

AABP FACT SHEET



DEEP DIGITAL SEPSIS

Authored by the AABP Lameness Committee

DESCRIPTION

Deep digital sepsis is a term used when the infectious processes have extended into the phalanges, navicular bone, synovial structures, or tendons of the foot. Affected cattle typically have a low body condition score due to reduced feed intake induced by chronic lameness. They have severe lameness, with extreme reluctance to bear weight on the affected foot. A significant swelling is present above the coronary band of a hoof of the foot (Figure 1). Most presenting cases are chronic in nature. The most common initial causes are sole ulcer, white line disease, or foot rot, while a minority occur as a result of other processes. In the majority of the cases, the veterinarian will be able to determine the original insult. The lateral hind digit is most commonly affected (82%) and the medial front digit is a distant second (11%).



Figure 1. Deep digital sepsis primarily caused by a complicated sole ulcer. Note the swelling around the heel bulb and prolapse of tissue through the ulcer site.



Figure 2. Longitudinal section of a bovine digit with chronic septic arthritis, showing the widening of the distal interphalangeal joint, ruptured deep flexor tendon and sole ulcer.



Figure 3. Severe swelling is present diffusely proximal to the coronary band of the lateral claw of the left hind limb; the presence of a training tract with expression of purulent material confirmed the deep digital sepsis.

DIAGNOSIS

Diagnosis of deep digital sepsis is made by examination of the swollen digit. Localized, asymmetrical swelling usually begins at the coronary band and includes the heel bulb of the affected digit (Figure 1). In dairy cattle, a hoof block has often been previously applied to the unaffected digit without resulting in complete improvement in the gait of the cow. In beef cattle, treatment for foot rot has often been attempted without response.

During an examination of the foot, tracts extending from the initial insult can be followed with a teat cannula to demonstrate the extent of the dam-

age. Radiography is not necessary to diagnose deep sepsis, but is useful to accurately determine the structures involved, help with treatment options and establish the diagnosis.

In deep sepsis secondary to foot rot, there is usually a fistulous tract extending from the interdigital space into the adjacent distal interphalangeal (DIP) joint. In cases secondary to a complicated sole ulcer, there is often a tract from the ulcerated sole into the DIP joint. The deep flexor tendon (DDFT) is often avulsed from the third phalanx or ruptured (Figure 2) if the affected digit can be overextended beyond the posture of the unaffected digit.

There may also be fistulae into the DIP joint in the heel bulb or above the coronary band with sepsis secondary to white line disease (Figure 3). Septic processes beginning in the region of the DIP joint may extend proximally along the deep flexor tendon. Ten-

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AABP FACT SHEET



DEEP DIGITAL SEPSIS

Continued

donitis extending proximally more than 7.5 cm or 3 inches above the dewclaws may involve the branch of the deep flexor tendon supporting the unaffected digit resulting in a poor prognosis if surgery is performed.

TREATMENT

Conservative therapy alone with systemic antimicrobial and analgesic drugs almost consistently leads to therapeutic failure. Successful treatment of deep digital sepsis and preservation of animal welfare involves surgical approaches including claw amputation, facilitated ankylosis of the DIP joint, and tendon/tendon sheath resection (Figure 4). Timely euthanasia or slaughter should be considered in cases where surgical management is not feasible. Current drug withdrawals should be considered in the decision-making process. The AABP Fact Sheet “Welfare Guidelines for Veterinarians Presented with a Severely Lame Cow With Deep Digital Sepsis” (www.aabp.org/Members/resources/AABP%20Welfare%20Guidelines.pdf) should be followed when managing each case.

Surgical techniques are dictated by the infected tissue. Intravenous regional analgesia with 20cc 2% lidocaine injected distal to a tourniquet placed at mid-metatarsus or mid-metacarpus is essential prior to surgery.

■ DIGIT AMPUTATION

Amputation of the digit has been the most common standard treatment in the field, and the median survival time after amputation is reported to be between 6 and 15 months. Amputation may be done with obstetrical wire by cutting through the distal end of P1, the proximal interphalangeal

(pastern) joint, or P2. Alternatively, the pastern joint may be disarticulated with a scalpel. Whatever technique is chosen, the amputation should be performed proximal enough so that the cut surface is free of signs of infection; loose fat should be removed and smooth cartilage removed to promote granulation and second intention healing. Control of hemorrhage is usually achieved by applying a non-adherent dressing and compressive bandage of the distal limb. Bandages should be removed after 24-48 hours to prevent bandage-induced problems. Once hemorrhage is controlled the use of a bandage is only necessary if the animal is in an environment that allows the opening of the wound. Healing is completed over several months. This procedure is associated with a rapid reduction in lameness score and rapid recovery.

