



# Skin grafting in oral cavity reconstruction

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## KEYWORDS

Skin grafting;  
 Oral cavity;  
 Head and neck  
 reconstruction;  
 Oral cavity cancer

**OBJECTIVES** The intent of this article is to help define the role skin grafts have in the reconstruction of oral cavity defects. It also illustrates the technique used and refined over the last 10 years at the authors' institution.

**DESCRIPTION** Skin grafting remains a very useful method of reconstructing soft tissue defects in the oral cavity. It allows for the reconstruction of the tongue, floor of mouth, buccal mucosa, and maxillectomy defects. Its ability to prevent tethering and preserve tongue mobility is extremely important. This method of reconstruction requires the harvesting of a medium thickness skin graft that is bolstered with sutures into the defect. The need to immobilize the skin graft with a bolster is very important in order to prevent sheering and graft loss. The bolster is then removed after five days, at which time the graft can be assessed. Minimal debridement should be performed initially, and small amounts of graft loss are usually well compensated for; however, complete graft loss will require regrafting of the defect.

**CONCLUSION** Skin grafting is a very useful method of reconstruction for specific oral cavity defects. The reconstructive technique revolves around a few key principles that are easily learned, and a successful skin graft allows for the preservation of mastication and speech.

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The oral cavity is the site most frequently affected by squamous cell carcinoma in the upper aerodigestive tract.<sup>1</sup> Methods to reconstruct surgical defects range from healing by second intention to the use of microvascular free flaps. Skin grafts have been used for some time to reconstruct the oral cavity. The ability to replace large mucosal defects with minimal bulk has significant utility in this area. We shall review the technical details important to the successful application of skin grafts in the oral cavity.

## Anatomy

The skin is comprised of three layers—the epidermis, dermis, and subcutaneous tissues. The epidermis is made up of several layers including the outermost stratum corneum (no nucleus) and a basal layer (stratum basal) that has mitotically active cells able to repopulate the upper layers.<sup>2</sup> Cells with varying degrees of keratinization populate the interme-

diate layers. The dermis can be divided into a papillary and reticular portion. The papillary portion has projections called rete pegs that carry capillary beds up to the epidermis. The reticular dermis has denser connective tissue and houses the adnexal structures (follicles and sebaceous glands). Split-thickness skin grafts (STSG) incorporate the epidermis and varying degrees of dermis based on desired thickness of the graft (Figure 1).

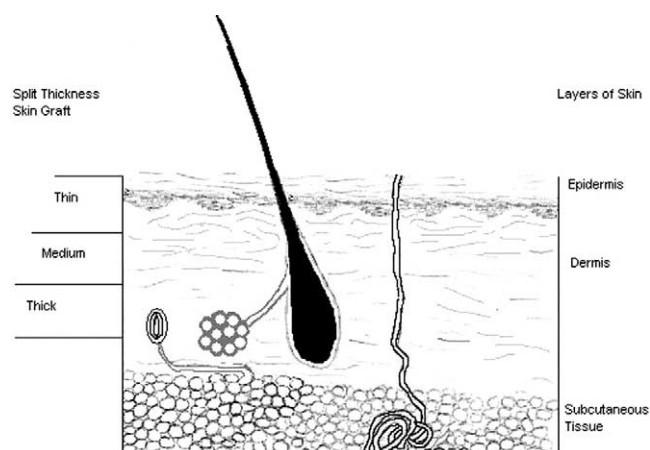
## Graft biology

Harvested skin grafts no longer have their own blood supply and require a vascular recipient bed to survive. Cortical bone and cartilage are unable to support skin grafts because they lack a vascular bed, but when periosteum/perichondrium is present, skin grafts are able to adhere and survive on these surfaces.<sup>3</sup>

A second requirement for graft survival is immobilization. For the graft to survive, it must acquire a blood supply from the recipient bed. This occurs in three phases over approximately 7 days, with the first 2 to 3 days being the most tenuous because of edema.<sup>4</sup> Graft take is not possible if significant sheering forces are allowed to act on the graft.

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**Figure 1** Skin grafts harvested for the oral cavity are of medium thickness in the range of 0.016 to 0.018 inches.

To decrease sheering forces, the graft is bolstered into place for 5 to 7 days. When a bolster is used in the oral cavity, it is usually necessary to perform a tracheostomy to safely maintain the patient's airway and to provide for clearing of tracheobronchial secretions.

Hemostasis at the recipient site is another important requirement. The graft will not adhere to the recipient bed if a hematoma develops. This is the most common reason for graft failure.<sup>5</sup> Some authors recommend making multiple small cuts in the graft to prevent accumulation of blood or serous exudates underneath the graft.

