

Hand infections are common. They can affect patients of all ages. There are multiple types and causes of infections. Therefore, the treatment of these infections varies. It is important to recognize that long-term complications from hand infections can occur. The unfortunate ongoing problems may occur even with proper and rapid treatment.

Below are some specific types and causes of infections in the hand and fingers:

Bite Wound Infection

In a bite, bacteria from the patient's own skin can be driven deep by the tooth puncture. Other bacteria that cause infection come directly from the mouth/teeth of the "biter." Both human and animal bites are common. Thorough washing, soaking, and often surgical drainage of the bite wound is needed to clear the infection. The smaller the puncture wound (cat bite), the higher the infection risk as only the surface of the skin can be cleansed. Small wounds often need to be each squeezed to express fluid or enlarged to better clean them. A larger open wound is often easier to wash out and, depending on location, degree of contamination, and what deep tissues are exposed, the wound may be closed with stitches or left open. Other wound treatments may include gauze packing into the wound. If the wound is left open, sometimes it can be closed later, or the wound is left to heal on its own. This called healing by secondary intention. Antibiotics are also commonly used during treatment. Sometimes pills are used, and sometimes IV antibiotics are needed for more severe infections and ones that involve bone or joints.

When someone punches another person in the mouth, a "fight bite" may occur. This is when the tooth of the other person penetrates the skin of the puncher over the knuckle. "Fight bites" to the hand and can cause particular problems when bacteria or foreign material (such as teeth) can become trapped in the knuckle (finger joints). These joint injuries often require urgent surgical exploration to enlarge the wound to effectively wash it out and determine if the tooth penetrated into the joint. Cartilage cannot heal once injured. Immediate treatment and starting antibiotics often protects the cartilage even if an infection may not yet be present. This is called prophylactic treatment. This means the surgery is being performed to try to prevent an infection from developing or becoming severe if it is mild. Thus, how quickly you seek treatment is important. If you wait several days after the injury to seek treatment, the infection is often established and severe, compared to seeking medical care within the first few hours.

After animal bite wounds, rabies must also be considered.

Treatment and evaluation should be initiated as soon as possible. It often requires rabies immunoglobulin being injected both into the wound area and a remote muscle. Several injection treatments are needed. This is particularly important with wild animal bites or dogs with unknown vaccination status.

Cellulitis

Cellulitis is a skin infection that can cause skin redness, warmth, and pain. Patients with cellulitis may have a fever, chills, or feel sick. Cellulitis usually happens around a break or cut in the skin. The infection can spread rapidly throughout the limb or into the bloodstream, and therefore prompt treatment is important. The treatment for this type of infection includes antibiotics and possible surgical drainage if there is abscess below the skin. Because the skin is easily visible, many infections will result in skin redness. It is important for your doctor to determine if the infection is restricted to the skin (cellulitis), or if there is a deeper infection with the skin being "the tip of the iceberg." Deep infections include fasciitis, tenosynovitis, myositis, osteomyelitis (bone), septic joint, or an abscess.

Deep Space Infections

The hand is divided into many separate "compartments" or "deep spaces." One or more of these can become infected even from a small puncture wound. An abscess can form in the muscle area at the base of the thumb (thenar space), the palm (deep palmar space), or the web spaces between the fingers. These infections can spread to other areas, even to the wrist and forearm. Urgent evaluation will include an exam by a physician and sometimes imaging and tests to determine the location of infection. Treatment will involve a combination of antibiotics, surgical drainage, and wound care.



Figure 1: Felon

Felon

A painful, throbbing infection of the pulp of the fingertip is called a "felon" (see Figure 1). This closed space is separated into many small compartments, each of which fills with infection and pus. A felon can occur after gardening, nail cutting, or other activities that involve sharp objects near the fingertip. Diabetics are often at high risk due to multiple finger sticks to check their blood sugar. Some felons will heal

with soaks and oral antibiotics, but others may also need

to be drained. If not treated early, destruction of the soft tissues and even bone can occur, leading to complications such as poor wound healing, stiffness, and pain.

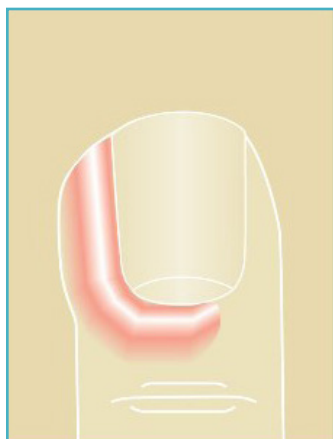


Figure 2: Acute paronychia

Paronychia

A paronychia is an infection of the special nail fold skin, which is the area around the fingernail (see Figure 2). Paronychia can occur at various times to cause an infection. In acute paronychia, bacteria causes the skin around the nail to be red, swollen, and tender. If the infection is treated early enough, soaks and oral antibiotics may cure the infection. If pus has formed under the skin, surgical drainage is needed to drain the pus. Sometimes part or

all of the nail requires removal. Chronic paronychia can be caused by fungus, and this usually occurs in people whose hands are frequently wet (such as dishwashers) or whose immune systems are not working well. The cuticle area becomes mildly red and swollen, without drainage and only mild tenderness. This may be treated with special medication and trying to keep the area dry. Constant exposure to moisture can promote the fungal infection. Topical medications such as gentian blue can be used. Surgery sometimes is needed to remove infected tissue.

Herpetic Whitlow

Herpetic whitlow is a viral infection of the hand, usually on the fingers, caused by a herpes virus. This is more commonly seen in healthcare workers whose hands are exposed to the saliva of patients carrying herpes. The condition, characterized by small, swollen, painful, blood-tinged blisters, usually heals in several weeks without many long-term effects. Sometimes treatment includes the use of an antiviral medication.

