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Management of Degloving Injuries



A 3-year-, 9-month-old, neutered male collie was referred for management of a traumatic degloving injury.

History. The patient had been struck by a motor vehicle earlier in the day. The referring veterinarian stabilized the patient and diagnosed a degloving injury of the right metatarsal area and a fracture of the second metatarsal bone. Initial treatment consisted of administration of corticosteroids, analgesics, and a bolus of crystalloids.

Examination. The dog had normal vital signs; however, it was nonambulatory and considered to be anxious and in pain. A combination of SC buprenorphine and IV hydromorphone was used to manage pain while in the hospital. The patient had an extensive degloving wound involving the right metatarsus with underlying muscles, bones, and tendons exposed. An open, transverse fracture of the second right metatarsal was noted (**Figure 1**).

ASK YOURSELF...

How would you manage this wound?

- A. Lavage and debride degloved skin, place skin graft immediately, and apply a "sugar" bandage.
- B. Lavage and debride degloved skin and allow the wound to heal by second intention.
- C. Lavage and debride wound bed, suture degloved skin back in place, and apply a sugar bandage.
- D. Simply cover wound with a bandage.



Degloving wound at presentation: note extensive damage to the patient's skin and the open fracture of the second metatarsal bone.

Correct Answer: C
Lavage and debride wound bed, suture degloved skin back in place, and apply a sugar bandage.

Initial Management. Proper initial management can help ensure that complicated wounds heal properly.

- The goals of lavage and debridement are multiple and include: removal of devitalized/necrotic tissue, foreign debris, microbiological organisms, and inflammatory mediators.¹
- Degloved skin may survive; therefore immediate debridement of the skin flap should be delayed for 5 to 7 days until demarcation of necrotic skin occurs.
- Granulation tissue is necessary, because it is highly resistant to bacterial penetration and it provides a barrier to systemic infection.¹ It contains fibroblasts and capillaries, which are essential for new extracellular matrix formation and wound contraction. It is also an essential substrate for a skin graft.

Benefits of Sugar Bandaging. Degloving wounds are common and are most often caused by vehicular injury that results in avulsion of skin, subcutaneous tissues, and blood supply from the underlying tissues.² Proper initial wound management is paramount to successful treatment. Sugar bandaging is one component of initial management that can be used in such cases. Sugar has many attributes that make it an attractive component to wound therapy:

- When applied directly to a wound, sugar acts as a mechanical debriding agent.^{2,3}
- It provides a hyperosmolar environment, which draws extravascular fluid into the wound and contributes to its bactericidal properties.
- It attracts macrophages into the wound, which help to hasten sloughing of necrotic or devitalized tissue.
- It cleanses the wound, decreases inflammatory edema, decreases odor, and rapidly induces the formation of granulation tissue and reepithelialization.^{2,3}



HOW TO APPLY SUGAR & MAINTAIN BANDAGES

- Lavage the wound with copious amounts of a fluid suitable for wound irrigation. Debride devitalized/necrotic tissue.
- Pour sugar into the wound, completely covering affected area, to a depth of approximately 1 cm, and bandage the wound with sterile, dry, absorbent material. Follow general bandaging principles and include a second bandage layer to hold the absorbent material in place. Then cover with an adhesive tertiary layer.
- Initially sugar bandages should be changed once to twice daily or if strike-through occurs. If crystalline sugar is present in the wound at the time of bandage change, the bandage should be changed less frequently.
- Lavage the wound at each bandage change and pat dry with sterile gauze sponges. Reapply sugar as above.
- Treat the wound with sugar until healthy granulation tissue is present.

Case Management. The owners were instructed to change the bandage and reapply sugar at home twice daily and to have the wound evaluated in 7 days. While at home, pain was controlled using tramadol and infection was controlled using enrofloxacin and amoxicillin.

Seven Days After Injury. Figure 2 shows the affected area seven days after injury. Note the complete discoloration of the degloved flap and line of sharp demarcation at the distal aspect of wound. The character of the skin was leather-like and Doppler assessment of the affected area revealed complete lack of blood flow to the entire flap, indicating complete necrosis.

