

Deep digital sepsis in cattle - Clinical differentiation

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Abstract

Deep digital sepsis (DDS) as applied to bovine lameness is not strictly defined, but for the purposes of this discussion will include infection of bones, joints, bursa or tendon sheaths within the foot. Often, there are infections of several of these structures in the same digit. Such infections are most commonly due to extension of infection from more superficial layers as in the case of advanced sole ulceration, white line disease or toe tip necrosis, but can be secondary to direct penetration or trauma. Deep digital sepsis should be suspected when lameness is severe coupled with 1 or more of the following: asymmetrical swelling of the foot, swelling extending proximal to the pastern region, and a duration of severe lameness of >2 weeks. Lameness associated with deep digital sepsis (DDS) is severe and requires aggressive and somewhat expensive therapy to resolve. Recognition of the development of DDS is critical to appropriate management of a lameness case. Description of therapeutic options will be provided in another paper in this volume (see Therapy of Deep Digital Sepsis).

Key words: bovine, cattle, deep digital sepsis, foot

Résumé

La dermatite digitale profonde dans le contexte de la boiterie bovine n'est pas strictement définie mais pour les besoins de cette discussion elle comprend l'infection des os, des articulations, de la bourse ou des gaines des tendons de l'onglon. Il y a souvent des infections impliquant plusieurs de ces structures dans le même onglon. De telles infections découlent souvent de la propagation de l'infection à partir de couches plus superficielles comme c'est le cas avec l'ulcération avancée de la sole, la maladie des lignes blanches ou la nécrose du bout de l'onglon bien qu'elles puissent être la conséquence d'une pénétration directe ou d'un traumatisme. On devrait soupçonner la dermatite digitale profonde lorsque la boiterie est sévère et s'accompagne d'un ou de plusieurs des éléments suivants : l'enflure asymétrique de l'onglon, l'enflure s'étendant à proximité de la région du paturon et deux semaines ou plus de boiterie sévère. La boiterie associée à la dermatite digitale profonde est grave et exige une thérapie agressive et assez dispendieuse pour être résolue. La reconnaissance du développement de cette dermatite est essentielle à la gestion appropriée d'un cas de boiterie. La description des options thérapeutiques sera abordée dans une autre présentation de ce volume (voir Thérapie de la dermatite digitale profonde).

Septic Arthritis

Sepsis of the distal interphalangeal (DIP) joint is a common sequelae to advanced interdigital necrobacillosis (foot rot), but also occurs secondary to progression of disorders of the hoof capsule such as sole ulceration, white line abscesses, and sole puncture. Occasionally the joint is infected by penetrating trauma near the coronary band or direct trauma through the hoof capsule. Far less frequently, it may become infected following hematogenous spread of an organism, but other larger joints are more commonly affected via that route. When DIP joint sepsis is secondary to penetrating trauma, the associated wound may not be evident on visual inspection. Clipping and cleaning the hair may allow for recognition of an early smaller wound. Early cases of septic arthritis may be responsive to medical management, but subacute to chronic cases are not and require aggressive and expensive therapy.

Recognizing DIP joint infection is critical for appropriate decision making. The hallmark clinical finding suggestive of DIP joint sepsis is circumferential localized swelling above the coronary band. This swelling will be additive to other swellings when the joint is infected by local extension. Chronically, subcutaneous depressions may be detected at the level of the coronary band representing sites of future fistulation. Once such fistulas form, a tract coursing distally leading to bone is indicative of chronic septic arthritis.

Radiography and ultrasonography, if available and economically feasible, are additional diagnostic tools that can support a diagnosis of joint sepsis in early cases with questionable swelling. Early on, radiographs may only reveal widening of the joint space or gas in the joint. More chronic cases may have subchondral lucency of the articular margins and periosteal proliferations along the margins of the joint. Ultrasonography with a high-frequency probe (7.5-12 MHz) is capable of demonstrating moderate joint effusion, and increased echogenicity of the effusion is suggestive of sepsis.

Arthrocentesis and synovial fluid analysis can confirm suspect cases of septic arthritis. Obtaining fluid from the DIP joint is challenging in normal joints, but is relatively simple and frequently rewarding when the joint is septic. Cytologic evaluation reveals abundant neutrophils (generally >90%) and the total protein concentration in infected joints is generally > 4 g/dl. Additionally, a culture can be performed in valuable cases although negative results are frequent, especially with prior antimicrobial administration.

