Chapter 6

When a Small Callus Becomes a Big Problem : Preventing Diabetic Foot Ulcers

One of the most common cause of diabetic foot amputations is neglected calluses (FIG 6-1) that progress to ulcers, become infected, and resulted in gangrene (Fig. 6-2).

Fig 6-1

Fig 6-2

The medical term for callus is called hyperkeratosis. "Hyper " means excessive and "keratosis" means (thickening of the skin or stratum calluseum). And it is an excessive thickening of the skin due to increased proliferation and rapid thickening of the germinal stratum, which is manifested by a firm calluses mass. Excessive keratinization of the skin produces thick, hard calluses. This hyperkeratosis above the toes is called a corn and bottom of the foot is called a callus (Fig. 6-1). If the hyperkeratosis occurs in between the toes, it is called a soft callus
(Fig. 6-3).


Fig 6-3 Callus between the toes is called soft corn

Neuropathy, particularly motor, affects the muscles and tendons of the foot and is responsible for the development of various foot deformities such as contracture of the toe joints. Irritation and pressure from the shoe result in increased hyperkeratosis.

The changes in the diabetic foot are so gradual that many diabetics are unaware of the severity of the problem and are upset when a "small callus" can result in amputation (Fig. 6-2). Although most diabetics are aware of the risk of foot infection and amputation, very few understand why and what they are like and what must be done to prevent this disaster. Some of my patients are unconcerned about calluses. This lack of concern contributes to a poor prognosis. It is well known that educating the patient is extremely important to maintain the legs for the rest of his life. It is difficult to motivate these diabetics to take part in preventive care, changes in the shape of their shoes and the use of appropriate inserts (Chapter 10). But when patients are well educated about diabetic foot problems, the feet can be maintained despite extensive neuropathy and circulation problems.
Common foot deformities in diabetics are hammer toes, bunions, bunionnettes Fig 6-4 (enlargement of the fifth toe joint, similar to a bunion), and calluses on the sole of the foot and soft calluses in the middle of the toes (Fig. 6-3). Hammer toes develop from an imbalance of the tendons located on the top and bottom of the foot. Continual pressure and friction on the toe of an unsuitable shoe causes the skin on the toe to become hard and thick. When shoe pressure continues, the callus may rupture and ulcerate (Fig.6-5). Corns on the top of the hammertoes can become infected ulcers (Fig 6-6)

Fig 6-4


Fig 6-5


Fig 6-6

When the callus ulcerates, the toe joint can become infected. Occasionally, the callus on the tip of the toe may ulcerate (Fig. 6-7) due to friction on the insole of the shoe.


Fig 6-7


Fig 6-8

When the toes are rotated, this can cause the nails to dig into the nearby toes, the nail like a knife, producing small ulcers (Fig 6-8). A pointed shoe causes crowding of the toes and friction of the skin between one toe and the other. These soft calluses in between the toes (Fig 6-9) are particularly dangerous if infection occurs.
The infection spreads rapidly through the tendons of the foot (Fig 6-10).

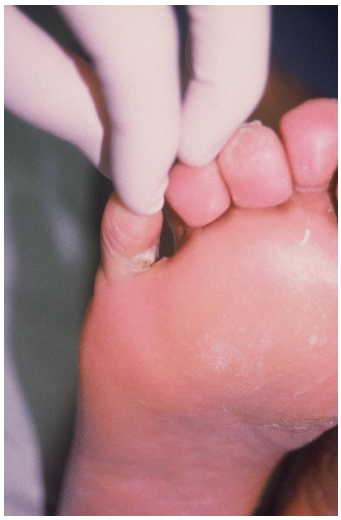

Fig 6-9

Fig 6-10

A bunion of the great toe is a large prominence of bone with occasional swelling of the bursa. Ulceration of the skin over the bunion (Fig. 6-11) allows infection to enter the big toe joint and eventually infection of the bone can occur. Bunion of the little toe is similar to the problems seen in the bunion. The heel is exposed to ulcerations in a bedridden diabetic patient (Fig. 6-12).

Fig 6-11

Fig 6-12

A blister behind the heel can turn into an ulcer, usually signifying excessive walking in a larger shoe, where the heel repeatedly slips in and out of the shoe. Heel ulcers that become infected and gangrene occur is a very difficult surgical problem.

Calluses on the sole of the foot are commonly seen in diabetics. These are usually accompanied by hammer-shaped toes. These calluses are the result of sensory and motor neuropathy. The motor neuropathy that causes the weakness of the muscles of the foot, produces an abnormal shape foot (Fig 6-13).

Fig 6-13

Fig 6-14

This causes the weight of the body to be supported and concentrated in a certain area of the sole of the foot. Chronic floor friction or inappropriate special inserts cause fissures and cracks in calluses allowing many different kinds of bacteria to enter. If infection is unrecognized due to neuropathy, continuing to walk results in an ulcer (Fig. 6-14). Plantar foot ulcers are difficult to treat as the patient puts weight on the foot.

Ulcers that occur in the arch of the foot are rare unless the diabetic patient has Charcot's deformity (Chapter 7). In Charcot's diabetic foot, the arch has completely collapsed, allowing the midfoot to support weight. Abnormal concentrations of body weight cause skin breakdown and subsequent ulcers in the arch of the foot (Fig 6-15).

Fig 6-15

These diabetic foot ulcers are the major cause of lower limb amputation. Ulcer prevention requires patient education and professional prevention from a diabetic foot specialist, a podiatrist. Ignoring corns and calluses can become infected and therefore lead to amputation. Regular trimming of corns and calluses by a specialist, plus the use of well-constructed shoes and inserts can prevent infection and amputation. A shoe with a large toe box can reduce callus irritation. Neuropathy in the diabetic foot

requires special insoles to balance the muscles and tendons that have been affected by motor neuropathy. Soft insoles made of plastazote are beneficial as they provide cushioning and mold to redistribute body weight evenly across the sole of the foot.

TEST YOURSELF

(T F) True or false

1. T F The most common cause of diabetic foot amputation can be traced back to callus and neglected calluses that are ulcerated, infected and become gangrene.

2. T F Diabetic motor neuropathy in the foot can cause the deformities such as bunions, hammer toes and calluses on the bottom of the foot.

3. T F The soft callus is a thickened skin between the toes.

4. T F When soft callus becomes infected, the spread of infection is much faster than any other foot infection.

5. T F "Minor problem like a callus " can cost your leg.

6. T F If you notice foul smelling liquid under calluses, you should carefully remove the callus with a clean razor blade.

7. T F Soft insole of the shoe can effectively prevent the callus and an ulcer.

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1. (T) 2. (T) 3. (T) 4. (T) 5. (T) 6. (F) 7. (T)