■ DIGIT SALVAGE

Digit salvage procedures offer the potential to extend the productive life of cattle with deep digital sepsis and may be indicated for bulls used for natural breeding. The general principle of all digit salvage surgical techniques is to remove the necrotic tissues (corium, distal part of the deep flexor tendon, and navicular bone), provide adequate drainage of the joint, and promote ankylosis of the resected joint.

Therefore, the veterinarian should evaluate the surgical candidate not only by examination of the lesion itself but also by judging how likely the patient will be to remain ambulatory during the post-operative period. Cows with extreme difficulty walking are poor candidates for joint resection as the pain worsens shortly after

surgery. No surgical attempt should be made for those animals that are no longer ambulatory. The prognosis is less favorable for cows affected with lameness in multiple limbs.

Four approaches are reported based on the location of the original lesion: palmar/plantar, dorsal, solar, and abaxial/modified abaxial.

A technique that may be readily used in the field involves opening the palmar/plantar aspect of the DIP joint, either through a vertical incision incorporating a sole lesion (such as a complicated sole ulcer), or a horizontal heel incision just above the coro-

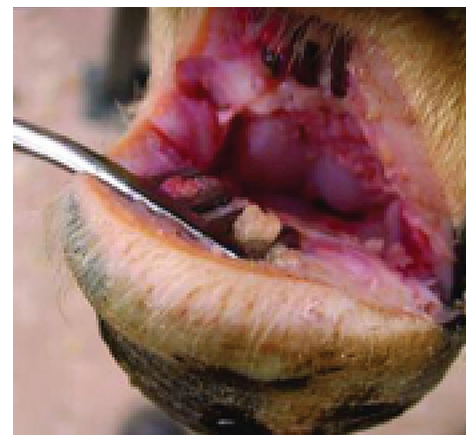


Figure 4. Resection of the DIP joint (heel approach). Close up view of the DIP joint after removal of deep flexor tendon and navicular bone.

nary band. Using either approach, a scalpel is used to dissect down onto the distal sesamoid bone, removing any remnants of the deep flexor tendon. Removal of the distal sesamoid bone allows direct access to the condyles of the DIP joint, where a drill can accurately be placed across the joint. Removal of the distal sesamoid bone is facilitated by splitting the bone in half with a drill bit and use of a dental rongeur to elevate the edges

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Continued

so that collateral ligaments may be incised. A 0.50-inch diameter drill bit is directed to emerge either just below the coronary band and after flushing and placement of a drain, a block is applied to the unaffected claw and the foot bandaged.

The abaxial approach is performed in cases without pathology on the sole, such as a penetrating foreign body in the interdigital space. Similar to the procedure above, a drill is used to accomplish drainage of the DIP joint. Drill placement is at a point one-third of the way down the hoof wall distal to the coronary band and halfway between the dorsal hoof wall and heel. The joint is drilled through, destroying the cartilage, and the joint is lavaged and maintained under a bandage.

TENOVAGINOTOMY AND DDFT RESECTION

Ascending infection following a complicated sole ulcer can initially be limited to the deep digital tendon sheath. Resection of the infected tendon is indicated only in the absence of concomitant DIP sepsis arthritis or distal sesamoid bone osteitis. A vertical wedged incision is performed from midway between the dew claw and the coronary band to the complicated sole ulcer to reach the tendon sheath. The deep digital flexor tendon is resected and abundant lavage and curettage are performed. The wound is dressed and left to heal by second attention under bandages changed periodically until healthy granulation tissue covers/fills the defect.

AFTER CARE

All cases of deep sepsis require systemic antimicrobials, and analgesic drugs and should be housed in a pen or pasture that is clean and has a deep soft surface for lying down. The frequency and amount of bandage changes after digit amputation after the initial bandage varies based on the facilities available and the environment in which the animal lives. A guideline would be that once the bone end is covered by granulation tissue, the limb can remain unbandaged to continue healing. Digit salvage procedures require more extensive care post-operatively, including longer time on systemic antimicrobials and analgesic drugs plus frequent local lavage, and potentially rebandaging.

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