Primary wound dressings – how to keep it simple

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Equine veterinarians have access to a wide variety of wound dressings designed to promote effective healing. Despite the advancements in dressing technology that enhance the healing process, confusion often persists regarding which dressings to use in specific situations. It is essential for practitioners to understand the characteristics and functions of various dressings, allowing for informed choices that create an optimal healing environment tailored to each wound's specific requirements and healing phase. Continuous wound assessment throughout the healing process is advised, as early intervention of changing wound requirements or complications can prevent prolonged healing times and mitigate adverse financial, functional, and aesthetic outcomes.

Understanding primary wound dressings

To effectively select wound dressings, knowing various properties and definitions associated with them is important. Equine practitioners should have access to dressings suitable for each stage of wound healing, and those suited to various complications that can occur. Key properties to consider include:

Non-adherent: These dressings do not stick to the wound bed, minimising trauma upon removal.

Adherent: These porous dressings allow for the wicking of exudate, which can lead to adherence to the wound surface.

Occlusiveness: This property refers to the degree to which a dressing prevents fluid evaporation from a wound. The degree of occlusiveness of the dressing can be affected by the dressing itself, the amount and type of exudate, and the frequency of changes. Dressings can be categorised as:

- Non-occlusive: These porous dressings allow for drying at the wound surface.
- Semi-occlusive: These dressings maintain a moist environment while permitting gas exchange, thereby promoting a favourable healing atmosphere.
- Occlusive: These dressings retain all exudate at the wound surface, which can be beneficial in specific healing stages.

Interactive: These dressings actively influence cellular activity at the wound site, such as calcium alginate, which stimulates macrophage and mast cell activity and donate calcium, chitins promote haemostasis and enhance neutrophil function and angiogenesis, hydrogels donate moisture to an eschar to dissolve it and promote autolytic debridement, and silicon reduces granulation tissue.

Antimicrobial: Many commercial dressings incorporate antimicrobial agents, such as silver polyhexylmethyl biguanide (PHMB), honey, chlorhexidine, iodine, and hypertonic salts to control or resolve superficial infection.

Biologic: These dressings are derived from biological sources and aim to enhance healing by integrating with the wound to provide a scaffold. Examples include amnion and peritoneum.

Types of dressings

Non-occlusive dressings: Traditional gauze dressings, including both woven and non-woven varieties (e.g. Melolin® and Telfa®), have been widely used in equine practice. While suitable for primary healing and

superficial abrasions, they are less likely to maintain necessary moist environment for effective second intention healing due to their porous, non-occlusive nature.

Semi-occlusive and occlusive dressings: Semi-occlusive dressings, such as polyurethane foam (e.g. Allevyn®), are preferred for their ability to maintain an optimal healing environment, absorbing excess exudate while retaining moisture at the wound surface and facilitating gas exchange. Occlusive dressings, including hydrocolloids, create a barrier that retains exudate and limits gas exchange, making them useful in specific early healing stages where autolytic debridement may be preferred.

Types of wound healing

Primary intention: Wounds primarily managed through suturing, such as surgical incisions, should be protected with non-adherent, non-occlusive dressings. Examples of non-adherent gauze-like dressings (or 'dry dressings') are Melolin® S&N and Telfa® Kendall which are both compressed cotton covered by a non-adherent thin perforated polyester film, or paraffin impregnated gauze (Jelonet® S&N). If any exudate develops, saline can be employed to ease removal.

Second intention: Second intention healing is best achieved by moist wound healing, and modern dressings are designed to provide the appropriate amount of moisture retention for each stage of healing. Moist wound healing occurs when wound exudate stays in contact with the wound bed. Contraction and epithelialization can occur twice as quickly if managed with dressings that promote each stage of wound healing and maintain a moist environment at the wound surface. This results in improved cosmetic and functional outcomes, and speed of healing.

Selecting primary wound dressings

The selection of appropriate wound dressings is influenced by several factors, including the size, location, and depth of the wound, the involvement of deeper structures, the presence of infection or contamination, available financial resources, and the specific stage of healing. The primary objective for the clinician is to promote efficient progress through each phase of wound healing, allowing for rapid and effective recovery.

