

## **Puncture Wounds of the Foot: Not as benign as you might think**

Spring and summer is coming and kids and adults alike are ready to strip those heavy shoes for a barefoot run in the grass. But take caution, it's a dirty world out there. Shoes with thick soles are the best protection for our feet from the elements. The ground is covered with splinters, glass, metal shards, and the infamous rusty nail. Even in the home environment, tacks, glass, and needles can be a hazard despite how well you keep your house clean.

Puncture wounds can be misleading as to the severity of the injury and the consequences of delay in treatment can be limb threatening if an infection occurs. When a puncture wound occurs, it may be tender and look very benign as a small hole with little or no evidence of the damage that it has caused. Superficial washing of these wound does little to clean out the puncture wound track. Key factors to evaluate a puncture wound include the type of object causing the puncture wound, the environment, the depth of the wound, the location of the wound on the foot, and the patients own immune system.

The type of object that has caused the injury can be an important factor in regards to the type of treatment. A puncture from a clean unused nail will have less risk factor's for complication than a rusty nail that is stepped on at a construction site. Glass maybe retained in the foot and is difficult to identify on radiographs (unlike a nail) unless it has lead content. Wood pieces may splinter and may not be removed in one piece and needles and pins easily break and can be retained within the foot. Animal bites deposit localized bacteria from within the animal's normal mucosa that is not normally seen in humans and antibiotics need to be specific to those types of bacteria.

The condition of the environment can increase the risks of complications. Rusty or dirty objects are prone to infection and also require updating of Tetnus immunization. If you were wearing a shoe and/or a sock, pieces of the rubber sole or material may have also been inserted into the wound serving as a nidus for infection. Water environments such as a lake or a swamp add another level of complexity to the potential bacterial colonization of the wound.

The depth and location of the wound increases the risk for trauma to underlying structures and infections. The foot is made up of a variety of superficial and deep compartments. Superficial infections are easily seen and drained. Deep compartment infections are delayed in presentation and are far more damaging. If a puncture wound transfers bacteria into one of the deep compartments, the puncture wound itself may look clean but an abscess is building up within one of the deep compartment that can destroy bone and soft tissue and can be potentially limb threatening. In addition, the location of the puncture wound is equally important. Puncture wounds to the forefoot are more likely to cut tendons, damage bone, and infect joint spaces due to the close proximity of these structures to the skin. The heel and midfoot region are less likely to cause structural damage due to the depth the object must achieve to reach these structures.

Persons with diabetes, neuropathy, poor circulation, and decreased immune response that are prone to infection have a significant increase in infection, amputation, and limb loss with puncture wounds. Diabetics and persons with neuropathy (loss of sensation, numbness) do not have a normal response to pain and may not even feel the puncture wound occur. On average, these patients will present to a physician five to seven days later than the sensate patient due to discoloration, drainage, or malodor of the foot, not because of pain. Persons with poor circulation are at higher risk of infection and amputation due to the lack of blood flow that provides the immune response and carries antibiotics to the wound site.

So what do you do about your puncture wound? First, identify the object and its environment, depth, and location. If it is a clean, superficial, and intact object, an antibacterial soap scrub with a band-aid and close monitoring should be sufficient. Please be sure you tetanus immunization is current, if not, see you physician or health department for immunization. If there is residual pain or there are any signs of redness or a white area at the puncture site, see a podiatrist or physician immediately. If the puncture object is dirty or broken or the wound is deep or located in the forefoot, please see a podiatrist or your physician immediately. Due to the high risk for infections and possible amputations, all persons of diabetes, those with poor circulation, or those with immune deficiencies should be monitored by a physician regardless of how benign or superficial the puncture wound looks.