Septic Pedal Osteitis

Infection of the third phalanx (P3) is frequently en-

countered secondary to neglected white line abscesses, toe ulcers, and direct trauma from nails or thorns through the sole. The term “osteomyelitis” should be avoided when referring to infection of P3 as there is no medullary cavity, hence the term osteitis. An uncomplicated subsolar or subparietal abscess can result in severe lameness, but usually there is minimal swelling above the hairline and when pared out, the underlying corium is intact. Septic pedal osteitis (SPO) is suspected if there is significant swelling of the coronary band region immediately dorsal to the abscess, extensive necrosis of the corium or a focal depression of the corium within the region of the abscess indicative of a draining tract. Ideally, radiographs are taken at this stage to evaluate the adjacent bone for lucency, fracture or sequestration. It is preferred to radiograph prior to probing into the corium so as not to introduce gas artifacts into deeper tissues. Importantly, it must be realized that radiographic changes lag behind infection of the bone by 7 to 10 days, so that normal radiographs may be misleading.

If radiology is not available or is economically unfeasible, gentle deep probing of the corium with a blunt metal object such as a teat cannula may reveal contact with the bone. If bone is contacted directly by the probe, judicious pressure is applied to the bone while feeling softness/crunching which is indicative of osteolysis and infection of bone or for movement of the bone (indicative of a sequestrum). Occasionally, severe hoof capsule trauma will expose portions of P3, and if not treated quickly can result in widespread SPO sometimes coupled with fractures. Septic pedal osteitis generally requires curettage in order to achieve resolution of the infection.

Complicated Sole Ulcer

Sole ulcers are a common cause of lameness in both beef and dairy cattle. Simple corrective trimming can alleviate early lesions. If neglected, the ulcer leads to deep infection of the corium and infection can spread deep within the hoof capsule. Advanced sole ulcers with concomitant DDS typically have a draining tract within the exuberant granulation tissue bed of the ulcer. For valuable cattle, radiographs should be taken before deep probing. Deep digital sepsis occurring secondary to a sole ulcer can be quite varied and may involve septic pedal osteitis (P3 or navicular bone), tendonitis of the deep digital flexor, navicular bursitis, septic arthritis of the DIP joint or tenosynovitis of the digital flexor tendon sheath (DFTS). Oftentimes more than 1 of these structures is affected in the same digit. Hyperextension, or toeing up of the affected digit, is indicative of necrosis of the attachment of the deep digital flexor tendon onto P3. When severe, there is often infection of the navicular bone and/or P3.

Alternatively, some associated deep infections result in a retroarticular abscess, which while associated with significant pain and swelling, carries a more favorable prognosis. Infection of the DFTS is generally readily apparent on physi-

cal examination (discussed later) and if absent, the primary diagnostic objective is to determine if the DIPJ or navicular bone are septic. Clinical findings suggestive of DIPJ sepsis include severe lameness and a circumscribed swelling just proximal to the coronary band that is additive to the generalized swelling originating above the heel region. Confirmation of DIP joint sepsis may be achieved via radiography (again being dependent on the duration of infection; >~10 days) or ultrasonography or arthrocentesis. Care should be taken to not tap the joint through a region of cellulitis for the risk of inducing sepsis, but can generally be safely performed on the dorsum of the digit in cases of sole ulcer. Probing of the tract within the granulation tissue as discussed for pedal osteitis may reveal spread of the infection into deep tissues with the direction and depth of the tract suggestive of the deeper structures involved. Sometimes a probe of smaller diameter than a teat cannula is needed to find an early/narrow tract. Infection of the navicular bone or navicular bursa as the only internal structures involved with DDS is very uncommon in this author’s experience. While the navicular bursa is physically separate from the DIP joint, infection quickly spreads to the joint, the navicular bone or more proximally into the DFTS.

Septic Tenosynovitis

Infection of the sheath of the digital flexor tendons commonly occurs following wire cuts or puncture wounds to the palmar/plantar pastern or fetlock region. Dorsal extension of infection from a complicated sole ulcer is also a common cause of DFTS infection. Sepsis of the DFTS is generally associated with severe lameness and characteristic swelling. The DFTS extends from approximately 6 cm above the fetlock joint to a point just proximal to the navicular bone, which is located immediately distal to the coronary band of the heel. Swelling due to DFTS sepsis is noticeably more prominent on the palmar/plantar aspect of the limb and there is an abrupt reduction of the swelling above the fetlock. Ultrasonography is a valuable tool for detecting modest effusion in the DFTS and for planning a site for needle aspiration for cytologic evaluation. Synovial fluid changes suggestive of sepsis are similar to those mentioned for DIP joint sepsis.

Conclusions

Detailed clinical examination of the foot can alert the veterinarian to the presence of DDS in lameness cases. Confirmation via ultrasonography, cytologic evaluation or radiography may be indicated in suspect cases or in valuable animals to help guide therapeutic decision making.