

Planter callous analysis and orthotic determination

The various types and locations of the various planter lesions is a valuable aid in determining foot type and subsequent orthotic therapy.

Briefly the foot during normal stance phase absorbs two different types of stress. They are vertical and shearing stress. In the abnormally pronated foot, shearing force is increased by abnormal movements of metatarsal heads upon planter tissues, which are fixed by friction between the skin and the ground. The resultant force will produce the various types of skin lesions.

There are three basic types of skin lesions (there are more)

1. **Discrete (with a core)** - Appearance - central core usually seen with vertical or linear stress.
2. **Diffuse lesion** - no central core. This usually is due to moderate shearing force as a result of biomechanical compensation.
3. **Diffuse and enucleated** - moderate to severe biomechanical compensation and or combination of structural with biomechanical compensation. Many times we see an inflamed bursae associated with the callous.

Planter fifth callous (singular)

This lesion is seen with the following conditions:

1. Uncompensated rearfoot varus

Clinically - The entire planter surface of the foot is inverted and the medial side of the foot cannot bear its share of weight or may not even touch the floor. This condition will show callous formation lateral side of foot with buttonhole type of lesion planter fifth. The callous discrete and enucleated. Orthosis should be ACCOMMODATIVE.

2. Uncompensated forefoot varus

Clinically - The calcaneus is vertical or inverted. The lateral aspect of the foot is straight. One sees normal contact phase of gait. Common observance is callous at medial planter aspect of hallux. Orthosis should be ACCOMMODATIVE.

3. Planter flexed fifth metatarsal

When the foot has normal range of motion and no apparent forefoot deviation, check the fifth metatarsal range of motion. If one sees greater planterflexion than dorsiflexion then we can have a planterflexed fifth metatarsal.

4. Fully compensated rigid forefoot valgus

In this condition one sees diffuse shearing or diffuse and enucleated lesion sub fifth metatarsal. The biomechanics of this foot type causes the foot to abruptly supinate after heel contact not allowing the foot to go through its normal contact phase pronation. This causes an abrupt supinatory shearing effect on the fifth metatarsal head. This is seen consistently with fully compensated forefoot valgus deformity. The treatment should be directed to a BIOMECHANICAL control with or without soft tissue supplements depending on the severity of the lesion.

Planter fourth callous

If one sees a singular-shearing lesion under the fourth metatarsal consider a biomechanical device. This lesion can occur as a result of hypermobility of the fifth metatarsal segment. The fifth metatarsal head has its own range of pronation and the range generally occurs in the conjunction with subtalar and midtarsal range of motion. An example of this would be fully compensated forefoot varus.

1. Fully compensated forefoot varus

In this instance the fifth metatarsal pronates dorsally out of the way when supinatory movement pattern occurs early in stance phase of gait.

2. Planterflexed fourth fetatarsal

When a keratoma develops under a metatarsal head that seems incongruous with forefoot angulation or excessive biomechanics, then local etiological factors should be considered such as a hypertrophied metatarsal head or planterflexed metatarsal. An accommodative orthosis should be considered.

Metatarsal lesion sub third or second

If one sees a diffuse lesion under second or third metatarsal then callous is due to hypermobility of the second or third metatarsal. An example of this would be forefoot varus.

Sub first lesion

1. Rigid compensated forefoot valgus

We see a discreet lesion due to linear or vertical stress placed upon this part early in stance phase of gait before this area is supposed to bear weight. In this instance we see adequate range of motion and fully compensated deformity. Orthotic therapy calls for fully posted valgus orthotic with neutral rearfoot post.

Two or more lesions

1. Lesions first and fifth

If we see lesions that are discrete and enucleated, uncompensated rearfoot varus should come to mind. This is a higher arched cavus type foot with limited range of motion. The planter fifth lesion occurs as previously mentioned. In addition, if the range of motion is inadequate to bring the first and fifth plane to the ground with maximum subtalar joint pronation, then the only way the first can get to the ground is by peroneus longus firing. The constant verticle stress causes a painful enucleated lesion. Biomechanical orthotic therapy usually fails.

2. Nucleated callous first and diffuse lesion fifth or fourth

What comes to mind is the fully compensated forefoot valgus mentioned previously. If the fifth metatarsal can pronate out of the way, the lesion will occur under the fourth. The orthotic prescription for this case would be a fully posted biomechanical device with neutral rearfoot post. Any increase in posting would cause the peroneous longus muscle to fire excessively planteflex further.

3. Lesion sub fifth lesion sub second

This lesion is commonly seen with planteflexed subfluxed fifth head associated with hypermobile first and shearing lesion second. This is commonly seen compensated forefoot varus.

4. First and second

The first metatarsal exhibits discrete callous and hypermobile second. This may be due to semirigid forefoot valgus and hypermobile second.

Multiple lesions

An example of this would be lesions first through fifth.

This condition is commonly associated with compensated equinus. The lesions usually are diffuse type (shearing) lesions. This patient exhibits limited dorsiflexion when knee is extended (not flexed) with a subtalar joint in neutral. If dorsal flexion is limited (less then 10%) in both knee extension or flexion then ankle equinus should be suspected.

It has been our experience at COL that many orthotic failures have been due to inadequate balance of biomechanical versus accomodative orthotics for prescription. A reference chart is enclosed outlining the type of lesion and corresponding location and type of orthosis. We at COL welcome your e-mail and comments concerning your experience and long term resolution of planter lesions.

References

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