

Therapy of Claw Diseases

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Abstract

The usual treatment of infectious causes of lameness is parenteral antibiotics for foot rot and topical antibiotics and disinfectants for the dermatitides. There continue to be cases of drug resistant foot rot that mostly respond to tylosin when other routine antibiotics fail. Tetracycline powder, oxytetracycline liquid, and a variety of acid or metal salt disinfectants are used successfully to treat digital dermatitis. Greater opportunities for veterinary involvement in lame cow care exist in surgical management of deep sepsis of the digit. Description of claw amputation, simple arthrodesis, navicular resection and arthrodesis, and flexor tendon resection illustrate that there are several field surgical procedures that can be offered for severely lame cows. The outcome for a group of cows from our client farms that received these surgical procedures, without randomization, showed that recovery was better for the arthrodesis procedures than for amputation. Current information on the pathogenesis of digital diseases is included with the discussion of treatment options.

Résumé

Le traitement habituel pour les causes infectieuses de boiterie se fait avec des antibiotiques parentéraux pour le piétin et avec des antibiotiques topiques et des désinfectants pour les dermatites. Il existe encore des cas de piétin résistants aux antibiotiques mais qui réagissent à la tylosine lorsque les autres antibiotiques de routine ont échoué. La tétracycline en poudre, l'oxytétracycline liquide et une gamme de désinfectants sous forme d'acide ou de sel minéral sont utilisés avec succès pour traiter les dermatites digitales. Le vétérinaire peut être plus impliqué dans le soin de la boiterie lorsqu'on recourt à la chirurgie pour les plaies profondes de l'onglon. Il existe plusieurs avenues chirurgicales pour les vaches atteintes de boiterie sévère telles l'amputation de l'onglon, l'arthrodèse simple, la résection naviculaire et l'arthrodèse et la résection du tendon fléchisseur. Les résultats de ces procédures chirurgicales chez un groupe de vaches provenant de la ferme d'un de nos clients indiquent que sans allocation aléatoire des cas le rétablissement est meilleur avec l'arthrodèse qu'avec l'amputation. Une mise à jour sur la pathogénèse des maladies de l'onglon est présentée avec une discussion des options de traitement.

Infectious Digital Diseases

Infectious claw diseases begin as a dermatitis that, in the case of footrot (interdigital phlegmon), penetrates the dermis and becomes a septic condition of the interdigital connective tissues. Therapy is aimed at killing the responsible bacteria with chemotherapeutic agents. To effectively treat footrot, due to the location of the infection deep within the tissues, parenteral antibiotics are required. In the US, penicillin, ceftiofur, and oxytetracycline have all been effective for most cases. There are some resistant strains of *Fusobacterium necrophorum* that are only sensitive to tylosin and lincomycin. Recognition of these cases usually occurs when the condition worsens during conventional therapy. Sometimes, farmer diagnosed footrot is actually deep sepsis of the digit due to other causes. In these cases, response to medical treatment is very poor, and examination will usually reveal the true nature of the problem.

For digital and interdigital dermatitis, topical medications are adequate and effective. The bacteria causing interdigital dermatitis is *Dichelobacter nodosus*, which responds to most topical antiseptics and antibiotics. Trimming of flaps of skin or horn is useful to allow the medication to reach all the deep pockets that sometimes form. Digital dermatitis, believed to be caused by spirochete bacteria of the genus *Treponema*, are very sensitive to tetracyclines. It is very common for hoof trimmers, farmers and veterinarians to treat the severe cases with tetracycline powder or injectable oxytetracycline on a piece of cotton wool secured with a bandage. This is the only disease for which bandages are routinely recommended. Bandages should be removed in three to five days. Individual cows may be treated with a solution of tetracycline that is applied as a spray, either from a hand sprayer on a small bottle or with a garden-type sprayer. Several trials evaluating the treatment of digital dermatitis with injectable antibiotics or those administered in the feed have all shown that these routes of medication fail to improve lesions.