The third digital pad also became necrotic and it was determined that the pad would be removed along with the digit at the time of graft surgery. Granulation tissue was developing in the wound; therefore, a nonadherent dressing (Adaptic Non-

Adhering Dressing; Johnson & Johnson, www.jnjgateway.com) was applied. Bandage changes continued twice daily, for another seven days, until skin graft surgery. The decision to change bandages twice daily was in part due to the owners' wishes. The wife is a veterinary technician and the husband is a paramedic.

Surgery. Prior to planning the grafting procedure, the remaining portion of the metatarsal pad was sutured in place over the weight-bearing region of the plantar metatarsophalangeal joints. The entire distal portion of the third digit became necrotic, so amputation at the level of P2/P3 was performed.

A paper template was made from the wound area. The template was placed over the lateral abdominal region and the outline of the graft was incised with a scalpel. Two stay sutures

continues



were placed at the corners of the graft. Fine, sharp Metzenbaum scissors were used to sharply excise the graft from the donor site. A rolled laparotomy sponge was used to stretch the skin graft as it was being harvested in order to facilitate rapid and easy excision of hypodermal fat (Figure 3). The graft was fenestrated using a #11 scalpel blade just prior to detachment from the donor site. The graft was then transferred to the recipient wound, stretched over the wound under mild tension, and stapled in place. The fenestrations act to relieve tension of the graft and they also act as drainage ports. The wound was bandaged using nonadherent bandage material as a primary layer (Figure 4). Note the antibacterial ointment spread on top of dressing.

Postgrafting Progress. Initially, wound healing was reevaluated on a daily basis for the first 3 days, then on a weekly basis for 3 weeks. Throughout the convalescent period, the owners were instructed to continue bandage changes every 48 hours, leaving the dressing layer in place and reapplying a topical antibacterial ointment on top of it. As of 21 days after surgery, 95% of the graft appeared to take to the donor site and the remaining area appeared to heal by second intention (Figure 5). The metatarsal pad appeared to have doubled in size throughout the 3 weeks of reevaluations due to hypertrophy with weight bearing. Recommendations for passive range of motion and gradual decrease of bandage material were made. ■

TAKE-HOME MESSAGES:

- Complete lavage and debridement of traumatic wounds is essential in preparing the area for proper healing.
- Sugar dressing is an easy and effective way to manage the healing of grossly contaminated wounds. Sugar is readily available, it is inexpensive, and it has many attributes making it suitable for wound management.
- Wounds on the distal aspect of limbs are especially challenging because of the lack of excess tissue that can be used for primary closure. Skin grafting is an easy, effective reconstructive modality that can be used to close wounds of this nature.

TIPS FOR SUCCESSFUL SKIN GRAFTING:

- A wound that has chronic fibrotic granulation tissue should be debrided down to healthy tissue and reformation of healthy granulation tissue over 5 to 7 days should be allowed prior to grafting.
- All fat should be removed from the graft; however, aggressive debridement of hypodermal tissue will result in poor hair growth. A skin graft can be quickly and easily prepared by stretching it over a roll of laparotomy sponges with two stay sutures.
- Ensure that the graft is oriented on the recipient wound such that the direction of hair growth matches surrounding skin.
- Staple or suture the graft in place under some tension, which will improve adhesion. In addition, this will minimize accumulation of fluid beneath the graft.
- A nonadherent contact dressing such as petrolatum-impregnated gauze (Adaptic Non-Adhering Dressing; Johnson & Johnson, www.jnjgateway.com) should be placed over the graft. Avoid tight bandages and removing the contact layer of bandage until the graft has "taken" (about 5 days).
- Wounds located in a mobile area should be supported with a splint.



at a Glance

- The second digit and associated metatarsal bone were removed.
- The entire affected area was copiously lavaged with sterile saline.
- Multiple tacking sutures were used to attach the degloved flap back over the wound.
- A sugar bandage was placed over the wound.
- A spoon splint was also placed to reduce movement of the flap during healing.

See Aids & Resources, back page, for references, contacts, and appendices.

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