



Principle of reconstructive surgery in orofacial region

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Classification of defect in orofacial region

1. Bone defect
2. Soft tissue defect
3. both

Defects of the facial bones

■ Causes

1. congenital deformities
2. Trauma
3. Infections
4. eradication of pathologic conditions

Goals of Reconstruction

- Restoration of function
- Facial reanimation
- Dental rehabilitation
- Return of sensation



Biologic Basis of Bone Reconstruction

- A tissue that is transplanted and expected to become a part of the host to which it is transplanted is known as a graft. Several types of grafts are available to the surgeon. A basic understanding of how a bone heals when grafted from one place to another in the same individual (i.e., autotransplantation) is necessary to understand the benefits of the various types of bone grafts available.
- The healing of bone and bone grafts is unique among connective tissues because new bone formation arises from tissue regeneration rather than from simple tissue repair with scar formation.



Definition of osteogenesis

- development and formation of bone

Phase Theory of Osteogenesis

- Two basic processes occur on transplanting bone from one area to another in the same individual.
1. The first process that leads to bone regeneration arises initially from transplanted cells in the graft that proliferate and form new osteoid.
 2. second phase of bone regeneration beginning in The second week. Intense angiogenesis and fibroblastic proliferation from the graft bed begin after grafting and osteogenesis from host connective tissues soon begins.

Immune Response

- When a tissue is transplanted from one site to another in the same individual, immunologic complications usually do not occur. The immune system is not triggered because the tissue is recognized as "self." However, when a tissue is transplanted from one individual to another or from one species to another, the immune system may present a formidable obstacle to the success of the grafting procedure. If the graft is recognized as a foreign substance by the host, it will mount an intense response in an attempt to destroy the graft.

Method to improve the success of grafting

1. suppression of the host individual's immune response.
2. alteration of the antigenicity of the graft so that the host's immune response will not be stimulated.

Several methods of treating grafts have been used, including boiling, deproteinization, use of thimerosal (Merthiolate), freezing, freeze-drying, irradiation, and dry heating.



Type of bone graft

1-Autogenous Grafts

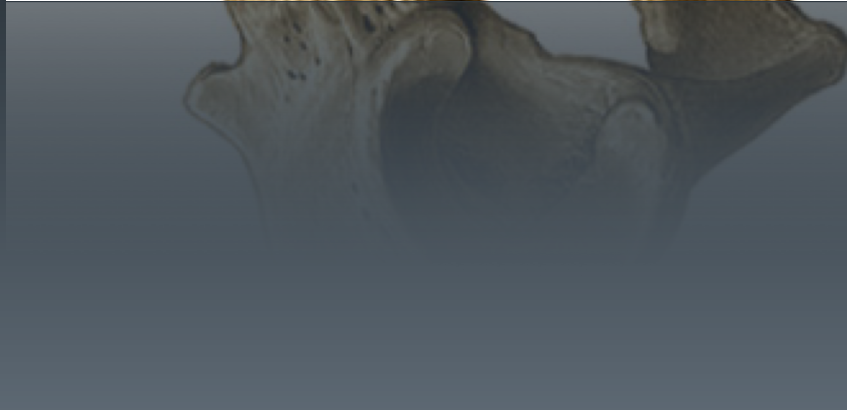
- Also known as autografts or self-grafts, autogenous grafts are composed of tissues from the same individual. Fresh autogenous bone is the most ideal bone graft material. The autogenous graft is unique among bone grafts in that it is the only type of bone graft to supply living, immunocompatible bone cells essential to phase I osteogenesis. The larger number of living cells that are transplanted, the more osseous tissue that will be produced.
- The bone can be obtained from a host of sites in the body and can be taken in several forms. Block grafts are solid pieces of cortical bone and underlying cancellous bone.


1. The iliac crest

2. Ribs

Autogenous bone may also be transplanted while maintaining the blood supply to the graft. Two methods can accomplish this:


1. (pedicled composite graft) involves the transfer of bone graft pedicled to a muscular (or muscular and skin) pedicle. segment of the clavicle transferred to the mandible, pedicled to the sternocleidomastoid muscle.
2. (free composite graft), by which autogenous bone can be transplanted without losing blood supply is by the use of microsurgical techniques.



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- The **advantages** of autogenous bone are that it provides osteogenic cells for I bone formation, and no immunologic response occurs.
 - A **disadvantage** is that this procedure necessitates another site of operation for procurement of the graft.


