Pre-prosthetic surgery for complete denture
Part (1)

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Preprosthetic surgery is defined as surgical procedures designed to facilitate fabrication or to improve the prognosis of prosthodontic care.

Preparation of oral cavity to remove any interference with prosthetic treatment e.g.: frenectomy

The preprosthetic surgery is an important procedure done prior to prosthetic replacements in compromised condition of the hard and the soft tissues supporting the complete denture.

Ideal denture base has following characteristics:

a) Adequate bony support
b) Soft tissue coverage
c) No undercuts or protuberances
d) No sharp ridges
e) Adequate sulci
f) Absence of peripheral scar bands
g) No muscle fibres to mobilize prosthesis
h) No soft tissue folds/hypertrophies
i) No neoplastic lesions
j) Proper maxillomandibular arch relationships
k) Adequate palatal vault/tuberosity notching

Aims Preprosthetic Surgery
1. To facilitate retention and stability of the denture.
2. To improve the condition of the supporting tissues.

BY:-

• Elimination of pre-existing bony deformities e.g. tori, prominent mylohyoid ridge, genial tubercle.
• Correction of maxillary and mandibular ridge relationship.
• Elimination of pre-existing soft tissue deformities, e.g. epulis, flabby ridges, hyperplastic tissues, relocation of mental nerve. Etc.
Oral surgical preparation can be categorized according to nature of the operation into:
- Resective
- Reshaping
- Augmentation

Or into:
- Soft tissue surgery
- Hard tissue (bone) surgery

**Pre-prosthetic surgical procedures** can be classified as:

- **Basic procedures** – can be carried out under local anesthesia on a day care basis.
- **Advanced surgery procedures** – require hospitalization and general anesthesia.

**Procedures are carried out for the following** –
1. Alveolar ridge correction
2. Alveolar ridge extension
3. Alveolar ridge augmentation.

**Indication of the Bony surgeries includes the following:**

1. Extraction of erupted or partially erupted tooth
2. Retained root
3. Alveolar ridge correction
   1. Alveolectomy
   2. Alveoloplasty
   3. Elimination of unfavourable undercuts
      - Reduction of genial tubercles
      - Reduction of mylohyoid ridge
   4. Excision of tori
   5. Maxillary tuberosity reduction and exostosis removal.
5. Knife edge margins of alveolar ridge

**Indications for preprosthetic surgery in soft tissue defects like:**
1. Bulbous maxillary tuberosity with normal underlying bone.
2. Alteration of muscle attachment e.g. Mylohyoid muscle attachment forms the floor of the mouth. Geniohyoid and genioglossus which are attached to genial tubercles
3. Frenectomy
4. Excision of epulis fissurata
5. Excision palatal papillary hyperplasia

RIDGE PRESERVATION PROCEDURE

Hard Tissue Abnormalities

Alveoloplasty

It is a plastic surgical recontouring procedure that is done on alveolar ridge to obtain a proper foundation and stability of a denture. Simplest forms of alveoplasty consist of compression of lateral walls of extraction socket after simple tooth removal. In many cases of simple tooth extraction digital compressions of extraction site adequately contours the underlying bone provided, there are no gross irregularities of bone in the area after extraction.

Alveoplasty in case of multiple teeth extraction is done in two stages:

a. Immediately after extraction or
b. After a certain level of healing has taken place

1. Simple Procedure

A conservative alveoplasty in combination with multiple extractions is carried out after all the teeth in the arch have been removed. Depending on the degree of irregularity of the alveolar ridge area, recontouring can be accomplished with a bone rongeur, a bone file or a bone bur in a handpiece alone or in combination. In any case copious saline irrigation should be used throughout the recontouring procedure.

2. Interseptal Alveoloplasty –
   a. Dean’s Alveoloplasty
   b. Obwegeser’s modification of Dean’s alveoloplasty

3. Post-extraction alveoloplasty

Dean’s Intraseptal

a. This technique is best used in an area where the ridge is of relatively regular contour and height but presents an undercut at the depth of the labial vestibule because of the configuration of the alveolar ridge.

b. It is done at the time of extraction of anterior teeth, a small rongeur can be used to remove the intraseptal segment from canine to canine region

c. then labial cortex is fractured with periosteal elevator and compressed into palatal direction in approximation with palatal plate or lingual plate area

e. any residual bony irregularities can be contoured using a bone file

Advantages:

• Labial prominence of the alveolar ridge can be reduced without significantly reducing the height of the ridge in this area.
• The periosteal attachment to the underlying bone can also be maintained, thus reducing postoperative bone resorption and remodeling.

