



## CASE DESCRIPTION

### Penetrating heel injury mimicking cracked plantar hyperkeratosis.

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#### Introduction

Penetrating foot trauma, also known as puncture wounds of the foot, is a common injury in humans, noted all around the world, spanning from wood and plastic (toothpick), metal (nail), plant, traffic accident to animal causes [1]. Usually it presents with acute pain, but the pain may be minor or not present at all times. It may happen around the house, the garden, during leisure in nature or while working. The typical treatment is ambulatory removal of the foreign body (if any) by the patient himself or in the ER, cleaning and debridement, tetanus prophylaxis and sometimes – antibiotics. The 2021 Sanford Guide to Antimicrobial Therapy lists the treatment for penetrating nail and toothpick injuries to include cleansing and debridement, tetanus prophylaxis and wound observation, withholding antibiotics, noting that only 1-2% progress to osteomyelitis [2]. If the wound is visibly infected, a culture is recommended and imaging such as X-ray may show the foreign body still located in the tissues. The treatment will then involve antibiotic therapy and possibly minor surgery if the foreign body cannot be removed from its location. Such injuries need to be separated from animal bites and insect stings, which may also be venomous and may need antitoxin and/or antibiotic administration and sometimes anti-shock medication in hypersensitive persons.

Plantar hyperkeratosis is one of the most common foot problems, a very common condition involving the skin of the soles of the feet, affecting a big proportion of the global population, especially the elderly, being present in as many as 30-65% of people aged 65 years and older [3]. It is defined as thickening of the stratum corneum of the epidermis and is usually resulting from the hypertrophy and/or hyperplasia of cells. Often, it is considered a natural defence mechanism of the skin, which by increasing the thickness, compensates for continuous stress in that given area, often due to increased pressure, overt friction or repeated irritation. The exact mechanism of hyperkeratosis has not been fully elucidated but there are many hypotheses in the medical literature [3].

Hyperkeratosis is a common reason for foot pain, often debilitating and a factor limiting mobility and impeding quality of life. The reason for the pain may vary and may involve:

- fissures and cracks in the affected thickened skin;
- calluses and corns in the hyperkeratotic areas; as well as
- infections of the cracked areas and infected ruptured blisters.

Pain is often accompanied by bleeding.

## Patient description

A 43 year-old otherwise healthy male from a small village in southern Poland asked for consultation of his plantar hyperkeratosis. He presented with pain of the left foot, and visible limping. He reported his condition worsening especially during summer months, when it was hot and he was not wearing socks. Fissures and cracks were a common find then and often he had difficulty walking, owing to the pain. Most often his complaints were related to hyperkeratotic cracked heels, and rarely to other parts of the foot (Figures 1-3). He usually self-treated himself by removing scales of the dry skin manually and with cosmetic pincers (Figures 4-6). He then applied alcohol solution to his feet and put band-aids over the cracks. Wearing socks helped to heal the lesions within 1-2 days.

This time, despite healed fissures, the patient still complained of pain around the heel region and difficulty walking. The pain was not present all the time, it was especially strong in intensity when walking but virtually absent when lying down. Upon physical examination of the feet, one could see the hyperkeratotic soles and dry scales. On the left foot however, there was a darker spot around the heel with pinpoint hyperaemia. Putting pressure on this spot exerted pain of high-intensity. Initial suspicion was a callus. Using sterile tweezers the spot was examined further. Unlike a callus or corn, the dark spot was really hard. Using the tweezers to examine the spot slightly deeper, it was revealed to be a foreign body lodged in the heel – a sloe thorn (*Prunus spinosa* aka blackthorn, Figures 7-9).

## Treatment

The thorn was extracted using surgical tweezers (Figures 10). After removal, the thorn measured approximately 15 mm (Figure 11). No excessive bleeding was noted over the site (Figure 12). The wound was washed with Octenisept and covered with band-aid. The patient felt immediate relief when standing on his left foot. No tetanus prophylaxis was administered because the patient received it a week before for another injury.

## Images



**Figure 1.** The patient's hyperkeratotic heels with visible fissures. The cracks made it difficult for the patient to walk owing to the pain. The fissures may be associated with the bleeding, staining the shoes or socks. This photo was taken by the patient during the summer on a beach.



**Figure 2.** The hyperkeratosis occurs mostly on both heels. Patient's own photo.



**Figure 3.** The hardened skin cracks mostly during summer months or when no socks are worn.





**Figure 4.** The hardened skin dry shavings the patient collected in the last year only from his affected, hyperkeratotic heels.



**Figure 5.** The hardened skin scales were removed by the patient by manual peeling or cutting them off from the hyperkeratotic heels.





**Figure 6.** After self treatment, using a combination of: dry skin removal, alcohol solution and dressing, the fissures heal rapidly, before the cycle repeats itself.



**Figure 7.** The blooming shrubs of *Prunus spinosa* that the patient was pruning during the gardening work when the incident happened.





**Figure 8.** The blooming branches of blackthorn. The patient cut some branches off the shrubs and placed them on the ground before carrying them to a different spot.