Allogeneic Grafts

- Also known as allografts or homografts, allogeneic grafts are grafts taken from another individual of the same species. Because the individuals are usually genetically dissimilar, treating the graft to reduce the antigenicity is routinely accomplished.
- Today, the most commonly used allogeneic bone is freeze-dried. All of these treatments destroy any remaining osteogenic cells in the graft, and therefore allogeneic bone grafts cannot participate in phase 1 osteogenesis. The assistance of these grafts to osteogenesis is purely passive; they offer a hard tissue matrix for phase II induction.

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- **Advantages** are that allogeneic grafts do not require another site of operation in the host and that a similar bone or a bone of similar shape to that being replaced can be obtained (e.g., an allogeneic mandible can be used for reconstruction of a mandibulectomy defect).
 - The **disadvantage** is that an allogeneic graft does not provide viable cells for phase I osteogenesis.

Xenogeneic Grafts

- Also known as xenografts or heterografts, xenogeneic grafts are taken from one species and grafted to another. The antigenic dissimilarity of these grafts is greater than with allogeneic bone. The organic matrix of xenogeneic bone is antigenically dissimilar to that of human bone, and therefore the graft must be treated more vigorously to prevent rapid rejection of the graft. Bone grafts of this variety are rarely used in major oral and maxillofacial surgical procedures.

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- **Advantages** are that xenografts do not require another site of operation and a large quantity of bone can be obtained.
 - **disadvantagees** are that xenografts do not provide viable cells for phase 1 osteogenesis and must be vigorously treated to reduce antigenicity.

Goals of Mandibular Reconstruction

1. Restoration of continuity
2. Restoration of alveolar bone height
3. Restoration of osseous bulk



imaging

1. OPG.
2. Computed tomography (CT)
3. CBCT
4. Virtual three-dimensional models



Surgical Principles of Maxillofacial Bone Grafting Procedures

- 1. Control of residual mandibular segments**
- 2. A good soft tissue bed for the bone graft**
- 3. Immobilization of the graft**
- 4. Aseptic environment**
- 5. Systemic antibiotics**



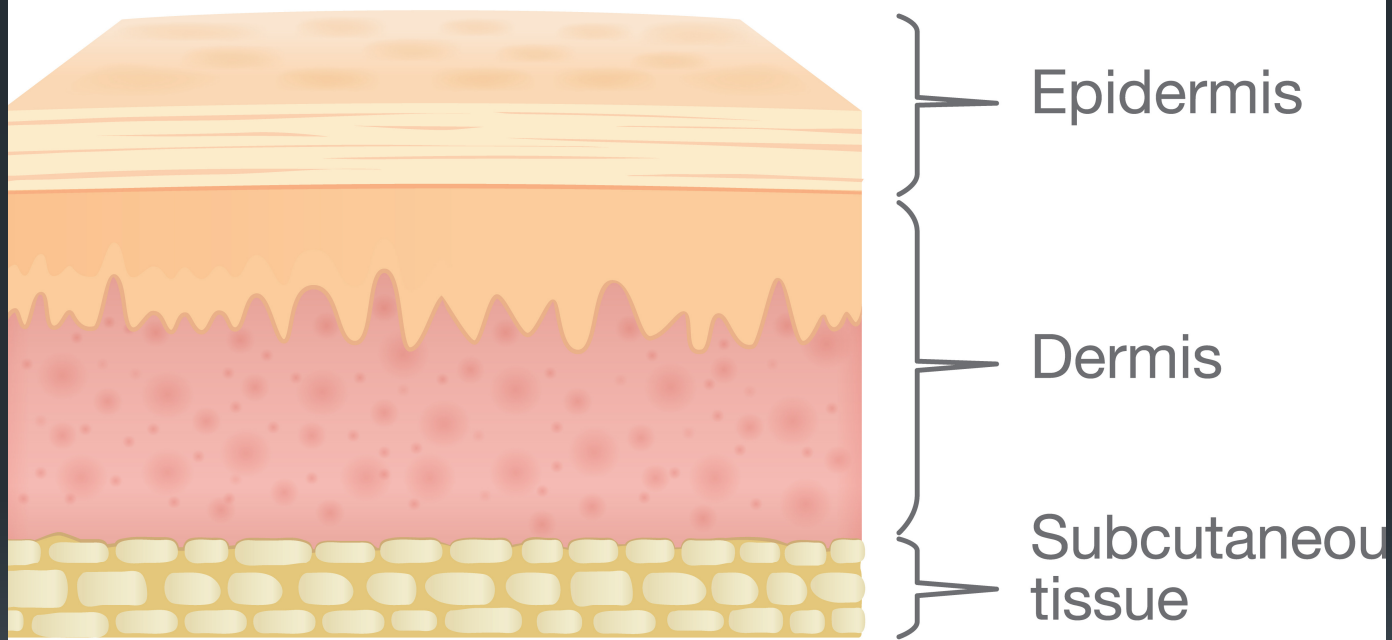
Soft tissue Reconstruction in oro facial region