Obwegeser’s modification of dean’s alveoloplasty
- In this both the labial and palatal cortices are repositioned.
- This is done when the anterior overjet is too gross that can not be reduced by labial plate repositioning.

Alveoluplasty after postextraction healing-
- This procedure is done in a region where extractions are done at different times.
- So in this case multiple areas will show sharp edges which are painful to touch.

Mylohyoid Ridge Reduction
- One of the more common areas interfering with proper denture construction in the mandible is the mylohyoid ridge area
- easily damaged thin covering of mucosa, the muscular
- attachment to this area often is responsible for dislodging the denture.

Genial Tubercle Reduction
As the mandible begins to undergo resorption, the area of the attachment of the genioglossus muscle in the anterior portion of the mandible may become increasingly prominent.

Maxillary Tuberosity Reduction:-Examination of tuberocity if it bony or soft tissue
by :
  ▶ X-ray
  ▶ Probing

The main reason of this overgrowth is extraction of opposing mandibular 3rd molars and subsequent supra-eruption of maxillary 3rd molar, where remains as bony overgrowth after maxillary 3rd molar extraction.

Maxillary tubercle because it decreases inter-arch space.

It can interfere with denture construction:
1-Extreme large that interferere with coronoid process buccally
2-Has undercut buccally so prevent proper flange extension and insertion of denture
3-Reduce inter arch space, the posterior occlusal plane may be placed too low no enough space to set all molars

Bone is removed either by a side cutting rongeur or rotary instrument by carefully avoiding perforation of the floor of the maxillary sinus. The area is smoothened with a bone file and copiously irrigated with saline. overlapping soft tissue resulting from the bone removal is excised in an elliptical fashion.
Sutures are allowed to remain in place for seven days.

**Buccal Exostosis and Excessive Undercuts**
Excessive bony protuberances and resulting undercut areas are more common in the maxilla than the mandible. Interference with design and cause mucosal ulceration and undercut.

**Lateral Palatal Exostosis**
Found in maxillary molar region. Preservation of vascular supply: main concern during surgery. This presents problems in denture construction because of the undercut created by exostosis and the narrowing of the palatal vault.

**Excision of Tori**
- Midline incision
- Two vertical releasing incision
- Flab reflection
- Cut the tori by bur to small piece
- Remove bone by mallet or osteotomes
- Smooth the bone by round bur and suture the flab

**Mandibular tori**
They are bony protuberances on the lingual aspect of the mandible that usually occur in the premolar area. Bilateral lingual and inferior alveolar injections provide adequate anesthesia for tori removal.

- Surgeon can remove one of tori and path of insertion is modified or both of tori is removed
- Elimination of unfavourable undercuts
  - Unfavourable undercuts are developed due to severe atrophy of the mandible which hinders in proper denture construction.
  - These undercuts are mostly present on lingual aspect of mandible like genial tubercle prominances, sharp mylohyoid ridge prominances.
  - Most of the times, patient wearing old dentures comes with the complaint of ulceration or inflammation on these lingual prominences.
  - So surgical reduction should be carried out to relieve these undercuts.

**Labial Undercuts**
Caused by resorption in apical areas.

**Treatment:**
- Δ Excision
- Δ Filling of undercut

Recontouring of a knife-edge ridge:
- Resorption result in in knife-edge alveolar ridge especially in mandible
Examine by vision or palpation

**Procedure**

After minimal reflection of the mucoperiosteum, a *rongeur* can be used to remove the major portion of the sharp area of the superior aspect of the mandible. A *bone file* is used to smooth the superior aspect of the mandible.

Another technique that may be used to correct contour defects involves: open exposure of the area to be grafted, placement of graft material, and the use of a membrane covering over the grafted tissue to facilitate guided bone regeneration.

**Bone AUGMENTATION**

Augmentation grafting adds strength to an extremely deficient bone and improves the height and contour of the available bone for implant placement on denture-bearing areas.