Non-Infectious Diseases

The first rule of treating claw diseases is to relieve the cow's pain. If specific therapy can resolve the underlying condition, it should be done after consideration of the pain felt by the cow. Local anesthesia of the digit

is quick and easy with intravenous lidocaine injected distal to a tourniquet placed on the metacarpus or metatarsus. It is required for surgery, but can also make the job of trimming a very painful condition much quicker, easier and tolerable for the cow. Hoof blocks are an essential tool in claw disease therapy because they permit the cow to walk without placing pressure on the diseased and inflamed tissues. Bandages are only recommended to control hemorrhage following surgery, since they do nothing to aid healing of digital tissues.

White-line abscesses are commonly found in the lateral digits of the rear feet. The most common location within the claw is near the heel in the abaxial white line. The intensity of therapy depends on the degree of undermining of wall or sole horn. For the smallest abscesses, trimming the adjacent wall and white-line tissue to release the pressure within the abscess leads to prompt resolution of the problem. With more extensive abscess cavities that lead to more sole or wall removal, a hoof block should be applied to the healthy claw. The general rule for trimming is that all sole or wall horn that is detached from the underlying corium or layers of hoof horn should be removed. When exploring the white-line area for an abscess, do not leave a crater with an adjacent rim or protruding hoof wall. The wall should be trimmed to the depth of the horn removed in the white line. This strategy prevents material from being forced up into the white-line area during walking, and promotes continuous drainage of pus. Systemic or local antibiotics are not indicated for white-line abscesses.

Sole ulcers in the typical spot just anterior to the sole-heel junction should be trimmed to relieve pressure from ground contact when walking. Loose horn around a full-thickness ulcer should be trimmed to a very thin edge adjacent to the ulcer. This thin horn will be flexible and not place shearing forces on the new tissue as it grows across the gap created by the ulcer. Most cows with a sole ulcer should receive a hoof block on the healthy digit. The cow should be re-examined in about a month to retrim the ulcer and remove or replace the hoof block.

A technique for relieving ground pressure on lesions in the caudal third of the digit was described in 2002.³ The strategy is to distribute weight bearing between the sound digit and the distal half of the diseased digit. For sole ulcers in the typical site, and white-line abscesses in the caudal portion of the hoof, the entire rear portion of the affected hoof is removed to an extent that permits walking without ground contact of this half-hoof. The transition between the caudal portion, where extensive hoof removal has occurred, and the toe is intentionally an abrupt step of one-half inch (1 cm) or more. The biomechanical argument for this approach versus a hoof block on the sound digit is to place a load on the toe tip and tension on the deep flexor tendon when

walking. Most claw-horn lesions are in the lateral digit of the rear limb. This claw is also most often out of balance with the inner claw. Since the deep flexor tendon branches to a portion that attaches to each of the inner and outer third phalanges, when the outer claw is overgrown relative to the inner, the deep flexor tendon branch to the outer claw will not be equally taut when standing on a hard surface. It is generally thought that part of the origin of claw-horn lesions is due to excessive sinking of the third phalanx within the hoof capsule. The asymmetry of the claws in the usual pattern may increase the likelihood that solar corium is contused or laminar corium torn by sinking of the bone. None of the other trimming strategies help to restore the position of the third phalanx within the hoof capsule as does the heel-less trimming strategy of Manabe.

Complicated sole ulcers in which necrosis extends through the corium and into the deeper structures of the digit require surgical intervention to be resolved favorably. Often the navicular bone or the caudal portion of the third phalanx can be felt through the ulcer with a finger. Other similar cases of deep sepsis can arise from cases of footrot that were not treated successfully. Rarely, wounds or penetrating foreign bodies will result in similar deep sepsis involving bone, tendon, and the distal interphalangeal joint (DIP joint). In our practice, we treat surgically many cases of DIP joint sepsis each year. Criteria for attempting surgery include that the contralateral digit on the same limb is healthy, and that the sepsis does not extend up the deep flexor tendon as high as the bifurcation point between the two distal branches of this structure. If surgery is not going to be performed, the cow should be slaughtered or euthanized as quickly as possible for humane reasons.