1. skin graft
2. Flap

Skin grafts

- Definition A skin graft is a shave of epidermis including a variable thickness of dermis. This graft can be transferred to a distant site (bed) where, once applied, it establishes a blood supply.
- 2 type of skin graft
 1. *A split skin graft (SSG)* must leave some remaining dermis at the donor site. The epidermal elements in the remaining dermis multiply and re-epithelialize the donor site.
 2. *A full-thickness skin graft (FTSG)* comprises the whole dermis and hence the donor site must be closed directly or itself skin grafted to heal.

The Layers of Skin



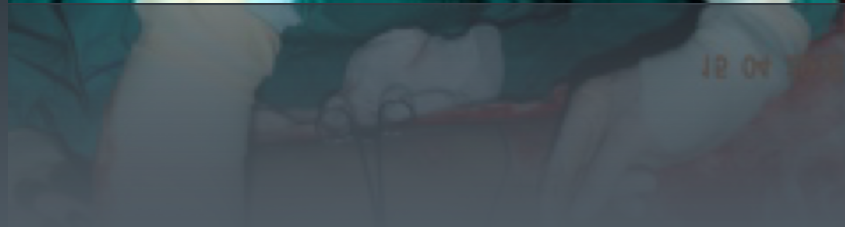
Indications

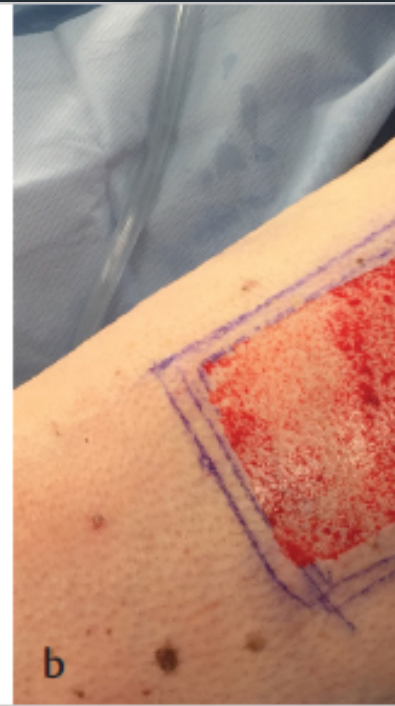
- A skin defect with a well-vascularized bed.
- Common donor areas SSG:
 - Thigh.
 - Medial upper arm.
 - Buttock (especially children).
- **FTSG donor site:**
 - upper eye lid
 - Pre-or post-auricular.
 - Supra-clavicular.

Methods of graft harvest

- Dermatome
 - - Humby (roller),
 - -scalpel.

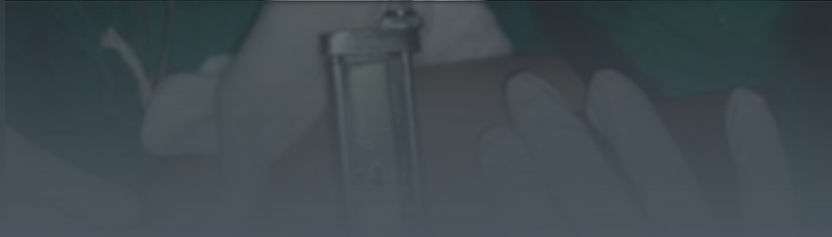






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Flap



- is a unit of tissue that may be transferred from a donor to a recipient site while maintaining its blood supply.

classification

1. Their component parts (e.g., cutaneous, musculocutaneous, osseocutaneous).
 2. Their Region in relationship to the defect as local, regional & distant flap
 3. Their nature of the blood supply
 - Axial Pattern Flap
 - Random Pattern Flap
 - Free flap microvascular free tissue transfer
- 4-Their movement placed on the flap
- Advancement flaps
 - Rotation flap
 - Transposition flaps


- **Local flaps** are considered adjacent to the primary defect. Like rhomboid, bilobed, V-Y advancement flap.
- **Regional flap** donor sites are located on different areas of the same body part. Like lateral cervical flap, temporal & forehead flap.
- - **Distant flap** is a flap taken from different body parts are used as the donor site .like fibula flap, forearm flap.
- **Axial Pattern Flap** A single flap which has an anatomically recognized arteriovenous system running along its long axis. Such a flap, because of the presence of its axial arterio-venous system, is not subject to many of the restrictions which apply to flaps in general
- **Random Pattern Flap** - has no named blood supply, rather, it uses the dermal (mucosal) and subdermal (submucosal) plexus as its blood supply.