All stages of wound healing overlap, and the duration each stage takes is influenced by the wound environment and various contributing factors. When selecting primary wound dressings or topical products, the aim should be to create the most conducive environment for healing at each stage. Accordingly, dressings can be categorized based on their ability to: (1) facilitate an effective inflammatory and debridement response; (2) provide moisture for dry or desiccated wounds; (3) encourage the development of granulation tissue; and (4) enhance epithelialisation and contraction. Additional interventions may be necessary if wounds are complicated by superficial or localized infections, exuberant granulation tissue formation, or exposure of sequestered bone.

Dressings that facilitate debridement

Hypertonic gauze dressings, such as Mesalt®, contain embedded hypertonic saline, which promotes antimicrobial and debridement properties through osmotic effects. This mechanism helps draw fluid from the wound, removing cellular debris and necrotic tissue.

Wet-to-dry dressings can be applied to the wound bed to promote debridement by soaking gauze swabs in saline, which are then placed in the wound. As the exudate wicks away, it causes drying and adherence of cellular debris, facilitating removal. Honey-impregnated dressings have hyperosmotic properties to draw fluid from the wound, effectively removing debris.

Antimicrobial dressings include several types (gauze, foam or gels) that have addition of substances with antimicrobial properties which can be used to enhance the debriding process if contamination and infection is present at the wound. Gauze-like dressings, hydrogels (Manuka G® , HydroGel 0.04% PHMB, KRUUSE, Normlgel AG® Moldnlycke), alginates (Algisorb AG® Moldnlycke) and hydrofibres (Suprasorb X+PHMB®, L&R) with antimicrobial properties can be used to promote debridement and resolve infection in the inflammatory phase.

Hydrogels are used if a wound is dry or has a dry eschar a hydrogel (Intrasite® S&N) should be applied to help dissolve the eschar and establish a hydrated and moist wound surface.

Autolytic debridement can be achieved in the first 72-96 hours by use of an occlusive dressing, for example hydrocolloid dressings (Suprasorb® L&R) or hydrogels (Intrasite® S&N). Wound exudate, in the absence of infection, provides substrate rich enzymes, and growth and chemotactic factors, which are breakdown products of neutrophils and macrophages. Enzymes break down the necrotic tissue and allow healing to proceed by autolytic debridement. Growth factors stimulate the fibroblasts and epithelial cells. Occlusion also provides constant thermal regulation and healthier cells and helps reduce bacterial penetration if the dressing is appropriate. Careful observation for signs of infection such as redness and swelling in the skin margins, superficial discoloured or malodorous exudate adhering to the wound, excessive exudate should prompt a change in wound management and an alternate to occlusive dressings.

Dressings that promote granulation tissue formation

Wounds may need ingrowth of granulation tissue in the early proliferative phase, or later when crevices or cavities remain in the granulation tissue bed.

Alginates (Algisorb AG® Moldnlycke) are made from acids obtained from seaweed with calcium salts and are processed into biodegradable fibres. Calcium from the dressing is exchanged with sodium from the wound fluid which causes the dressing to absorb exudate, swell and form a gel creating a moist environment for healing, and stimulation of inflammation and fibroplasia which promotes granulation tissue formation.

The dressing can be placed on exposed bone to reduce the risk sequestrum development and promote rapid covering with granulation tissue. Alginates should be discontinued once granulation tissue has formed. If a wound has minimal exudate, the alginate should be moistened with saline prior to application to the wound.

Hydrofibres and chitin/chitosan products also promote the formation of granulation tissue and should be used on wounds with moderate to marked exudate.

Dressings that support epithelialisation and wound contraction

Once the wound has complete granulation coverage, calcium alginate dressings should be discontinued, and semi-occlusive polyurethane foam dressings should be used to promote epithelialization and contraction.

There are many types of foam dressings, but all absorb exudate into the dressing, then maintain a moist and warm temperature at the wound surface (Mepilex® Molnlycke, Allevyn® S&N) which promotes epithelialisation and contraction. Granulation tissue does not grow into foam dressings, and their non-adherent properties protect the wound surface and epithelial cells from being disrupted at bandage changes. Additionally, because of these properties, bandage changes can be less frequent.