Sources of graft material include autogenous or allogeneic bone and alloplastic materials.

**MANDIBULAR AUGMENTATION**

- Superior Border Augmentation
- Inferior Border Augmentation
- Hydroxyapatite Augmentation of the Mandible

**Superior Border Augmentation:**

- **indicated when:**
  1. Severe resorption of the mandible results in inadequate height and contour and potential risk of fracture.
  2. When the treatment plan calls for placement of implants in areas of insufficient bone height or width.
  3. Neurosensory disturbances from inferior alveolar nerve dehiscence at the location of the mental foramen at the superior aspect of the mandible also can be corrected.

**with this technique**

- Use iliac crest bone (secondary donor site)
- This large amount of resorption 70%
- Can be stabilized by wires or screw
- Tissue-guided regeneration with the use of a membrane is often combined with the bony augmentation.
- In some cases implants can be placed at the same time the bone graft augmentation is completed.

**Inferior Border Augmentation:**

*This technique is rarely, if ever, used.*

- Using iliac crest bone grafts, secured with rigid fixation
• Indications for use of this technique, in addition to atrophy of the alveolar ridge area, included the prevention and management of fractures of the atrophic mandible.
• However, this technique does not address abnormalities of the denture-bearing areas, such as the increased inter arch distance, superior border irregularities, or exposed position of the mental nerve.

**MAXILLARY AUGMENTATION**

**Onlay Bone Grafting**

- Bone grafting of the edentulous atrophic maxilla with an autogenous rib or iliac crest bone
- Indicated primarily when severe resorption of the maxillary alveolus is seen that results in the absence of a clinical alveolar ridge and loss of adequate palatal vault form

**Interposition Bone Grafts**

Indicated in the bone-deficient maxilla, where the palatal vault is found to be adequately formed but ridge height is insufficient (particularly in the zygomatic buttress and posterior tuberosity areas and when excessive Interpositional grafting techniques provide stable and predictable results by changing the maxillary position in the vertical, anteroposterior, and transverse directions and may eliminate the need for secondary soft tissue procedures.

Disadvantages of this type of procedure include the need to harvest bone from an iliac crest donor site and possible secondary soft tissue surgery. (space exists)

**Osteotomies**

1-mandibular visor osteomy

Indicated in case of severe atrophy of mandible

**Procedure**

- Crestal flap
- Bone is splitted in vertical fashion
- Lingual bone is elevated and secured to the proximal mandible
- Then bone graft and bone material placed on the lateral aspect to provide well contoured bone
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**Soft Tissue Abnormalities** Abnormalities of the soft tissue in the denture bearing and peripheral tissue areas include:

**Indications for preprosthetic surgery in soft tissue defects like:**
- Bulbous maxillary tuberosity with normal underlying bone.
- Soft tissue surgery for ridge
- Vestibuloplasty includes:-
  - Ridge extension
  - Maxillary ridge extension surgery
  - Mandibular ridge extension surgery
- Floor of mouth extension: alteration of muscle attachment e.g.
  - Mylohyoid muscle attachment forms the floor of the mouth and
  - Geniohyoid and genioglossus which are attached to genial tubercles
- Frenum (frenectomy, frenotomy)
- Redundant crestal soft tissue removal
  - Inflammatory papillary hyperplasia of the palate.
  - Fibrous hyperplasia of alveolar ridge.
  - Epulis fissuratum.

1-Maxillary Tuberosity Reduction (Soft Tissue) :-
indicated to
1-provide adequate interarch space for proper denture construction in the posterior area.
2-firm mucosal base of consistent thickness over the tuberosity
procedure
An initial elliptic incision is made over the tuberosity and this section of tissue is removed. After tissue removal the medial and lateral margins of the excision must be thinned to remove excess soft tissue. After the flaps are thinned, digital pressure can be used to approximate the tissue sutured with interrupted or continuous suturing techniques.

2-Mandibular Retromolar Pad Reduction
The need for removal of mandibular retromolar hypertrophic tissue is rare. The same procedure done for maxillary tuberosity but avoid extension of flap lingually which result in damage to the lingual nerve and artery.