MRSA

MRSA, or Methicillin Resistant *Staphylococcus Aureus*, is a type of bacteria that is resistant to certain antibiotics. In the past, MRSA was seen in those in a hospital setting and was less common. Over time, this type of infection has become more common in hospitals and in the community. Skin infections usually look like boils or collections of pus. Treatment with antibiotics and the need for surgery typically depends on the location and severity of this infection. It is important that skin MRSA is treated right away to prevent it from causing more serious infections

and spreading to others. If this bacteria is identified, it is important to avoid touching other people. Healthcare workers should wear a gown and gloves to prevent transmission to themselves or others.

Necrotizing Fasciitis, or “Flesh-Eating Bacteria”

Necrotizing fasciitis is a very rare but severe infection. The fascia is a deep connective tissue that covers muscle and is below the fat layer. Because it is a deep infection below the skin level, it can spread rapidly without much skin redness until very late. It often results in severe pain and swelling out of proportion to the skin appearance. There may be some skin blisters. Patients are often very ill. *Streptococcus pyogenes* or other “flesh-eating bacteria” enter the body through a cut. These bacteria produce toxins that destroy skin, muscles, and other soft tissue and result in low blood pressure, high heart rate, and problems with bleeding, the liver, and kidneys. Necrotizing fasciitis is a true emergency — it can be life threatening — and very powerful. Often, multiple IV antibiotics are given as soon as possible. Urgent surgery is usually needed to remove dead tissue and fascia to stop the spread of the infection, similar to cutting down live trees ahead of a spreading fire to stop the fire spread. These infections have a high chance of amputation and death. Although they are rare, it is very important to recognize quickly for the best outcome. Certain factors may increase the chance of developing this infection, including diabetes, IV drug abuse, or patients with a poor immune system.

Mycobacterial Infections

Less common infections may be caused by mycobacterium, a specific category of infectious organism. These organisms are very slow growing and hard to identify in the laboratory. One of these types, *Mycobacterium marinum* infection, can develop after a puncture wound from fish spines or contamination of a simple wound from contaminated water (water from nature or from aquariums). These atypical infections develop gradually and may be associated with swelling and stiffness without much pain or redness. Surgical removal of infected tissue may be necessary and is helpful to determine which medicine will help treat the infection. It may take 6 weeks to identify the origin in laboratory culture. Often the medical treatment lasts several months. Patients whose immune systems are not working well (for example, those undergoing chemotherapy or who have HIV) are more susceptible to atypical mycobacterial infections.

Septic Arthritis/Osteomyelitis

A wound in or near a joint can cause septic arthritis, which is a severe infection inside the joint. Wounds of various types and sizes, including puncture wounds, can cause this type of infection. This type and location for infection

can cause a problem quickly. Therefore, urgent surgical drainage and antibiotics are needed. If this treatment is delayed, infection of the bone (osteomyelitis) or rapid destruction of the cartilage can occur. Septic arthritis with or without osteomyelitis can require one or more surgeries and long-term treatment with antibiotics. Because cartilage cannot heal, once it is damaged by the bacteria and the white blood cells release toxic chemical to fight the infection, it may leave the person with a painful, swollen, stiff joint even after the infection is cured. If this happens in a young active person there may be few treatment options. Some small, chronically painful joints may be surgically fused to obtain pain relief.

Tendon Sheath Infection (“Infectious Flexor Tenosynovitis”)

Tendons that bend the fingers run from wrist through the palm and to the fingertips. At the base of the finger the flexor tendons enter a pulley system or sheath. If a small cut or puncture wound occurs in a finger, especially near a joint on the palm side, the canal that the flexor tendon runs through can get infected. Prompt treatment is recommended, as this infection can cause severe stiffness or even destroy and injure the tendon. The tendon may rupture or become adherent to the bone or sheath, limiting or eliminating its movement. A finger with a tendon sheath infection is swollen, red, and tender over the palm side of the finger, the finger often is slightly bent to relieve pressure and pain, and it is very painful to straighten (see Figure 3). This infection usually requires that the patient be admitted to the hospital for IV antibiotics, and surgical drainage is often a part of the treatment.

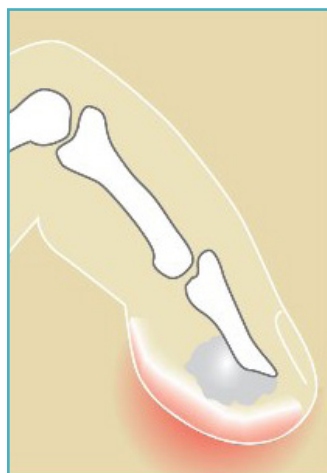


Figure 3: Flexor tendon sheath infection

Treatment

Hand infections can cause severe problems that persist even after the infection has resolved. Some of these symptoms include stiffness, loss of strength, pain, swelling, and loss of tissues such as skin, nerve, and bone that may require surgical removal to treat and cure the infection. Thus, early and aggressive treatment of hand infections is essential. When seen early, some types of infection can be treated with antibiotics, local wound care, and nonsurgical treatment. However,

other infections can cause problems quickly if not treated with a combination of antibiotics and surgery. Surgery may include simply opening the infected area to promote drainage and local wound care. Or surgery may require removal of highly infected, devitalized, or dead tissue to reduce the number of bacteria and allow the antibiotics a chance to work. A sample of the infected tissue from surgery can be sent for laboratory testing to determine the type of bacteria causing the infection. Additional testing of the infection that is grown in the laboratory can find out what antibiotics are effective or ineffective against the organism. If the organism is killed by the antibiotic, it is called susceptible. If the organism is not killed by the antibiotic, it is resistant.