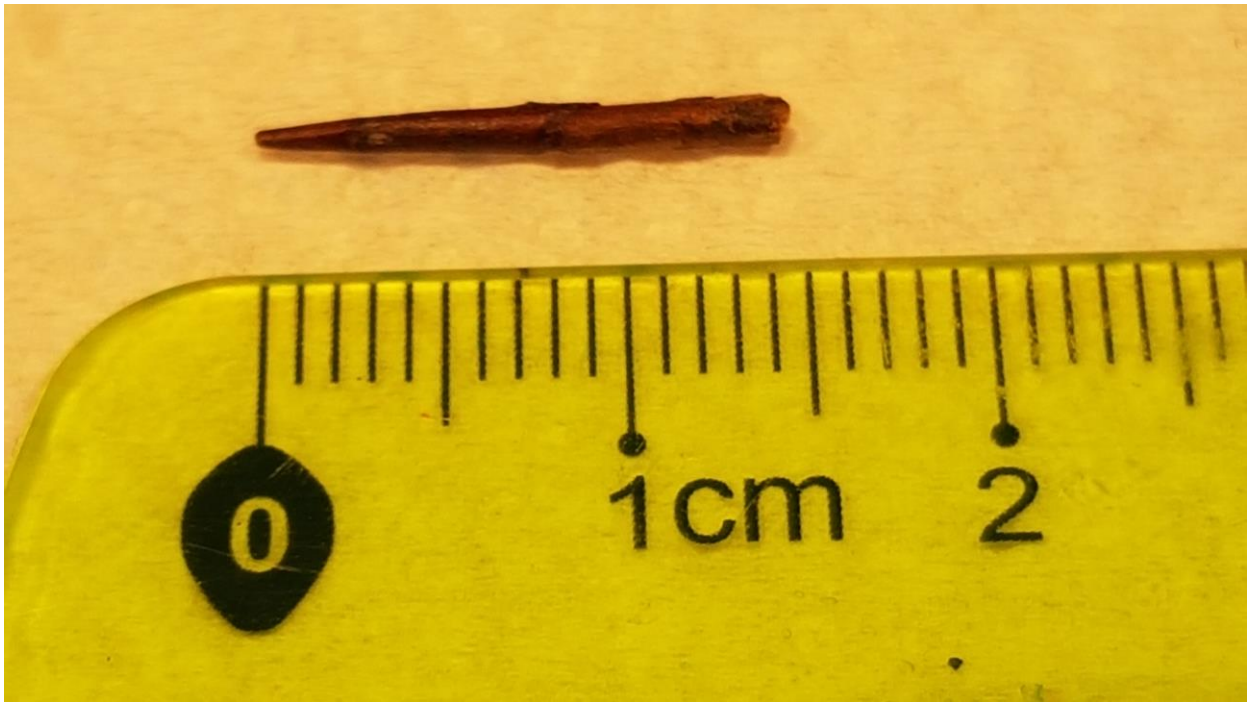


**Figure 9.** The thorns of *Prunus spinosa* may reach the length of 4-5 cm. The patient reported stepping on the branches he trimmed and being "stung".





**Figure 10.** Thorn removal was performed with surgical forceps. After removal the patient felt instant relief of pain. Please see the film on the official WJOMI YouTube channel here: <https://youtu.be/9LxBsj6eTXI>



**Figure 11.** The removed thorn of *Prunus spinosa* measured 15 mm.



**Figure 12.** The removal site showed little bleeding and was washed with Octenisept.





## Follow-up

The follow-up visit a week later was uncomplicated, with the wound healed completely.

## Discussion with conclusions

Despite the fact that the patient had evident plantar hyperkeratosis, and often reported painful fissures and cracks of his heels, this case shows the need for closer inspection of the feet in case of pain. Pressure exerted pain is quite typical for corns but may also occur with a foreign body lodged in the skin. Many sources recommend performing imaging studies, but in this case the source of the symptoms was found immediately and removed.

In the history, the patient revealed garden work over the past few weeks. He cut himself with a rusty nail and that was the reason for his tetanus prophylaxis a week before. He reports trimming some thorny shrubs in his garden and stepping on the branches a couple of times in the process. He was wearing soft, Crocs-like shoes and mentioned he got “stung” a few times in his feet. When doing his typical routine of removing the hyperkeratotic skin, he did not see anything unusual on the heels.

There are many approaches to the treatment of plantar hyperkeratosis: scalpel removal, dry or wet scraping and sandpapering using special cosmetic files, using special keratolytic agents (often as a type of occlusive dressing or sock), moisturizing the skin using urea creams and ointments, antifungal treatment (if the lesions

are resulting from a chronic infection) and quite recently also skin grafts [4]. Hyperkeratosis, next to fungal infections, still remains one of the most common dermatologic conditions of the feet in the global sense [1, 3, 4-7].

A few conclusions may be drawn from this case description:

1. Initial presentation (hyperkeratosis) is not always the reason for the pain;
2. It's always good to thoroughly examine the feet, especially if the patient suffers from diabetes;
3. Very often removal of the corn or foreign body results in an immediate relief of pain;
4. You don't need to administer antibiotics from the start;
5. Always consider tetanus prophylaxis;
6. Have time to talk and listen to the patient – solutions to many problems come from careful medical history. The patient can guide you as close to the diagnosis as possible, so that you may be able to solve the problem during the same visit;
7. Recommend safe working environment and adequate occupational health practices to the patients, e.g., use of hard-soled shoes when working with potential sharp objects on the ground, which may pose a puncture hazard;
8. Refer the patient to a dermatologist or podologist to solve the hyperkeratosis problem – this is a chronic long-term condition.



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**Conflict of interest:** PK is Editor-in-Chief of WJOMI.

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