

## What to Do About Calluses?

Mark Charrette, DC

When the skin is exposed repeatedly to shearing or friction stress, a protective layer of keratin (a "callus" or "keratoma") is laid down. This prevents damage to the skin and prepares it to handle further pressure and abrasion. In fact, sometimes these also are called "friction calluses." Keratomas frequently develop under weight-bearing areas of the foot as a result of abnormal loading. As they continue to enlarge in response to the recurrent stress, they can contribute to elevated foot pressures.<sup>1</sup> Callosities are relatively common in most adult populations; a population survey in Britain found that 48 percent of females ages 25-44 years displayed plantar callus, and the prevalence increased to 56 percent in the 45-64 age group.<sup>2</sup>

### Alterations of Weight-Bearing

Since plantar callosities form in response to sustained pressure patterns, they provide helpful clues regarding alterations in foot function. Most commonly, these are seen in either the forefoot (in the metatarsal region) or under the anterior (distal) aspect of the heel.<sup>3</sup> This pattern (under the transverse arch and at each end of the medial longitudinal arch) has always been taken to indicate that most calluses are caused primarily by arch collapse and/or excessive pronation. In fact, a 1999 study confirmed that callus formation is associated closely with several specific "abnormal foot weightbearing patterns." These are: a lower medial arch with greater pronation, reduced dorsiflexion of the first metatarsal joint, and limited ankle dorsiflexion (due to calf muscle tightness).<sup>4</sup>

If there is a large difference in the patterns of callus formation between the left and right foot, this indicates significant foot and ankle asymmetry, and may be associated with a discrepancy in leg length or other biomechanical difference. And when a thick callus is found at the medial plantar aspect of the great toe (or occasionally at the lateral fifth metatarsal), it is called a "tyloma." These are secondary to altered toe-off and excessive propulsive forces, often combined with abnormal pressures due to poor shoe fit.<sup>5</sup>

### Special Considerations

While it seems clear that most keratomas develop secondary to altered biomechanics, and that proper treatment should consist of improving foot alignment and function, two other areas must be considered. First is the importance of calluses in patients with diabetes, and second is the differentiation of a plantar wart from a callus.

**Diabetes.** A highly significant association has been demonstrated between the presence of plantar calluses and the subsequent formation of neuropathic ulceration in diabetics.<sup>6</sup> Since the process of ulceration and infection can progress rapidly to amputation in diabetics, the identification of plantar calluses in diabetics is especially critical. All chiropractic patients with diabetes (or with "pre-diabetes" obesity) should be evaluated carefully for the presence of foot keratomas, in order to develop an early treatment response and help prevent pressure ulceration.

Plantar warts. It also is very important to differentiate callosities from plantar warts. Warts on the plantar surface of the foot are due to a viral infection, and are less likely to respond to a purely biomechanical treatment. Two factors help to make this distinction - tenderness and cutaneous mobility. Calluses usually are tender to direct pressure, but not to pinching, and they do not separate from the underlying tissues. On the contrary, plantar warts customarily are not tender to pressure, but are painful upon pinching, and warts usually can be separated from the surrounding tissues during palpation.<sup>7</sup>

### Orthotic Support and Control

Since callus formation is primarily a biomechanical problem, the treatment also is biomechanical. Custom-made, flexible orthotics, worn in properly sized shoes, will clear up most problems. These orthotics should provide support for the longitudinal and anterior transverse arches. They also should help to control pronation, yet be flexible enough to encourage first metatarsal mobility. The material and placement of the metatarsal arch support is very important. If it is placed too far back (too proximal), or made too spongy, the decrease in metatarsal pressure is less likely to be sufficient.<sup>8</sup>

Forefoot adjustments for "dropped" and/or fixed metatarsal heads frequently are needed. Patients with limited ankle dorsiflexion may need specific adjustments for the talus, along with calf muscle stretches. In a few patients, a very large, thick callus may require podiatric surgical removal. Of course, if the foot biomechanics are not improved, the callus will tend to recur.

### Calluses as Clues

When a good patient exam reveals foot calluses, the astute doctor of chiropractic will realize these are clues to abnormal biomechanical function. Often, spinal corrections will be only partially successful until the lower extremity problems are addressed. Custom-made, flexible orthotics that support the three arches of the foot frequently are necessary for these patients. By decreasing excessive pronation and increasing the transverse arch with a properly placed metatarsal pad, an orthotic reduces the abnormal stresses. Specific foot adjustments and calf stretches also can be very helpful. The result will be improved lower extremity function in daily and recreational activities, with better pelvic and spinal alignment.

### References

1. Whiting MF. Skin and Subcutaneous Tissues. In: Lorimer D, ed. *Neale's Common Foot Disorders*, 4th ed. Edinburgh: Churchill Livingstone, 1993;93-121.
2. Brodie BS, et al. Wessex feet: a regional foot health survey. *The Chiropodist* 1988;43:152-168.
3. Magee DJ. *Orthopedic Physical Assessment*. Philadelphia: WB Saunders, 1987;323.
4. Bevans JS, Bowker P. Foot structure and function: etiological risk factors for callus formation in diabetic and non-diabetic subjects. *The Foot* 1999;9:120-127.
5. Subotnick SI. *Sports Medicine of the Lower Extremity*. New York: Churchill Livingstone, 1989;232.
6. Murray HL, Boulton AJM. The pathophysiology of diabetic foot ulceration. *Clin Podiatr Med Surg* 1995;12:1-17.
7. Hoppenfeld S. *Physical Examination of the Spine and Extremities*. New York: Appleton-Century-Crofts, 1976;220.
8. Hayda R, et al. Effect of metatarsal pads and their positioning: a quantitative assessment. *Foot Ankle Int* 1994;15:561-566.

*Mark N. Charrette, DC*  
*Las Vegas, Nevada*

OCTOBER 2005

©2024 Dynamic Chiropractic™ All Rights Reserved