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- **Advancement flaps** use mobilized tissue in a direction toward the primary defect.
 - **Rotation flap** pivot mobilized tissue around a point toward the primary defect.
 - **Transposition flaps** are mobilized tissues that traverse adjacent tissue by rotation and/or advancement in an effort to close the primary defect.



Examples of Flaps used in Maxillo-Mandibular Reconstruction

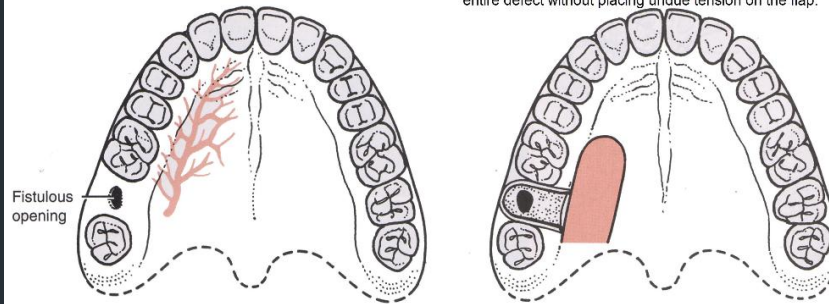
■ Palatal Flap:

represents the most commonly used local reconstruction in oral and maxillofacial surgery for the closure of oro-antral fistulas following dental extractions. Palatal reconstructive flaps can be unilateral or bilateral, which are pedicled flaps based on the palatal artery and vein. The entire palatal mucosa can be raised and rotated as a flap or a finger flap alone can be used. The donor area is left for secondary granulation and is mucosalised in three to five weeks yielding a smooth surface.

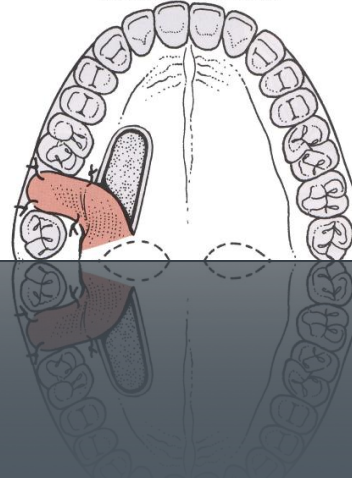


Included in the flap to supply adequate blood supply to the transpositioned soft tissues.

The flap should be full-thickness of mucoperiosteum, should have a broad posterior base & should include the Anterior Palatine Artery. Its width should be sufficient to cover the entire defect without placing undue tension on the flap.

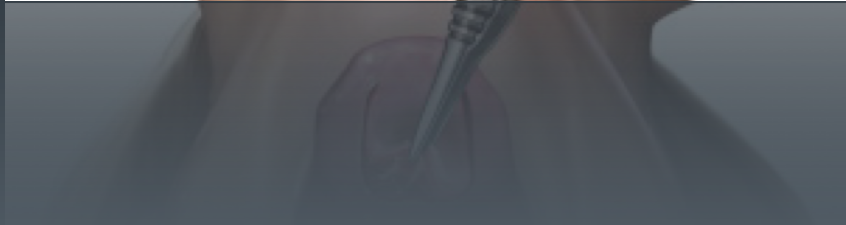


The palatal flap has been rotated to cover the osseous defect in the dento-alveolus (ie the OAF) & sutured into place. The exposed bone on the palate, which remains after the rotation of the flap, will heal by secondary intention, with minimal discomfort to the patient & little or no change to the normal soft anatomy.



