton's syndrome consists of building a flexible platform under the first met and toe. By bringing the ground up to the first met and toe, it is assuming extra weight, and thereby relieving the second met. This addition of material to the distal end of a foot orthotic is called a flexible Morton's extension. It can be made out of cork, EVA, or other suitable materials, and is usually 1/8"–1/4" thick.



Top: Reversed Morton's extension with sesameoid pad.
Bottom: Rigid Morton's extension.

Morton's Extensions


The goal of a flexible Morton's extension, as discussed above, is to increase the range of motion (ROM) and weight bearing along the first metatarsophalangeal joint (MPJ) and hallux. However, there are other conditions that require decreasing the ROM at the first MPJ.

Hallux limitus and hallux rigidus occur due to the inflexibility of the first MPJ. The great toe is unable to dorsiflex, which may cause pain and will interfere with toe-off during gait. Patients will often shift weight to the outer border of the foot in order to prevent motion in the big toe. There are several techniques available to limit ROM in the forefoot. A **rigid Morton's extension** is a foot orthotic where the rigid orthotic material extends under the first to the distal tip of the hallux. It is usually made out of a rigid thermoplastic or carbon graphite material.

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This device may impede the gait cycle, and if the extension is not fully rigid, it may even exacerbate the condition! If the goal is to decrease ROM, then it is preferable to either add a sole stiffener to the shoe, or place a full-length carbon footplate under the insole of the shoe. Full-length footplates have the added advantage of being transferable between shoes. In addition, putting a rocker sole or rocker bar on the shoe will help reduce flexion.

A more conservative approach is to create a **reversed Morton's extension**, which will also help decrease ROM along the first. A reversed Morton's is a channel that allows the first MPJ and hallux to "float" while transferring weight laterally to the second, third, and fourth mets. Typically, this is an accommodative-type orthotic. It will also include a sesamoid pad (a broad met pad

with a deep drop for the first met head). Other conditions such as turf toe and sesamoiditis will benefit from this style of device. A summary of these devices is listed in Table 1. 

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Table 1: Morton's Extensions

TYPE	EFFECTS	INDICATIONS
Flexible	Increases ROM along 1st MPJ and hallux. Increases weight borne by 1st.	Morton's Syndrome
Rigid	Decreases ROM along 1st MPJ and hallux. Tends to impede gait.	Hallux Limitus Hallux Rigidus Turf Toe
Reversed	Decreases ROM along 1st MPJ and hallux. Decreases weight borne by 1st; used in conjunction with a sesamoid pad.	Hallux Limitus Hallux Rigidus Turf Toe Sesamoiditis