SOFT TISSUE SURGERY FOR RIDGE
As alveolar ridge resorption takes place, the attachment of mucosa and muscles near the denture-bearing area exerts a greater influence on the retention and stability of Dentures. Primary goals of soft tissue pre prosthetic surgery are to provide an enlarged area of fixed tissue in the primary denture-bearing

Vestibuloplasty:
Ridge extension
- Maxillary ridge extension surgery includes:
  1-Submucosal Vestibuloplasty
  This technique is particularly useful when maxillary alveolar ridge resorption has occurred but the residual bony maxilla is adequate for proper denture support
  Procedure
     midline incision is made mucosa is undermined and separated from the underlying submucosal tissue. A supraperiosteal tunnel is then developed by dissecting the muscular and submucosal attachments from the periosteum. The intermediate layer is incised at its attachment area near the crest of the alveolar ridge. Suture and splint is placed
  2-Secondary epithelialization vestibuloplasty
  Used when there is inadequate clinical ridge and poor mucosal coverage
  Procedure
     Supraperiosteal flap is dissected and repositioned superiorly. Leave periosteum to be covered by epithelium. Main problem is relapse
3- Soft tissue graft vestibuloplasty
Graft used are mucosal (mostly palatal or buccal) or skin graft (from abdomen)

Indication
1- adequate bone expected after procedure
2- poor mucosal coverage

**Procedure**
1- Supraperiosteal flap is opened at sulcus on ridge side
2- mucosal incision margin from the upper lip and sutured at the depth of the maxillary vestibule
3- Denuded periosteum of ridge is covered by graft tissue
   - Mandibular ridge extension surgery
1- Submucosal vestibuloplasty: - Same as that done for the maxillary arch
2- Sulcus slide vestibuloplasty
3- Transpositional Flap Vestibuloplasty (Lip Switch)

**Indication**
1- adequate anterior mandibular height (at least 15 mm),
2- inadequate facial vestibular depth from mucosal and muscular attachments in the anterior mandible
3- presence of an adequate vestibular depth on the lingual aspect of the mandible.

**Procedure:**
mucosal flap from lip side of sulcus a raised from the underlying tissue and sutured to the depth of the vestibule. The inner portion of the lip is allowed to heal by secondary epithelialization.

**Floor-of-Mouth Extension**

**Procedures:**
mylohyoid and genioglossus muscles in the floor of the mouth present similar problems on the lingual aspect of the mandible.

**Indication**
Adequate alveolar ridge for a denture-bearing area is lost but at least 15 mm of mandibular bone height remains. The most commonly used procedure is Obwegeser modification

**Procedure**
This procedure done on anterior and posterior mandible. A crestal incision is made. Buccal and lingual flaps are created by a supraperiosteal dissection mucosa and mylohayoid m. are sutured inferiorly. Skin graft or mucosal graft are used to cover the exposed periosteum and held in place with splint.

Frenum (frenectomy, frenotomy)
Frenectomy
Labial Frenectomy
(1) Simple excision technique,
(2) Z-plasty technique, and
(3) Localized vestibule-plasty with secondary epithelialization movement of the
soft tissue adjacent to the frenum may create discomfort and ulceration and may interfere with the peripheral seal and dislodge the denture.

1. *Simple excision technique*: Used when frenum has narrow base

**Procedure**
Local anesthetic infiltration and avoid excessive anesthetic infiltration directly in the frenum area, because it may obscure the anatomy that must be visualized at the time of excision. Narrow elliptic incision around the frenal area down to the periosteum. Frenum is then sharply dissected from the underlying periosteum and soft tissue, and the margins of the wound are gently undermined and reapproximated first suture should be at the maximal depth of the vestibule and should include both edges of mucosa and underlying periosteum at the height of the vestibule beneath the anterior nasal spine.

2. *Z-plasty technique*
   1. After midline excision of the fibrous tissue, two oblique incisions are made in a Z fashion, one at each end of the previous area of excision
   2. The two pointed flaps are then gently undermined and rotated to close the initial vertical incision
   3. This technique may decrease the amount of vestibular ablation sometimes seen after linear excision of a frenum.