Intravenous regional anesthesia is established with 20 to 30 ml of 2% lidocaine. The affected area is scrubbed for surgery. These procedures are aimed at debriding the necrotic tissues and establishing drainage for further resolution of the secondary infection that accompanies the necrotizing processes. The simplest procedure is amputation of the affected digit. This may be done with obstetrical wire, making a cut diagonally upwards from the interdigital space. All of the second phalanx should be removed, which may require some dissection on the proximal side of the wire cut. Alternatively, the digit may be disarticulated at the pastern joint to remove all of the second and third phalanges. If the exposed tissue at the level of the amputation is all healthy, no further surgery is needed. A very tight bandage is applied for hemostasis. This bandage should be removed in two to seven days. Parenteral antibiotics are routinely used for a few days following surgery.

If there is evidence of ascending infection in the deep digital flexor tendon or sheath, the tendon should

be resected. This is most easily accomplished by making a longitudinal incision about 1-2 inch (3 cm) long above the tendon just proximal to the dewclaw. Incise through the superficial flexor tendon and grasp the deep flexor tendon.⁴ Pull the distal stump of the deep flexor tendon out through the proximal incision. If the inflammation is chronic, there may be adhesions of the tendon distally that will require sharp dissection. After removing the tendon, place a surgical drain from the proximal incision to the amputation site and secure. Suture the skin at the proximal incision, and bandage as for claw amputation alone.

If the complicated sole ulcer has resulted in sepsis of the DIP joint and there is no evidence of ascending infection, a surgical ankylosis may be easily performed. The septic DIP joint can be recognized by swelling at the coronet near the heel and severe pain on manipulation of the digit. The claw should be trimmed as for sole ulcer and a hoof block applied to the healthy digit. Next, drill through the digit with a power drill (using a 10 to 14 mm bit) starting in the sole ulcer site and exiting just proximal to the coronary band in a sagittal plane. Place a surgical drain through the drilled hole and administer systemic antibiotics for five days. If there is excessive bleeding after the tourniquet is removed, a bandage is required that will be removed the next day. The drain should be left in place for two weeks. We have not found it advantageous to secure the tips of the two digits together.

Additional surgical steps can be added to the facilitated ankylosis to address inflammation and necrosis that extend beyond the DIP joint. If there is significant heel bulb involvement or the deep flexor tendon is avulsed from the third phalanx, the navicular bone and bursa are likely involved. The navicular bone is removed and the heel debrided through a transverse incision about 1-2 inch (3 cm) long across the heel, just below the extent of haired skin. The navicular bone may be very necrotic and be easily removed by grasping

with dental pliers. If it is more difficult to remove, drill a hole in the center of the bone and break it into two pieces. Each piece can then be grasped and twisted until the collateral ligaments are ruptured. If there is inflammation ascending the deep flexor tendon it can be removed as described above. Drains are placed through all incisions and the skin wounds closed with simple interrupted sutures. Antibiotics are placed in the cavities created by removal of necrotic tissues. A bandage will probably be necessary to control hemorrhage and it should be removed the next day. We have not used systemic antibiotics on all cases, but on most of them. Drains are removed in two weeks.

Toe-tip necrosis and toe abscesses are often difficult to resolve by routine trimming and debriding of the obviously inflamed tissues. Surgical debridement with curettes and chisels has been described to have success in the majority of cases.² We had surprisingly good results with partial-toe amputation using obstetrical wire or a rigid saw. Anesthesia is as above, and the affected portion of the toe sawed off. If there is discolored tissue remaining on the proximal side of the cut, simply remove another slice of digit. A hoof block should be applied to the healthy digit and a bandage for hemostasis. No antibiotics are generally required. It is common for the regrowth of the digit to take a normal shape and be fully functional.

References

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