Many companies also have equivalent foam dressings with antibacterial properties added such as silver (Mepilex® AG, Molnlycke), polyhexylmethyl biquanide (PHMB) (Kendall AMD Foam®, Covidien 0.5%PHMB) and honey (KRUUSE Manuka AD or ND®). It is not recommended to add topical wound agents under the foam dressings during the epithelialization process unless indicated.

Allogenic amnion has low immunogenicity and the potential to enhance wound healing if available for harvest and storage. It can also be used as a biologic wound dressing that has both scaffold and bioactive properties. Its use has been shown to increase the rate of epithelialisation and reduce exuberant granulation tissue production in equine wounds. It is obtained from the inner most layer of placenta and has three layers, an epithelial layer, a strong basement membrane, and an avascular mesenchymal tissue layer. It is a collagen rich matrix that includes proteoglycans, hyaluronic acid, laminin, growth factors and heparin sulphate. Storage and preparation can impact the presence and activity of growth factors, but regardless the structural matrix is beneficial for scaffold properties when used as a biological dressing.

Wounds in the late proliferative phase where healing is progressing normally and exudate is minimum can be dressed with a polyurethane film dressing to maintain moisture at the wound surface and protection from friction (Opsite® Film and Opsite® Spray S&N).

Wounds with specific requirements

Excessive exudate, infection and exuberant granulation tissue delays wound healing. Wound dressings are available that can help address these complications.

Wounds with excessive exudate: Wounds with excessive exudate should be examined for infection and addressed if present by superficial excision of exuberant granulation tissue, removal of necrotic or foreign material or sequestered bone. Wounds that do have excessive exudate can be managed with alginate dressings and foams with an absorbent secondary layer of the bandage.

Infected wounds: Wounds that have local signs of infection and cellulitis such as hyperaemia, swelling and pain in the surrounding tissues with excessive exudate, may require systemic antibiotics. Granulated wounds with superficial infection do not require systemic antibiotics and can be successfully managed with local wound care and antibacterial dressings. As mentioned above, removal of contaminated and necrotic tissue or sequestered bone should be performed if required. Culture and sensitivity of tissue or exudate is indicated if the wound healing is delayed due to chronic and refractory infection. Biofilms develop when micro-organisms colonise into communities on the surface of wound, producing a protective extracellular matrix that encases the organisms, preventing antimicrobial penetration. Excision of granulation tissue to remove the biofilm layer is effective as an initial step to managing superficial infection, then once haemostasis has occurred, topical antimicrobials or antiseptics can be applied under and appropriate dressing, or dressings with antimicrobial properties can be used.

Dressings with antimicrobial properties includes those with silver, PHMB, chlorhexidine, iodine, and honey, and hypertonic solutions. If these dressings are not available, topical antiseptics and antibiotics can be applied under the appropriate dressing, for example under a foam dressing if granulation is complete, or alginates and hydrofibre if granulation tissue ingrowth is needed (see above).

Wounds with exuberant granulation tissue (EGT): Management of EGT should initially identify and address potential underlying causes. Management at the local site can be done by excision of the EGT to skin level using a scalpel or a razor, and intermittent use of topical corticosteroid. Corticosteroid is thought to act by decreasing the production of TGF beta1 by monocytes and macrophages. Many over the counter preparations are available including prednisolone (Imflamol® Dechra) or triamcinolone, and they are commonly combined with antimicrobials. Use should be judicious due to the negative effects on wound healing such as delayed contraction, epithelialization and angiogenesis. Often only 1-2 applications are required if the EGT is trimmed as required, and other risk factors for development of EGT are controlled. Dressings that incorporate silicon have also been shown to reduce the formation of EGT. Silicon sheets can be applied to granulated wounds that are at risk of developing EGT. The dressings are expensive but can be used multiple times by cleansing between dressings (Circa-care®, S&N).

Conclusion

The array of topical products and primary wound dressings available to equine practitioners is extensive. The selection process should be informed by the stage of healing and the specific needs of the wound to achieve optimal functional and aesthetic results while ensuring rapid healing. Maintaining moisture and proper coverage throughout the healing process is crucial. Clinicians must remain knowledgeable about the properties of various dressings and carefully evaluate the wound condition at each bandage change to adjust dressing selections accordingly. Adopting straightforward approaches, coupled with a limited inventory of reliable products for different wound requirements, can enhance familiarity and improve the predictability of outcomes in equine wound management.

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