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HOW TO CLOSE - FLAP RECONSTRUCTION AND SKIN GRAFTS

Next to the reliance on secondary wound healing for full-thickness skin defects, there are many other surgical options for coverage of large defects. The skin of dogs and cats is loosely attached to the underlying fascia and is viscoelastic, which makes it very suitable for reconstruction techniques.

Tension-relieving techniques and wound plasty

Wounds should always be closed without tension on the suture line to prevent complications such as dehiscence. Several techniques are available to relieve tension on the wound edges. Proper understanding of the skin tension lines of the animal and careful surgical planning are essential. Techniques for relieving tension include undermining of adjacent skin, the use of tension-relieving suture patterns, skin stretching and relaxing incisions. Another option is the use of wound plasty, where a flap of adjacent skin is used to relief tension on the wound. Available techniques include the V-Y plasty, Z-plasty and M-plasty.

Subdermal plexus flaps

The aim of a flap is to transfer tension from edges of the original wound to fresh wound edges created by relocation of the donor skin. Subdermal plexus flaps are full-thickness skin flaps, that rely on collateral blood circulation through the subdermal plexus from the remaining attachments to adjacent skin. Usually they are detached along three or four sides and then stretched or rotated into the defect. The aforementioned plasty techniques are essentially a form of subdermal plexus flaps. Other types of subdermal plexus flaps include advancement flaps (single or bipedicle), rotation flaps, transposition flaps, interpolation flaps and distant flaps that can be created directly or indirectly.

Preparation for surgery includes optimizing the systemic condition of the patient; ruling out or treating any systemic illness that can delay wound healing. Local preparation of the recipient bed should provide a tissue bed with healthy and well vascularized granulation tissue, without infection, contamination or necrotic tissue. The created flap should be large enough to cover the whole defect, with still being able to close to donor site without tension. Since the blood supply depends on the base of the flap, this should not be too narrow or more narrow than the remainder of the flap. In undermining the flap, care must be taken not to damage the subdermal plexus. Subcutaneous musculature can be included or excluded in the undermined skin; sometimes other underlying tissues (such as mucosa) can also be included (so called composite flaps).

Examples of subdermal plexus flaps include skin fold flaps, in which the elbow or flank fold is used; scrotal flaps, in which the scotal skin is harvested after castration; labial flaps to correct lip defects and the so-called lip-to-lid flap where the upper lip skin with underlying mucosa is used to replace the lower or upper eyelid.

Axial pattern flaps

Axial pattern flaps incorporate a direct cutaneous artery and vein, of which terminal branches supply and drain the subdermal plexus. Compared to subdermal plexus flaps, this allows for a larger flap with more consistent survival. A variety of axial pattern flaps have been described in dogs and cats, among which the most commonly used and most versatile are the thoracodorsal and the caudal superficial epigastric axial pattern flaps.

An axial pattern flap can be rotated up to 180 degrees to cover wounds adjacent or distant to the donor site. Advantages of axial pattern flaps include the size of the defect that can be closed with the flap, the possibility of early closure, coverage of areas with suboptimal wound healing conditions and excellent flap survival rates (87-100%). Disadvantages include cosmesis, the limited use on distal limbs, and regional variation in vascular anatomy making identification of the direct cutaneous vessel difficult. As with subdermal plexus flap both patient and local preparation and planning are essential to optimize flap survival rates. The presence of granulation tissue in the recipient bed is not required, but it should be free of gross contamination. Fresh wound edges should be created with sharp incision in chronic wounds. Boundaries of the flaps are described for every axial pattern flap and blood supply should be carefully preserved during flap preparation. In closure, tacking sutures under the flap should

be avoided or used very cautiously to prevent damage of the vasculature, and usually one or more drains are placed under the flap to reduce dead space and prevent fluid accumulation.

Skin grafts

In dogs and cats, skin grafts are usually indicated on distal limbs, where wounds are not suitable for local flap reconstruction. There are several types of skin grafts (full thickness, spilt thickness, meshed and unmeshed), but in small animals, the most commonly used graft type is the full thickness mesh graft. Donor skin is most commonly harvested from the lateral thorax or lumbar regions. Preparation of the graft bed should result in a healthy granulation bed, or a well vascularized fresh wound bed with fresh wound edges. After harvest of the donor skin, all subcutaneous tissue must be removed, resulting in a cobblestone appearance of the underside of the graft. Meshes can be created with a scalpel blade or a special mesh device. The graft is then placed on the recipient bed and sutured around the edges and in some of the slits. The donor site is closed directly after undermining of the wound edges.

The most common causes of graft failure are separation of the graft from the recipient bed, infection and movement. Postoperative care should be aimed at reducing these conditions, including a proper and strict bandaging regime. Another way to augment graft take is the use of negative pressure wound therapy over the graft, increasing graft survival compared to standard bandage care.

References

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