Improving the patient's ridge foundation and ridge relations

**a-Non-surgical methods.**

**b-Surgical methods.**

**a-Non-surgical methods:**

1-Rest.
   – remove dentures for 48-72 hours.
   – don't even put them in for meals.
   – one meal will require 4 hours to recover.

2-Tissue Conditioners.
   – Not as effective as rest, but patients prefer.
   – Many brands; all powder/liquid systems.
   – Start to deteriorate after a few weeks.

3-Massage.
   – Washcloth, Soft brush, Sugarless gum.

4-Medications / Nutrition.
   – Topical & systemic anti-fungal medications.
   – Vitamin supplements, soup (patient may have a protein deficiency).

5- Optimize occlusion & vertical dimension.
   – Balanced contacts (remount, acrylic “pivots”).
   – Increase vertical dimension (“open the bite”).

**b-Surgical methods.**

The majority of patients who require prosthodontic treatment will not require surgical intervention prior to starting with construction dental prosthesis. Few cases needed some surgical intervention to improve the prognosis of the case.

The objectives of preprosthetic surgery for edentulous patients:

1-To provide of a comfortable tissue foundation to support the denture.

2-Enlargement of the denture bearing area in attempt to provide stability of a denture.

**The ideal edentulous ridge is characterized by:**

1-provide adequate bony support.
2- should be covered by normal attached soft tissue.

3- No bony projections or undercuts.

4- No sharp ridges.

5- Adequate buccal and lingual sulcus.

6- No tissue hyperplasia.

7- The muscle fibers and frenum should not interfere with prosthesis.

8- No neoplastic lesions.

9- Satisfactory relationship between the maxillary / mandibular ridges.

**Preprosthetic surgery can be divided into:**

1- **Soft tissue preprosthetic surgery.**

2- **Hard tissue preprosthetic surgery.**

1- **Soft tissue preprosthetic surgery:**

   A. **Resective surgeries:**

   1- **Hypermobile tissue (flabby ridge):** Excessive tissue is usually the result of the resorption of the underlying bone. If adequate alveolar height will remain after reduction of hypermobile tissue, then excision may be indicated. If the ridge is atrophic and the bone is thin and sharp, excision may result in a greater deficiency. If the alveolar height is inadequate so ridge augmentation or vestibuloplasty should be indicated.

   2- **Papillary hyperplasia:** When hyperplastic tissue forms on the hard palate, it usually takes a papillary form. The condition usually begins as a series of tiny papillary projections that gives the palate a velvety appearance. Later it assumes a more nodular form.

   The main causes of papillary hyperplasia usually related to patient having an old denture due to a relating large space between the palatal mucosa and the fitting surface of the denture. (normal relief is 0.02 mm.).
Also papillary hyperplasia occurs due to ill-fitting dentures, mechanical irritation in poor oral hygiene patients.

The options in the treatment of papillary hyperplasia either non-surgical treatment such as proper denture adjustment and tissue conditioning. Or combined with surgical treatment may be needed as surgical excision, electrosurgery, or abrasion of the superficial layer of palatal mucosa.

3-Denture hyperplasia (epulis fissuratum) A continuous fold of hyperplastic tissue may form to fill the space between an ill-fitting denture and the alveolus. It may appear as a lobulated localized mass which can be hidden under the denture, or may be bifid, extending both behind and in front of the flange. In long-standing cases, multiple folds may form.

the most common cause denture irritation from an over extension denture flange or ill fitting denture. other possible causes are Allergic or chemical reactions to the denture material, or carcinoma. All excised tissue should be submitted for histological examination.

Treatment Correction of denture irritation, placement of a soft liner, electrosurgery (if small) or conventional surgery (if larger)

4-Frenectomy The labial frenum is usually not a problem in the dentate patient unless associated with a diastema. In the edentulous patient, it may be irritated by the flange of the denture. 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. An abnormal lingual frenum may bind the tip of the tongue to the posterior surface of the mandibular alveolar ridge, and can affect speech and interfere with denture stability.

Treatment Simple excision, Z-plasty, or localized vestibuloplasty with secondary epithelialization, localized supraperiosteal dissection removing the fibrous attachment.

