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Best practice in equine bandaging

Equine wound care can be challenging, time consuming and expensive for clients. Wounds are an all-too-common occurrence in veterinary practice owing to the horse's natural 'fight or flight' instinct and we see many patients with injuries caused by fencing, wire or trauma, such as a kick from a companion.

There are many things for veterinary professionals – especially registered equine veterinary nurses (REVNs) – to consider when treating wounds in horses to encourage optimal healing and a swift return to athletic function.

Before attempting wound care, however, it is important to have some knowledge of how wounds heal so that an optimal environment can be created. The four stages of wound healing are explained in **Table 1**.

Normal wound healing is what we all work towards; although there are 12 key factors that can inhibit the healing of equine wounds (Knottenbelt, 2003). These factors are:

- infection
- movement
- foreign bodies
- necrotic tissue
- continued trauma
- poor blood supply
- poor oxygen supply
- poor nutritional and health status
- local factors – e.g. large tissue deficit
- iatrogenic factors – e.g. incisions, swabbing and use of veterinary instruments
- genetic factors – ponies heal faster than horses
- cell transformation – e.g. sarcoid formation.

If a wound is not healing as expected, then each of these factors should be assessed in turn to help to determine and correct the problem.

Wound cleaning

One way to minimise the likelihood of the patient developing a wound infection is the use of early lavage and debridement. The area around

the wound should be clipped and sterile wound hydrogel may be applied during this process to prevent stray hairs contaminating the wound. This hydrogel must be removed afterwards so the wound can be thoroughly lavaged. Sterile saline is usually the fluid of choice for lavage.

Antiseptics should be used with caution, as their action can actually compromise healing in some cases. Antiseptic solutions are usually reserved for severely contaminated wounds and only used at very low concentrations. **Table 2** provides a guideline for wound lavage solutions and when to use them.

Bandages

Bandages have a number of roles in practice and these are displayed in **Table 3**.

Many of these roles are involved in preventing the 12 factors that delay healing – infection, movement and continued trauma, for example. This makes a properly applied bandage a powerful tool for the REVN in practice when assisting with optimal wound healing.

On the other hand, a poorly applied bandage can actually enhance some of the 12 factors that delay healing:

- poor blood supply and poor oxygenation encouraged by a bandage that has been applied too tightly
- movement can be facilitated by a bandage that has been applied too loosely

- continued trauma and infection will be exacerbated by a bandage that has slipped down, allowing the patient/bacteria access to the wound.

This is why it is so important to apply a bandage correctly and monitor it to reduce the risks of any subsequent complications.

Bandages are made up of three layers – a primary layer, a secondary layer and a tertiary layer.

Primary layer (wound dressings)

This article will focus mainly on bandaging technique. However, wound dressings form the first part or primary layer of the bandage.

It is well known that wounds heal best in a warm, moist environment and this is what we are aiming to achieve with a wound dressing. There are many dressings out on the market now and the best practice is to select one that will provide optimal healing conditions for the specific wound with which you are dealing.

Table 4 provides a summary of the main types of wound dressings available and when they should be used.

Secondary layer

The secondary layer is essentially used to keep the primary dressing in place, provide protection and absorption of discharge as well as helping to prevent movement. Materials used for this include a roll of soft

orthopaedic padding and cotton wool.

These padding materials are held in place with a stretchy, conforming, mesh bandage. Care should be taken when applying this bandage. It should never be applied directly to the skin as it can cause damage; and an inch of cotton wool should be visible above and below the bandage once it has been applied to protect the skin of the patient.

Bandage sores are commonly seen on the lower limb of the horse in equine practice. The lower limb of the horse does not contain any muscle, therefore bandages are often applied over large bony prominences, such as the point of the hock and the accessory carpal bone at the back of the knee. Bandage sores develop when pressure is applied over the thin skin in these areas (**Figure 1**).

The following are some top tips for preventing bandage sores:

- applying extra padding in the secondary layer – such as cotton wool – can help to prevent bandage sores from occurring
- 'doughnuts' made from rolled-up cotton wool can be applied directly to the bony prominence, before the bandage is put on top, to help to pad and protect it
- using bandaging materials that are at least 15cm wide is thought to reduce areas of focal pressure that can predispose to the formation of bandage sores
- each layer of bandage applied should overlap the previous layer by 50 per cent so that an even pressure is achieved
- apply enough pressure, but not too much. This comes with practice but bandages do not need to be applied really tightly – a good, firm, even pressure is what is required.

