**Complications in Wound Healing And Possible Solutions**

Granulation tissue and proud flesh- too much of a good thing:

Granulation tissue begins to form from three to six days after injury and is an important stepping stone in the repair process. It provides a protective seal over the underlying tissues and hence prevents bacterial infection. It also acts as a bridge to allow epithelial cells to migrate over and it contains fibroblasts, which are the cells responsible for both production of collagen and wound contraction, all essential parts of the wound healing process.

Unfortunately, horses are the species ‘par excellence’ in forming excessive granulation tissue, commonly referred to as ‘proud flesh’. Granulation tissue is considered to be excessive (or ‘proud’) when it becomes raised above the level of the normal adjacent skin. Good wound repair practices as early as feasible, and pressure in the form of bandaging or casting will help to reduce the likelihood of proud flesh but sometimes it just cannot be avoided.

The best way to deal with proud flesh is to have it surgically removed by a vet, who will often trim it back level or to just below the level of the adjacent skin.

Other common treatment methods for proud flesh includes the use of astringent or caustic medications such as Ranvet Yellow Lotion or topical steroid ointments such as Prednoderm. Both these approaches will likely be successful at dealing with the excessive granulation tissue but can be damaging to other components of the wound healing process.

Antibiotics, pros and cons.

Antibiotics are usually only prescribed for more serious wounds and those involving deeper structures. They are not needed for superficial wounds only involving the skin. When joints are involved, or healing is delayed vets may perform a ‘culture and sensitivity’ of a wound discharge, joint or tendon fluid to determine what bacteria are involved and the best antibiotic for treating that strain. Surgical flushing of wounds, infected joints and tendon sheaths with antibiotics is sometimes indicated.

Topical antibiotics may also be used, with the recommendation they are not used for longer than 1-2 weeks to help prevent bacterial resistance. Silver impregnated dressings and raw Manuka honey are thought to have some antimicrobial properties, however if a wound is truly infected, systemic antimicrobials should be used.

Bandaging and casting legs.

Keep wounds bandaged for as long as possible- the firm pressure of such dressings greatly aids and expedites wound repair. There are no golden rules regarding intervals between bandage changes, for this varies according to the degree of exudate and size of the wound or its location. Some wounds need daily dressing initially which can then be extended to alternate days or longer as the wound begins to heal.

Casting legs can have very good results. Casts reduce the requirement for frequent dressing changes and provide stability to wound edges. They are often necessary when serious tendon or ligament damage has occurred, and the limb needs extra support. Most vets prefer that horses are hospitalised when wearing distal limb casts to allow for close monitoring.

Fresh, profusely bleeding limb wounds will need to have a pressure bandage applied immediately. A relatively small, non-life-threatening quantity of blood can look like a much greater quantity (a horse has to lose upwards of 1.4 gallons of blood before there is a severe problem). A pressure bandage compresses the haemorrhaging blood vessels and helps promote blood clotting. If a large artery is severed, it can be hard to apply enough pressure, especially if the laceration is someplace other than the lower limb, but an attempt should be made.

The immediate bandage should not be too thick, as this will limit its ability to apply enough pressure for bleeding control. Generally, three sheets of sheet cotton, a shipping bandage quilt, a large bath towel appropriately folded, or several layers of roll cotton is sufficient and can be applied with several rolls of elastic bandage material. The elastic bandage material should be applied in a smooth, even, and firm manner—there must be adequate pressure if it is to be effective in controlling haemorrhage. This sort of bandage might be too tight for long periods of time but can effectively control bleeding. Leave the bandage in place for 20-30 minutes, then replace it with new material applied snugly. If the bleeding has subsided, apply a clean and more normally applied support bandage.

If the laceration involves the flexor tendons or suspensory ligament, it’s important to provide support and immobilization. A Robert Jones bandage (a layered and padded bandage to limit limb mobility) and splinting should be applied for transportation or while waiting for veterinary evaluation. This support and immobilization might help prevent further damage to the injured area. The horse should be moved as little as possible until he has been evaluated and treated.

If the wound is older, bleeding might have subsided or slowed, but there could be contamination with dirt, debris, and bacteria. In wound repair, there is a "golden period," thought to be the first six hours after initial injury. If the wound is appropriately cleansed and treated during that time, chances of complication from infection and subsequent repair breakdown are reduced. Therefore, it is important to have wounds evaluated and treated as soon as possible.

In the interim, cleanse the wound with warm water and a mild soap or dilute chlorhexidine solution to minimize contamination and potentially reduce the risk of complications. Applying a sterile dressing and support bandage can help a lot, especially if the veterinarian can’t come right away. If the wound is very old (with dried-out skin edges, obvious infection, or pus), swollen, and inflamed, hose it with water to reduce inflammation and clean it until a veterinarian can properly debride the wound.