5. Maxillary tuberosity reduction of soft tissue. The amount of soft tissue available for reduction can often be determined radiographically, or with a sharp probe after local anesthesia. It
may be necessary to remove both soft tissue and bone to achieve the desired result.

**b-Ridge extension surgeries:**

**Vestibuloplasty:** the goal of vestibuloplasty is to expose and make available for denture construction that bone which is still present. In vestibuloplasty the surgeon detaches the origin of muscles on either facial or lingual side of the edentulous ridge. Healing occurs by secondary epithelialization or by skin or mucosal graft. Vestibuloplasties with skin grafts do not seem to accelerate bony resorption. If healing occurs by secondary epithelialization, bone resorption changes of 4-20% may occur over a 2 year period.

Some potential complications may occur as, loss of sensation if the mental nerve is dissected, sagging of the chin if the mentalis muscle is completely dissected, and hypotonia of the circumoral muscles.

**transpositional flap vestibuloplasty:** This procedure is indicated primarily for patients with sufficient mandibular bony height and an adequate vestibular sulcus on the lingual aspect of the mandible. It can be accomplished successfully without a splint or can be combined with immediate reinsertion of a modified relined denture or splint in order to maintain tissue adaptation in the depth of the vestibule.

**lowering the floor of the mouth vestibuloplasty:** As the alveolar bone is resorbed, the attachments of the mylohyoid and genioglossus muscles may interfere with the lingual aspect of the denture.

**2-Hard tissue preprosthetic surgery.**

**A. Resective surgeries:**

**1-Removal of retained roots and impacted teeth:** not always but depend on the case, if the position of the retained root or impacted tooth deep and no local pathological changes, it is better to leave it, while if it is near or with local pathological changes, it must be removed.
2-Alveoloplasty: Irregularities of the alveolar bone can be recontoured either at the time of tooth extraction, or after a period of initial healing before fabrication of the prosthesis.

Intraseptal alveoloplasty might be indicated where the ridge is of relatively regular contour and adequate height, but presents an undercut to the depth of the labial vestibule because of the configuration of the alveolar ridge.

3-Tori removal: A torus is a slowly growing osseous formation of unknown etiology. They can be variable in size, shape, location, and pattern. Usual locations are along the midline of the palate, and along the lingual aspect of the mandible. *They are found in 20% of the female population, approximately twice the prevalence in males.* The indications for removal of tori:

1- Extremely large torus.
2- Torus that extends beyond denture periphery.
3- Torus with traumatized mucosal coverage.
4- Torus with deep undercuts.
5. Torus that interferes with speech or deglutition
6. Psychological reasons

4-Maxillary tuberosity reduction: Either horizontal or vertical excess of the maxillary tuberosity may interfere with proper denture fabrication. This may be as a result of excess soft tissue, bone, or both. The most common problem created by enlarged maxillary tuberosities is the *encroaching upon the available interarch distance for denture fabrication, recontouring and removal of bone and/or soft tissue may be necessary to remove irregularities or allow for adequate interarch distance.*

The most frequent complication of tuberosity reduction surgery is *perforation of the maxillary sinus.*

5-Ridge undercuts, irregularities, exostoses: Excessive bony protuberances and the resulting undercuts can interfere with fabrication of the prosthesis. The denture bearing area should be palpated as well as visually inspected for such potential problem areas.

The procedure for surgical correction: *After reflection of a flap, the areas of irregularity are recontoured with a bone file, rongeur, or rotary instrument. After completion of the bony recontouring, the*
soft tissue is readapted, and visually inspected and palpated to assure that no irregularities or bony undercuts exist.

The area should be allowed approximately 4 weeks to heal prior to making impressions for denture fabrication.

If resective surgery would result in a narrowed crest of alveolar ridge and a less desirable area of support for the denture an augmentation of the site with either autogenous, allogenic, or alloplastic material.

6-Genial tubercle reduction: As the mandible undergoes resorption, the area of attachment of the genioglossus muscle may become increasingly prominent. In some cases the tubercle may actually function as a shelf against which a denture can be made, and in other cases may interfere with proper denture fabrication. Ridge augmentation is considered an alternative to genial tubercle reduction.