Table 1. The stages of wound healing (Hollis and King, 2011)

Stage of wound healing	Action in the wound
Stage 1: Haemostasis (stemming of the bleeding)	Bleeding stops and a clot forms over the wound
Stage 2: Inflammation (natural debridement)	White blood cells (neutrophils and macrophages) begin a clean-up process. Slough and exudate (discharge) are produced as a by-product. Inflammation is most active 2-3 days after injury
Stage 3: Proliferation (true healing)	A healthy blood supply forms at the edges of the wound to provide a healthy bed for epithelialisation (healing). The wound contracts down in size
Stage 4: Maturation (scar maturity)	Collagen is laid down to give the wound a greater tensile strength. This process continues many months following injury

Table 2. Wound lavage solutions and when to use them (Hollis and King, 2011)

Wound presentation	Suitable wound lavage solution
First presentation of a very dirty wound or a heavily infected wound with large amounts of devitalised tissue	Sterile saline (0.9%), Hartmann's or lactated Ringer's solution. One litre minimum per 5cm diameter of wound. These fluids should be warmed to body temperature. Very dirty wounds that are heavily infected can be further lavaged with a dilute solution of chlorhexidine (0.5%) or povidine iodine (1%). This should only be required once and should not be continued as the wound begins to granulate, because these products negatively affect wound contraction and epithelialisation. This point is a heavily debated area where there will be contradictions in practice
All presenting wounds	Sterile saline (0.9%), Hartmann's or lactated Ringer's solution. These fluids should be warmed to body temperature
Follow-up and dressing change	Sterile saline (0.9%) – warmed cans of saline may be useful, especially if the owner is required to cleanse the wound at home

Table 3. The role of the bandage in equine veterinary practice (Miller-Smith, 2006)

Role of bandage	Benefits to patient
Support (fractures, tendon/ligament injuries)	<ul style="list-style-type: none"> ■ helps to reduce pain and swelling ■ gives additional support to internal structures
Protection	<ul style="list-style-type: none"> ■ from infection or other contaminants ■ from self-mutilation ■ holds dressings in place
Pressure	<ul style="list-style-type: none"> ■ to help stop haemorrhage ■ to help to reduce swelling
Immobilisation	<ul style="list-style-type: none"> ■ to restrict movement of joints/soft tissue injuries ■ to reduce pain levels ■ to provide comfort



*Suggested Personal & Professional Development (PPD)

BANDAGING

Table 4. Different wound dressings and their uses (Packer and Devaney, 2011)

Wound dressing	Specific properties	Typical application
Foam dressings	Absorb excessive exudate whilst providing a protective layer. Aid the processes of moist wound healing, granulation and epithelialisation	<ul style="list-style-type: none"> wounds producing a large amount of exudate
Wound hydrogels	Hydrogels provide and maintain a moist wound environment. They donate fluid to the wound and can be used as a filler for a desiccated cavity where they can restore a physiologically sound moist wound healing environment	<ul style="list-style-type: none"> when clipping around the wound to prevent hair contamination in combination with foam dressings in any type of wound where a moist, warm healing environment is required
Hydrofiber	Hydrofiber dressings are soft, woven pads of carboxymethylcellulose. These dressings provide a moist wound environment as they transform into a soft gel substance when brought in contact with the wound bed through absorbing exudate. They aid in the debridement of the wound without causing damage to viable tissues	<ul style="list-style-type: none"> necrotic wounds that require debridement wounds producing a large amount of exudate
Hydrocolloid	These dressings provide a moist environment for the wound without causing maceration and were originally designed to soften necrotic tissue to aid in natural debridement in human health care. They are said to promote angiogenesis and fibrinolysis, therefore, they are useful in the proliferation stage of wound healing	<ul style="list-style-type: none"> wounds that require debridement wounds that are in the proliferation stage of healing
Silver dressings	Silver has an antimicrobial effect against many types of bacteria and is used to manage infection in wounds. Various types of silver dressings are available	<ul style="list-style-type: none"> infected wounds
Alginates	Alginate dressings are fine, fibrous dressings that absorb exudate. However, alginates should not be used on dry wounds as the fibres may irritate the wound and there is real risk of wound bed desiccation. Alginate dressings actively stimulate granulation tissue formation through the release of calcium ions. Caution, therefore, should be used when applying these dressings to wounds on the distal limb of the horse, where excessive granulation tissue can be a problem	<ul style="list-style-type: none"> wounds producing a large amount of exudate
Manuka honey	Manuka honey is formulated into medical grade honey, which has prolonged antibacterial effects. It has debriding, antimicrobial and some anti-inflammatory and antioxidant properties. Normal honey is not recommended as wound exudate dilutes it quickly, and the dilution reduces its antibacterial effects	<ul style="list-style-type: none"> necrotic or infected wounds

For most bandages in equine practice, two layers of cotton wool and conforming bandage are applied over one layer of orthopaedic padding. However, for a Robert Jones bandage – which is used to immobilise fractures – the bandage should end up six times the original circumference of the limb you are bandaging.

Tertiary layer

This is the protective outer layer that is usually achieved by using self-adhesive, conforming bandages. These bandages must be applied

carefully as they are stretchy and it is easy to put them on too tight. The aim is to get a neat, even finish, with no areas of focalised pressure or creases.