## Indications

When planning reconstruction of the oral cavity, it is important to consider the functional requirements of the defect. STSG are most successfully employed when minimal bulk is needed and an epithelial covering is desired to prevent scarring and tethering of the tongue (ie, loss of the lingual sulcus or anterior floor of mouth). Ankyloglossia can be a significant consequence resulting in poor articulation and deglutition. STSG are able to cover the defect while allowing adequate mobility of the remaining tongue and excellent restoration of speech and swallowing.<sup>6</sup>

Skin grafts can be used to reconstruct defects of various subsites in the oral cavity. These include defects created from resections of the floor of the mouth, retromolar trigone, and partial and hemiglossectomy. Resection including a marginal mandibulectomy may also be reconstructed with a skin graft. This is possible because the remaining exposed mandible is primarily cancellous bone with only a thin rim of cortical bone.<sup>7</sup> Defects of the buccal mucosa created during a maxillectomy may be covered with a skin graft as well.

The primary contraindication to using a skin graft in the oral cavity is a history of prior radiation to the head and neck. Any patient with a history of radiation would be better served with reconstruction using well-vascularized tissue such as a radial free flap or a pedicled flap (ie, pectoralis major flap), particularly if radiated bone will be exposed if the STSG fails. Another situation where skin grafts may not be the best reconstructive option is in extremely large re-



**Figure 2** The dermatome engages the skin at a 45° angle. (Color version of figure is available online.)

sections where bulk may be desired to aid function after the repair.

## Technique

The first consideration in harvesting a STSG is the location of the donor site. The thigh is a commonly used location because it has relatively thick skin, is easily accessible, and is well concealed by the patient. Preparation includes positioning the leg to give access to a large surface area, shaving the area, and prepping it with an antibacterial wash (avoid Duraprep for skin grafts because it does not wash off easily and can cause the dermatome to stick).

After resection of the primary tumor, the surgeon (or assistants) must change gown and gloves and use a sterile setup to harvest the graft. Skin grafts can be harvested by free cutting (Humby knife), drum dermatomes, or air/electric powered dermatomes. The width of the graft depends on the size of the defect. It is important to remember to convert your 3-dimensional defect into a 2-dimensional area to harvest the correct amount of skin. It is also better to err on



**Figure 3** Once the skin is engaged, the dermatome angle is dropped to 30° for the remainder of the harvest. (Color version of figure is available online.)

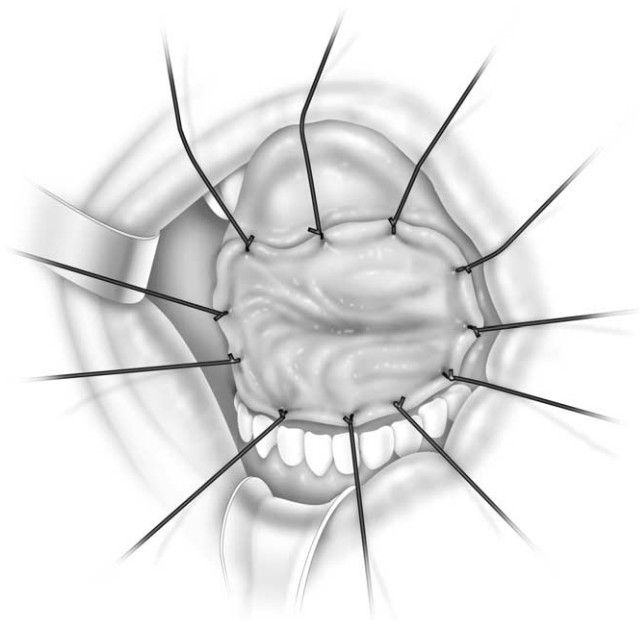


**Figure 4** After an adequate amount of skin has been harvested, the dermatome angle is dropped to 0° to cut the graft from the remaining attachment to the donor site. (Color version of figure is available online.)

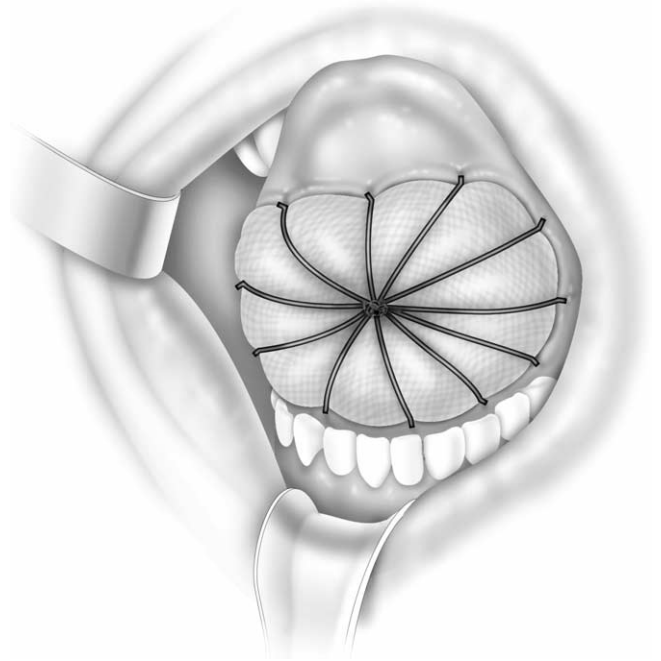
the side of more graft than necessary and trim the graft as needed.

