

Skin Flaps

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• Skin flap • Skin transposition • Reconstructive surgery

Open wounds, particularly around the face, often require complicated techniques for optimal closure. The approach to the closure of the complicated wound depends largely on the nature of the wound, including the location and size of the defect, the functional outcome after closure, the medical comorbidities of the patient, neighboring structures, and whether the defect is secondary to a malignancy or trauma. The goals of wound management are optimal aesthetic outcome, preservation of function, and patient satisfaction.

The authors briefly review basic skin closure options and discuss use of skin flaps, particularly of the head and neck region.

HISTORY OF SKIN FLAPS

The earliest documented surgical intervention to rebuild a complicated defect occurred in India in 700 BC. Sushruta published a description of a forehead flap for nasal reconstruction. This information was not available to Western medicine until the late 1700s, when a British surgeon noted the technique still used in India and wrote a brief description in *Gentleman's Quarterly*.

Independently, the Italians developed delayed flaps, tube flaps, and flap transfers by using the upper inner arm skin to reconstruct a nose. This technique was published by Tagliacozzi in the 1500s. In modern medicine, the use of local flaps to repair facial defects began to evolve during the mid-1800s. A variety of flaps were used, but the blood supply and the dynamics of the surgery were not well understood. Harold Gilles popularized tube flaps and flap delays and initiated an interest in reconstructive surgery after World War I.¹

Local skin flaps, such as those described in this article, were primarily refined in the 1950s in Europe and the United States by the second generation of plastic surgeons. Ian MacGregor^{2,3} recognized the importance of an axial blood supply in flap surgery in the 1970s. Plastic surgeons have subsequently redefined cutaneous blood supply.

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Countless vascularized flaps have since been developed. The skin flaps discussed in this article are primarily random flaps.¹⁻³

PREOPERATIVE PLANNING AND CONSIDERATIONS

For each patient, a medical history encompassing smoking, peripheral vascular disease, atherosclerosis, diabetes mellitus, steroids, and previous surgeries should be elicited, because of the effects of these factors on wound healing and skin perfusion.

In managing the excisional defect, the surgeon must first assess the size and depth of the wound, as well as the nature of any exposed underlying internal anatomy. A defect containing exposed bone, nerves, or blood vessels usually necessitates a more advanced closure than would a less complicated wound.

The quality of the surrounding skin is also of great importance. Skin quality may vary from young, tight, and elastic to aged, dry, and lax. The wrinkled skin of an older patient produces less obvious scarring and offers the opportunity to conceal scars within skin tension lines. Skin that is more oily or heavily pigmented generally yields a less favorable scar. Color match is also of importance in deciding on the flap donor site. The presence of actinic damage, skin diseases, and premalignant satellite lesions should be considered. Finally, location is of major concern. Defects adjacent to critical anatomic structures, such as the eyelids, the nares, the oral commissure, and the external auditory meatus, must be reconstructed so as to avoid distorting the anatomy unique to those areas. Any alteration of these surrounding landmarks may compromise functional and aesthetic results. Previous surgical incisions and traumatic scars should also be assessed before the closure of the defect is designed.

Well-planned and -executed reconstruction of facial defects is particularly important because of the visibility of the result and the potential for functional deficits. However, the principles presented here may be applied to the management of all complicated wounds.

In the repair of facial tumor defects, the most important consideration is the management of the tumor. Incompletely excised tumor should not be covered by a flap. Skin adjacent to a tumor resection margin should not be turned over to line the nasal cavity or any other site where it will be difficult to examine. In patients who have a history of multiple or recurrent skin cancers, a strategy must be developed to allow for serial repairs. No bridges should be burned along the way. When planning a reconstruction, one must protect function first, then consider the cosmetic issues. It is crucial to discuss options with patients so that they can offer any biases that must be respected. A good-looking static repair that compromises dynamic function is unacceptable. The anatomic boundaries of the face are the allies of a good plastic surgeon. They must be respected and will be helpful in camouflaging scars.

Many defects can be treated with primary closure, secondary healing, or skin grafts. However, if, after careful assessment of the lesion, defect, and patient, the surgeon determines that the patient needs a flap for closure, he or she can apply techniques that produce the optimal aesthetic outcome.

TUMOR RESECTION

The paramount consideration in tumor excision should be the complete removal of the tumor. Although the surgeon should have a number of reconstructive options in mind, the planned reconstruction should not dictate the extent of tumor excision. The surgeon must remain open to alternative reconstructive techniques. If the defect obtained in excising the tumor cannot reasonably be reconstructed at the time of the

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