3. *Localized vestibuloplasty with secondary epithelialization*

**Procedure**
1. V shaped incision is made through mucosal tissue and underlying submucosal tissue, without perforating the periosteum.
   2. Undermining the mucosal and submucosal tissue with scissors
   3. The edge of the mucosal flap is sutured to the periosteum at the maximal depth of the vestibule and the exposed periosteum is allowed to heal by secondary epithelialization.

Lingual Frenectomy
Its attachment binds the tip of the tongue to the posterior surface of the mandibular alveolar ridge. After loss of teeth, this frenal attachment interferes with denture stability, because each time the tongue is moved, the frenal attachment is tensed and the denture is dislodged.

**Procedure**
Tongue is elevated by traction suture. Transverse incision is in the frenum to the base of tongue Releasing the anterior portion of tongue. Do undermining to the
margin of incision by sessior. Avoid lingual nerve and sublingual duct. Margin approximated and sutured.  

**Redundant crestal soft tissue removal**  

**1. Hyperplastic Ridge**  

Mobile tissues (e.g., a hyperplastic ridge) that interfere with optimal seating of the denture. A so-called ‘fibrous’ or ‘flabby’ ridge is a superficial area of mobile soft tissue affecting the maxillary or mandibular alveolar ridges. It can develop when hyperplastic soft tissue replaces the alveolar bone and is a common finding, particularly in the upper anterior region of long term denture wearers. Excessive hypermobile tissue on the alveolar ridge is generally the result of:  
- a. resorption of the underlying bone.  
- b. ill-fitting dentures.  
- c. or both.

Before the excision of this tissue, a determination must be made of whether the underlying bone should be augmented with a graft. If a bony deficiency is the primary cause of soft tissue excess, then augmentation of the underlying bone is the treatment of choice. If adequate alveolar height remains after reduction of the hypermobile soft tissue, then excision may be indicated.  

**Procedure**  
- A local anesthetic  
- Removal of hypermobile tissue in the alveolar ridge area consists of two parallel full-thickness incisions on the buccal and lingual aspects of the tissue to be excised.  
- A periosteal elevator is used to remove the excess soft tissue from the underlying bone  
- Continuous or interrupted sutures are used to approximate the remaining tissue

**2. Epulis Fissuratum** *(Inflammatory Fibrous Hyperplasia)*  

Epulis fissuratum: Patients who wear ill-fitting dentures for a prolonged period of time may develop denture irritation hyperplasia, also known as epulis fissuratum an epulis localized enlargement of peripheral tissues. Such a mucosal hyperplasia develops slowly from *chronic low-grade trauma, typically induced by unstable dentures or an overextended denture flange. As a consequence of the resorption of the alveolar*  

**Treatment**  

When fibrosis is minimal, nonsurgical treatment with a denture in combination with a soft liner is frequently sufficient for reduction or elimination of this tissue.
When the condition has been present for some time, significant fibrosis exists within the hyperplastic tissue. This will not respond to nonsurgical treatment excision of the hyperplastic tissue is the treatment of choice.

**Procedure**

Local anesthetic infiltration in the area of the redundant tissue is sufficient for anesthesia. When the area to be excised is minimally enlarged, electrosurgical or laser techniques provide good results for tissue excision. If the tissue mass is extensive, large areas of excision using electrosurgical techniques may result in excessive vestibular scarring. Simple excision and reapproximation of the remaining tissue is preferred. The redundant areas of tissue are rasped with tissue pickups, a sharp incision is made at the base of the excessive fibrous tissue down to the periosteum, and the hyperplastic tissue is removed.

**3. Papillomatosis (Inflammatory Papillary Hyperplasia of the Palate)**

*a papillomatosis* (tissues that readily harbor *microorganisms*)

Hyperplastic tissue formation multiple nodular projections in the palatal tissue.

Caused by
- wear ill fitted prosthetic
- Wearing denture at night
- Poor oral hygiene
- Fungal

Early stages, nonsurgical treatment, such as proper denture adjustment combined with a tissue conditioner, may eliminate or reduce this problem.

If not respond to treatment, removal is required, a mucosal excision superficial to the periosteum is recommended.

Technique using following
- electrosurgical loops
- scalpel
- Techniques to abrade the superficial layer of palatal use coarsely fluted bone bur in a rotating hand piece can be used for this purpose
- cryosurgery
- Lasers