An adhesive layer can be applied at the top and bottom of the bandage to help keep it in place and to prevent any bedding getting down the top and contaminating the wound.

Conclusion

A bandage is a powerful tool used in veterinary practice to help patients to achieve

optimal wound healing. It is, however, important to have a good working knowledge of wound healing and factors that may interfere with this process. A poorly applied

bandage can often do more damage to the wound than no bandage at all, so rules and standards must be adhered to if we are to achieve optimal healing for our patients. ■

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Figure 1. How to bandage the hock.

Step 1



Prepare all your equipment in advance. This should include:

- tail bandage
- appropriate wound dressing
- gloves (non-sterile)
- orthopaedic padding
- cotton wool (half rolls)
- cotton wool doughnuts
- conforming layer
- zinc oxide tape cut into strips
- self-adhesive layer
- protective layer
- curved scissors.

Step 2



Ensure that your patient is restrained by a competent handler, wearing the appropriate PPE.

Step 3



Apply a tail bandage to your patient making sure that there are no long strands of hair hanging down, as these could contaminate the wound.

Step 4



Put on the non-sterile gloves.

Step 5



Select an appropriate wound dressing and apply it to the wound with the orthopaedic padding. You should try to work from distal to proximal as much as possible. The overlap between layers should be 50 per cent of the width of the previous bandage to ensure an even pressure is applied.

Step 7



Apply a conforming layer over the top of the cotton wool. Apply working from distal to proximal and overlap each layer by 50 per cent of the width of the previous layer. Never apply the conforming bandage directly to the patient's skin because this can cause damage. Always leave 1-2cm of cotton wool at the top and the bottom of the bandage. Do not apply this layer too tightly – a firm, even pressure is all that is required. Fix the bandage in place with zinc oxide tape. Do not tuck it in to secure it as this will create a pressure point within the bandage. For a supportive two-layer bandage, repeat steps 6 and 7.

Step 6



Apply the cotton wool over the top of the orthopaedic padding. Start distal and work to proximal. The overlap should again be 50 per cent of the width of the previous layer. A doughnut should be applied over the point of the hock to reduce pressure in this area.



Step 8



Apply the self-adhesive layer. This should be applied with an even pressure and should look neat and tidy when finished.

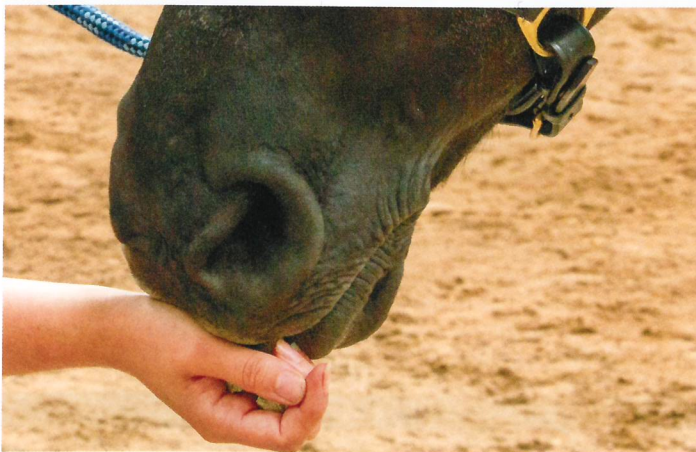
Step 9



Apply the protective layer to the top and the bottom of the bandage. Do not put this on too tightly – a firm, even pressure is all that is required.



Step 10



Pat your patient and feed him or her treats (if appropriate) so they know that they have been well behaved! Put them back in their stable.

References

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Knottenbelt DC (2003). *Handbook of Equine Wound Management*. Elsevier Science, Edinburgh.

Miller-Smith W (2006). 'First aid' in: Aspinall V (Ed), *The Complete Textbook of Veterinary Nursing* Elsevier Science, Edinburgh.

Packer M and Devaney J (2011). 'Dressings used in equine traumatic wound care', *The Veterinary Nurse* 1(3): 162-171.

PPD Questions

1. Name five of the 12 factors that delay wound healing

2. Very dirty wounds that are heavily infected can be lavaged with a dilute antiseptic. What concentration of chlorhexidine can be used in this situation?

3. Name three things you can do to prevent the formation of bandage sores in horses

Answers

1. Infection, movement, foreign bodies, necrotic tissue, continued trauma, poor blood supply, poor nutritional and health status, local factors (e.g. large tissue deficit), iatrogenic factors (e.g. incisions, swabbing and use of veterinary instruments), genetic factors (ponies heal faster than horses!), cell transformation (e.g. sarcoïd formation) 2. 0.5% chlorhexidine solution 3. Applying extra padding in the secondary layer, 'doughnuts' made from rolled-up cotton wool can be applied directly to a bony prominence; using bandaging materials that are at least 15cm wide; each layer of bandage applied should overlap the previous layer by 50 per cent so that an even pressure is achieved; apply enough pressure, but not too much