7-Mylohyoid ridge reduction: Often the shelf-like projection at the insertion of the mylohyoid muscle must be removed to lessen the amount of undercut present or to relieve irritation of the mucosa over a knifelike bony structure.

the denture should be delivered immediately following surgery, to help facilitated a more inferior relocation of the muscular attachment.

B. Augmentation surgeries:

1-Augmentation with synthetic graft materials. Hydroxyapatite is a nonresorbable ceramic bone substitute, which comes in a granular form in a syringe, and may be placed alone, or combined with autogenous bone to augment the atrophic ridge.

In this procedure incisions are made down to the periosteum, and a subperiosteal tunnel developed on the crest of the alveolar ridge. The hydroxyapatite is injected, filling the tunnel. The incisions are then sutured closed. The hydroxyapatite is then molded with finger pressure to form an ideal ridge, and a stent placed. Potential complications of the augmentation procedure are migration of the material, nerve dysesthesias, difficulty achieving height augmentation and inadequate increase in strength of mandible.
2- Onlay bone grafting:

Maxillary autologous onlay bone graft (Rib). Indicated in severe maxillary alveolar atrophy, flat palatal vault form, and mild to moderate anteroposterior ridge relation discrepancy. Advantages of this surgery are augments alveolus, improve vault form, improve anteroposterior relations and remodeling leaves good ridge form. Disadvantages of this operation is secondary donor site required, unpredictable resorption, secondary soft tissue surgeries necessary, delay in wearing dentures 6-8 months.

Mandibular superior border augmentation (Rib or iliac crest): the additional disadvantages of a mandibular superior border graft is Significant postoperative resorption, from one-half to two-thirds with rib, up to 70% with iliac crest bone.

Mandibular inferior border augmentation (Rib): In this procedure, a rib graft is used for augmentation of the inferior border of the mandible. The advantages are prevention and management of fractures of the atrophic mandible. Disadvantage of this operation that it does not address abnormalities of the denture bearing area.

3-Interpositional bone graft:

This procedure can be used to augment the atrophic maxilla or mandible. It was developed in an attempt to overcome the main disadvantage of mandibular onlay grafting, i.e., rapid resorption. In this procedure the maxilla or mandible is "split", elevated, positioned and supported by interposed grafts of autogenous bone or cartilage, freeze dried bone, alloplastic material, or combinations of these grafts.

4-Osteotomies:

Mandibular "visor" osteotomy: Used usually in combination with a graft, the osteotomy is a vertical one with an elevation of the lingual segment in a visor or sliding manner, with graft material placed along the lateral aspect to provide the proper contour of the ridge.
Segmental osteotomy in the partially edentulous patient: indicated in a partially edentulous patient where supra eruption of teeth and bony segments into an edentulous area, repositioning of
abutments, loss of teeth in one arch producing esthetic and functional concerns.

Maxillary osteotomy with advancement: The natural tendency is for the maxilla to resorb to a smaller, more posterior position while the mandible becomes more prominent. If after thorough evaluation, the patient is determined to have a deficiency in the anteroposterior dimension, the maxilla can be positioned forward a predetermined distance and stabilized with transosseous wires and an interpositional grafts.

C-Miscellaneous:

1-Nerve relocation: In the case of severe atrophy of mandibular alveolar bone, the mental neurovascular bundle may occupy a position at the superior aspect of the mandible that lead to trauma from the denture on the superior portion of the alveolar ridge in this area that may produce pain. When the discomfort is persistent, relocation of the mental neurovascular bundle may be required.

2-Sinus grafting: Placement of endosteal implants in the posterior edentulous maxilla often requires grafting of the floor of the maxillary sinus. Also commonly referred to as a sinus lift procedure, Alloplastic material, allogenic bone, autogenous bone, or a combination of these materials are used.

3-Tissue sclerosing: As an alternative to other procedures for treating the hypermobile alveolar ridge, injection of a sclerosing agent (sodium morrhuate) can produce fibrosis in soft hyperplastic tissue.