Typically, grafts in the oral cavity are of medium thickness at 0.016 to 0.018 inches. This setting is always checked to avoid inadvertent harvesting of a graft of incorrect thickness. Once the desired thickness and width of the graft have been selected, the graft may be harvested. The donor site must be thoroughly cleaned of all antiseptic and dampened with sterile saline. With older dermatomes, mineral oil was needed to help prevent sticking to the skin, but with the Zimmer-style dermatome (Zimmer, Warsaw, IN), moistening the skin with saline is adequate.

Two important points when starting is to maintain constant tension and engage the donor site at a 45° angle. The operator of the dermatome should use his/her non-



**Figure 5** This drawing illustrates the skin graft in the oral cavity defect (tongue/floor of mouth) with bolster sutures in place. Note that the bolster sutures are left long and the skin graft overlaps the mucosal edge of the defect.



**Figure 6** This illustration shows the end of the procedure after the bolster is tied in place with long Vicryl sutures.

dominant hand to retract the skin just behind the dermatome. An assistant should be placing counter traction and move with the dermatome to keep the skin taught throughout the procedure. The dermatome should engage the skin at a 45° angle and then drop to a 30° angle for the remainder of the harvest. Constant pressure and momentum should be maintained throughout. Once the desired length of graft is achieved, the dermatome can be dropped parallel to the skin and the graft can be cut from its attachment. The graft is then placed in sterile saline until needed (Figures 2-4).

Once the graft is harvested, the donor site will need covering. Various dressings may be used, but we prefer to spray the site with thrombin spray and then cover it with Glucan II matrix (Brennen Medical, St. Paul, MN). The matrix is then covered with an Exudry dressing (staples used to tack both down) (Smith & Nephew, Largo, FL). The Exudry is removed the following day to prevent sticking and infection underneath the dressing. The matrix is allowed to slough over the next 7 to 10 days.

### Graft placement

Once hemostasis and thorough irrigation of the defect have been performed, the graft can be placed. The graft must be placed with the dermal side down, and it must be in contact with the recipient bed to survive (ie, minimize bunching of the graft). Once the graft is inset, 3-0 chromic sutures are used to tack the graft to the underlying muscles to keep the graft in place. The graft is placed so that the edges overlap the mucosal edge, and it is sown in a pie-crusting fashion.<sup>7</sup> The edge of the graft is sewn in with 3-0 Vicryl sutures (Ethicon, Somerville, NJ), with every other suture left long. If drainage cuts are desired in the graft, they are made at this

point. It must be remembered that when constructing through-and-through defects in the oral cavity (ie, connect with the neck), an intact graft that is watertight is required, and no drainage cuts are desired.<sup>8</sup> Once the graft is adequately secured and excess graft trimmed, antibiotic impregnated gauze is firmly packed over the graft. Bolstering the graft helps keep it in place (ie, decreases sheer forces) and expands the graft, pushing it in contact with the recipient bed. The gauze should be packed to a level that will allow the bolster sutures (the 3-0 Vicryl sutures at the edge) to be cross-tied to hold it snugly in place. In the through-and-through defect, it is also advisable to wrap the patient's neck (eg, with pressure dressing) postoperatively until the bolster is removed to help the tissues remain in contact with the graft (Figures 5 and 6).

The bolster dressing is left in place for 5 to 7 days; this is when the graft is most susceptible to sheer forces and has not yet acquired a blood supply of its own. After 5 days, the bolster can be taken down and the sutures cut. It is important to remember that debridement of the graft should initially be kept to a minimum, and any areas of concern should be allowed to declare themselves before more aggressive debridement is performed. Small areas of graft loss, especially on the periphery of the wound, are of little concern and will re-epithelialize. Large areas or total graft loss, however, may require debridement and regrafting at a later time.

## Conclusion

Skin grafting can make for an excellent method of reconstruction of the oral cavity. When performed effectively and appropriately, it will allow the patient to maintain excellent articulation and swallowing. It is important to remember that even with newer methods of reconstruction, STSG still has a role in the reconstruction of defects in the oral cavity.

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