

Bandaging, casting and splinting

Jennifer A. Schleining, DVM, MS, DACVS-LA
School of Veterinary Medicine and Biomedical Sciences
Texas A&M University, College Station, TX 77843

Abstract

Trauma, including lacerations and fractures, are a common presentation to bovine practitioners. Additionally, the need for wound dressing following surgical procedures of the foot is a primary care necessity. Factors that can negatively affect wound healing include duration of time from injury to veterinary intervention, level of contamination, and involvement of pertinent anatomical structures including blood supply and synovial structures. Proper attention to wound management and fracture immobilization through the use of coaptation can positively influence the outcome of patients suffering from traumatic wounds.

Key words: bovine, trauma, laceration, cast, bandage

Introduction

Trauma is commonly encountered in bovine practice. From fractures to lacerations to fighting injuries to getting caught up in fences, feeders and other equipment, cattle provide the veterinary practitioner ample opportunities to practice wound management. Bandaging is as essential to wound care as casting is to fracture stabilization.

Wound care and bandaging

Wounds are best addressed when the patient is adequately restrained (physically and/or chemically). Wounds on the distal limbs may be better managed following regional limb anesthesia using lidocaine in a Bier block. The wound should be clipped generously, being mindful to decrease further contamination of open wounds through use of lubricating jelly within the defect. The wound should then be copiously cleansed paying special attention to hemostasis when necessary and removal of macrodebris and necrotic material from the wound. Chlorhexidine solution (not scrub!) diluted to a 0.05% solution (25 ml of 2% chlorhexidine solution added to 975 ml sterile saline) or 0.1-0.2% diluted povidone iodine solutions (10 – 20 ml of 10% povidone iodine solution to 980-990 ml sterile saline) can be used to irrigate contaminated wounds. Hydrogen peroxide is cytotoxic and should not be used to irrigate wounds.

The wound should be closely examined to identify all structures involved and if synovial involvement is suspected or confirmed, appropriate measures taken to communicate the resultant prognosis with the owner. After cleaning and debridement, the wound can be sutured or left open to heal by second intention healing depending on the location of the wound and wound characteristics.

Distal limb wounds are amenable to bandaging as long as the patient can be exercised restricted and maintained in a clean, dry environment. A bandage protects the wound from environmental contamination, aids in reduction of edema and swelling, and can support suture lines in areas of motion. However, the bandage should be applied in multiple layers to be effective.

How often the bandage is changed is dependent on the degree of discharge from the wound, contamination or slippage of the bandage, and other factors like need for antibiotic administration or wound debridement.

Primary layer

This layer serves as protection of the wound bed and should be comprised of a non-stick dressing. A topical ointment or cream can be used if deemed necessary. There are many options available, and the best choices are silver sulfadiazine (SSD), triple antibiotic ointment, Manuka honey, or a bismuth-iodine preparation in petrolatum (BIPP). It is important to note that nitrofurazone is not allowed for use in food-producing species. Additionally, nitrofurazone has been shown to decrease epithelialization and delay wound contraction and, thus, is not an ideal wound treatment. The primary layer is often held in place by an elastic adhesive tape such as Expandover™ or other similar product.

Secondary layer

The secondary layer is comprised of cotton or other synthetic combine material. This layer should be applied in two or three uniform layers and secured tightly with non-elastic brown or white gauze. This layer helps resolve swelling and edema within the wound and provides protection and support to the wound.

Tertiary layer

The tertiary layer serves to secure the secondary layer and is usually completed with either Vetwrap™ or Elasticon™ materials. Elasticon (or other similar elastic tape) should be used to seal the top and bottom of the bandage to prevent debris from getting into the bandage.