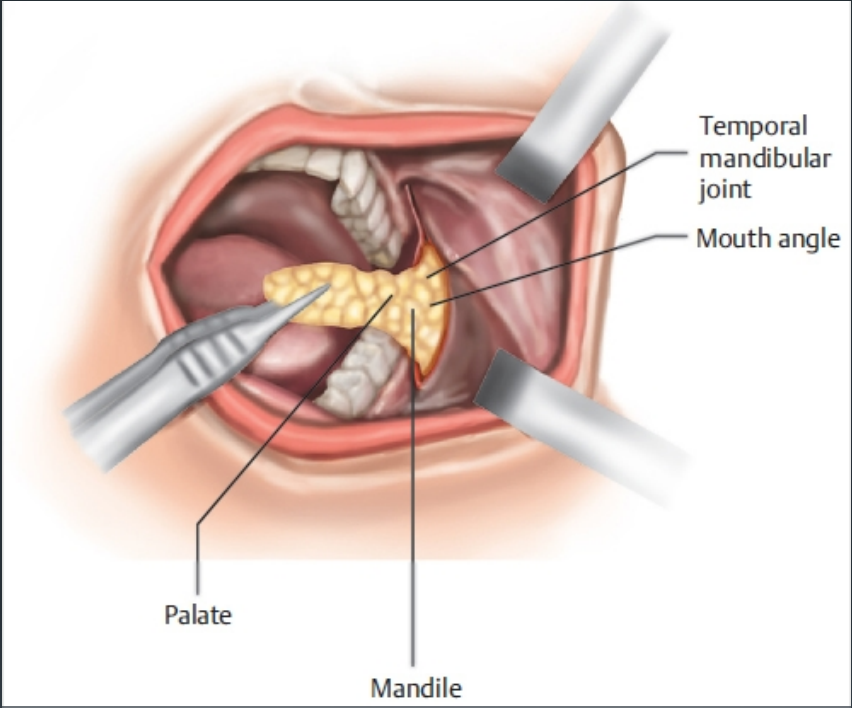
Tongue Flap

- : Tongue flaps have been used in the reconstruction of local defects of the floor of the mouth as well as in palatal defects. dorsal flaps are used for palatal defects and lateral or ventral flaps are suitable for the mandible or the floor of the mouth. Tongue flap can be anteriorly based or posteriorly based. .



Buccal Fat Pad Flap

- Ideally suited for small retromolar and posterior maxillary defects, this axial pattern flap enjoys a robust blood supply with contributions from the buccal and deep temporal branches of the maxillary artery, the transverse facial branch of the superficial temporal artery, and buccinator branches from the facial artery. Within the fat pad, a network of small arterioles and venules are present .



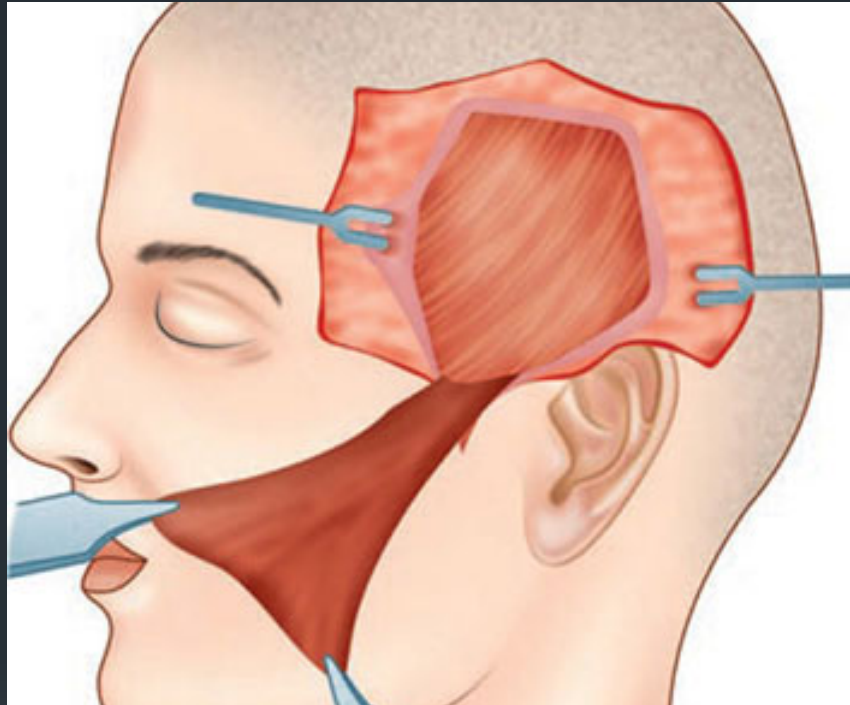
Palate

Mandible



Temporalis muscle flap

- The external cheek, orbital exenteration, as well as maxillary and oral defects can be reconstructed using this flap.



lateral cervical flap by (kummoona)

- includes skin, fascia and muscle can safely be elevated as superiorly based flap with rich blood supply coming from superficial branch of occipital arteries, the posterior auricular artery and sub mental branch of facial artery. Damage to the sub mental branch during elevation of the flap has little effect on viability of the flap.
- The flap can be used for reconstruction of the tongue after hemiglossectomy or alveolus after radical resection of the mandible or reconstruction the floor of the mouth or reconstruction of the cheek after radical cancer surgery of the cheek. The flap can be used for reconstruction of sub mental region and chin following post traumatic missile injuries of the orofacial region there is no need for tunnel to be used.

