Wound management in cattle

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Abstract

Wounds of variable shapes, lengths, locations, depths and ages are invariably encountered by bovine practitioners. The healing process starts immediately following the insult and is composed of 3 overlapping phases: inflammatory, proliferative and remodeling. Each of these phases can be subdivided into more specific steps during which biochemical and cellular events occur, ultimately resulting in the restauration of a physical barrier protecting the deeper structures. Whether the completion of the healing process allows to return to a full function depends on multiple factors, including the type of wounds, the location of the wound, and the structures involved.

Key Words: wound, cattle, secondary intention healing, primary intention healing, infection

All wounds require attention in a timely manner. However, there is some for which any delay can have severe consequences for the ability of the cow to remain in production; wounds involving synovial structures and teat lacerations do not support any delay in their management for optimal outcome.

Teat injuries should be considered as emergencies and require immediate assistance. Teat lacerations should be managed by primary closure (Mulon 2016). In a study evaluating the risk of fistula formation following surgical repair of teat injury, the delayed repairs (48 to 72 hours) had an 8.3 times the odds of fistula formation compared to the teats sutured within 24 hours (Azizi 2007). Limiting the inflammation and swelling of the tissue facilitates the repair and can be achieved on the farm by placing the cow in the milking parlor and gently soaking the injured teat with cold water. The running water on the wound decreases the contamination and decreases the inflammation of the teat wall. Surgeries are best performed with the cow maintained on lateral or even dorsal recumbency under sedation. The surgical debridement is an essential step to make sure that no organic debris remain embedded prior to starting the suture. The surgical closure is perform in 3 layers using small diameter (USP 3-0) absorbable monofilament suture material. Contact with milk alters the biomechanical properties of the suture material faster than serum, and Polydioxanone has been determined as the best suited suture material for this type of surgery (Nichols 2007). Post-operative care includes careful manipulation of the teat for the 2 weeks following the repair, and absence of manual milking to avoid uneven pressure around the teat. Mastitis should be monitored very closely as it represents a severe complication. The long-term milking status of lacerated teats repaired surgically has been reported to be adequate for 75% of the cows. No statistically significant association was established between the configuration of the laceration and the successful outcome of the repairs (Nichols 2016).

Wounds on the distal limb are not uncommon considering the presence of sharp objects in the environment (Anderson 1996). The time elapsed between their occurrence and detection varies greatly depending on the production type and the housing of the animals. Due to the lack of soft tissue protection in the distal limb, joints and tendon sheaths can be penetrated and contaminated. Evaluation of the wound often necessitates restraining the animal in lateral recumbency. Anesthesia of the distal limb can be performed by regional limb perfusion using 2% lidocaine prior to the exploration of the wound and determination of the contamination of the synovial structure (Simpson 2020).

Exploration of the wound and surgical debridement are essential to evaluate the extent of the lesion and identify the repair necessary. The reduction of the contamination as well as the reduction of the concentration of pro-inflammatory mediators within the synovial cavity is an important step to allow control of the infection and return to function. This can be performed by either lavage/flush of the synovial or the temporary use of passive drains.

Unless the wound occurrence has been witnessed and is addressed within 6 to 12 hours, managing them by second intention under aseptic bandages allows drainage of the synovial fluid until achievement of the control of the infection.

Managing wounds by secondary intention healing or by delayed primary closure is fairly common due to gross contamination and possible chronicity of those wound at presentation. With the cow restrained in a standing chute, the wound is visually inspected and the decision is made whether to sedate or restrain her in lateral recumbency for increased safety and access to the wound. Initial cleaning includes clipping of the hair in the periphery of the wound after protecting the wound bed with a water-based ointment, and then cleaning the wound with diluted antiseptic solution. Probing the wound digitally after the initial surgical preparation is important to make sure no deeper structures are involved.

Debridement is performed after local or loco-regional block using lidocaine. Debridement can be performed either surgically in case of the presence of extensive necrotic tissue, or by application of mechanical debridement by the application of a wet-to-dry bandage change daily for few days. The recruitment of the fibroblast into the wound bed starts rapidly but granulation tissue in the wound bed is visible only around day 5. When granulation tissue is present and the control of the infection is achieved, approximation of the skin edges can be attempted for delayed primary closure if possible, otherwise the wound is maintained covered in a moist environment to enhance the proliferative phase.

For wounds managed to heal by second intention, early recognition of an impaired healing process is important. The initial sign that the healing process has stopped and that some infection may still be present in the deeper structures is the absence of contraction of the wound and the presence of an exuberant proliferative granulation tissue. This is particularly important when evaluating the progression of the wounds following deep digital sepsis treated by claw amputation, facilitated ankylosis or tenovaginectomy (Bicahlo 2007, Devaux 2017, Hund 2020). Surgical revision of those wounds is necessary to ascertain complete debridement of the necrotic tissue prior to resume the secondary healing process.

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