Splinting

Splints are most commonly used in food animal practice to treat contracted tendons in calves or stabilize fractures. Common splint materials include PVC, wood or plaster cast material. Contracted tendons most commonly manifest as a flexural limb deformity at the carpus. Use of a caudal splint over the top of a cotton bandage that spans the distance from the floor to the elbow is necessary to correct contracted tendons. When presented with a fractured limb in the field, splinting can often be useful to protect the fracture from further displacement and allow transport to the barn, clinic or referral center for further treatment. Some fractures will not be amenable to splinting due to environment, patient behaviors, or location. Fractures of the proximal radius, proximal tibia, humerus and femur are often best left without a splint due to inability to effectively immobilize the joint above and the joint below the fracture. Fractures distal to the carpus and tarsus should be stabilized with a half-limb bandage and caudal splint. Fractures of the carpus, tarsus and proximal to these joints should be stabilized with a full-limb bandage and a caudal and lateral splint.

Cast placement

Correct cast placement is facilitated by a cooperative patient, attention to detail, and having the right equipment. Our primary objectives with a cast are to have a fracture reduced and a comfortable patient with a straight limb. Sedation and local anesthesia may be necessary to make this happen. Distal limb fracture reduction can be aided by suspending the limb of a calf or small ruminant from a sturdy rafter or overhead pole. A disposable nylon dog leash can be used around the foot to suspend the leg while having an assistant hold the leash taut placing tension on the leg to maintain fracture alignment. Depending on the fracture configuration, manual external reduction may first be needed to achieve alignment. When the fracture is reduced, the leg is ready for a cast.

Cast application

A cast should have at least three layers – stockinette, cast padding and fiberglass cast material. Stockinette can be purchased in a large range of sizes and calves will generally take 3 inches, while adult cattle may require 5 or 6 inches. The stockinette should be cut to a generous length twice the length of what is needed. After cutting, find the center of the length of stockinette and mark it. Start rolling the stockinette from one end outwardly like a tube sock ending at the center. From the other end, roll the stockinette inwardly onto itself until you reach the center. Then place the patient's foot into the lumen of the stockinette unrolling the stockinette up the leg. With the unrolled half of the stockinette, give it a few twists to encase the foot and then also unroll it up the limb. The stockinette should be tight enough that there are few wrinkles and the top of the stockinette should extend at least three inches above the proposed top of the cast.

Next, cut a 1-inch-wide strip of thick felt to line the top of the cast and place it circumferentially around the leg where the top of the cast will be. Hold it in place with white tape. Depending on circumstances, you may choose to make felt “donuts” for the accessory carpal bone and/or dewclaws as well. Next, take cast padding and place it on the leg overlapping each layer by ~50% as you go up the limb. Make sure you are using cast specific padding and not roll cotton or cotton combi-rolls. You want some padding in your cast, but too much padding will cause movement at the fracture site. This will result in a painful patient, healing complications, and in worst-case scenario, a cast that falls off.

Finally, apply fiberglass cast material. Calves will usually take 3- or 4-inch cast material and adult cattle will necessarily need 5- and/or 6-inch material. Place enough layers of the cast material to effectively eliminate motion of the leg under the cast. You want to place the layers snugly, but not tight. There should be no wrinkles in the cast material. The warmer the water is that you dip your cast material in, the faster the cast material will set. If you are placing a large cast, you may choose to use cool water to allow for more time to get all of the cast material on the leg before it starts hardening. In calves, you will likely use 4 or 5 rolls depending on the length of the cast. In adults, it will likely take 10-15 rolls, again depending on size of the cast.

Prior to the last roll of cast material being placed, the stockinette at the top of the cast should be rolled down and incorporated into the cast. All layers of cast material should be in place before the material starts ‘weeping’. This is a sign that the chemical reaction is starting to bond the layers of the cast material together. Failure to have your cast completed by this time will result in an “onion peel” effect and the layers will not bond effectively decreasing the strength of your cast. When the cast is dried, elastic tape should be used to seal the top of the cast to prevent debris or shavings from entering the cast. During the healing period, the cast should remain dry. The addition of methylmethacrylate or rubber from a tire to the bottom of a cast can also improve its longevity.

Conflict of interest

The author declares no conflict of interest.

