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# **Preprosthetic surgery, Importance and Indications**

A Project Submitted to

The College of Dentistry, University of Baghdad, Department of  
Prosthodontics in Partial Fulfillment for the Bachelor of Dental Surgery

By

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## **Certification of the Supervisor**

I certify that this project entitled "Preprosthetic surgery, Importance and Indications" was prepared by the fifth-year student Mohammed Husham Mahmood under my supervision at the College of Dentistry/University of Baghdad in partial fulfillment of the graduation requirements for the Bachelor Degree in Dentistry.

**Assist. Lect. Zinah Salah Mawlood**

**May, 2023**

## **Dedication**

I dedicate this project to my dearly loved family for their endless support, especially to my parents for their continuous motivation and encouragement.

To all my previous teachers and any one that gave me any information, guidance, and help.

To my friends and colleagues who shared their words of advice, motivation and encouragement.

## **Acknowledgement**

First and foremost, praise is to **Allah**. I would like to thank Allah for giving me the patient and strength to do my project. His continuous grace and mercy were with me throughout my life, and even more during the tenure of my project.

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### List of Abbreviations

<b>AIDS</b>	Acquired immunodeficiency syndrome
<b>ANS</b>	Anterior nasal spine
<b>BMP</b>	Bone morphogenetic protein
<b>FPD</b>	Fixed partial denture
<b>HIV</b>	Human immunodeficiency virus
<b>IPH</b>	Inflammatory fibrous hyperplasia
<b>OPG</b>	Orthopantomogram
<b>RPD</b>	Removable partial denture



## Introduction

After the loss of natural teeth, bony changes in the jaws begin to take place immediately. Because the alveolar bone no longer responds to stresses placed in this area by teeth and the periodontal ligament, bone begins to resorb (**Hupp *et al.*, 2019**). The results of this resorption are accelerated by wearing dentures and tend to affect the mandible more severely than the maxilla because of the decreased surface area and less favorable distribution of occlusal forces (**Miloro *et al.*, 2011**).

Since the end of World War II, through the development of better materials, the improved accuracy of processing techniques and a better understanding of oral physiology, dental prosthetics has made great strides in increasing the successful use of prosthetic appliances in fully or partially edentulous patients. Nonetheless, there remain a significant number of patients, who can never be made to use dentures effectively, because of the bone atrophy, soft tissue hypertrophy or localized soft and hard tissue problems or all of them, which have progressed beyond the point of prosthetic accommodation. Preprosthetic surgery offers a significant contribution in these patients (**Malik, 2021**).

The goal of preprosthetic and reconstructive surgery in the 21st century is to establish a functional biologic platform for supportive or retentive mechanisms that will maintain or support prosthetic rehabilitation without contributing to further bone or tissue loss (**Miloro *et al.*, 2011**). This environment will permit a properly constructed prosthesis to restore function, be stable and retentive, preserves the associated structures and satisfies aesthetics (**Cawood and Stoelting, 2000**).

## **Aims of the study**

To demonstrate a various preprosthetic surgeries, when it's indicated, its importance, how it's performed, how the prosthesis will perform with or without preprosthetic surgery and how the recently used treatment modalities cause a shift in the type of the procedures performed and the outcome of prosthodontic treatment.

**Chapter one:**  
**Literature review**

## **1.1 Definition of preprosthetic surgery**

It is the surgical procedures performed to facilitate fabrication of the prosthesis or to improve the prognosis of prosthodontic care, by converting the unfavorable denture foundation into more favorable one (**Chari and Shaik, 2016**).

## **1.2 How to Avoid Some of the Surgical Procedures?**

- 1- Carefully planning the teeth extraction, because making of satisfactory artificial denture begin with the teeth extraction.
- 2- By changing the path of insertion and removal of the prosthesis
- 3- Blockout undercuts during denture construction when possible.
- 4- By smoothing of sharp bony spicules at the time of teeth extraction.
- 5- Small mandibular tori can be removed at the time of extraction (**Soratur, 2006**).

## **1.3 Importance and objectives of Preprosthetic surgery**

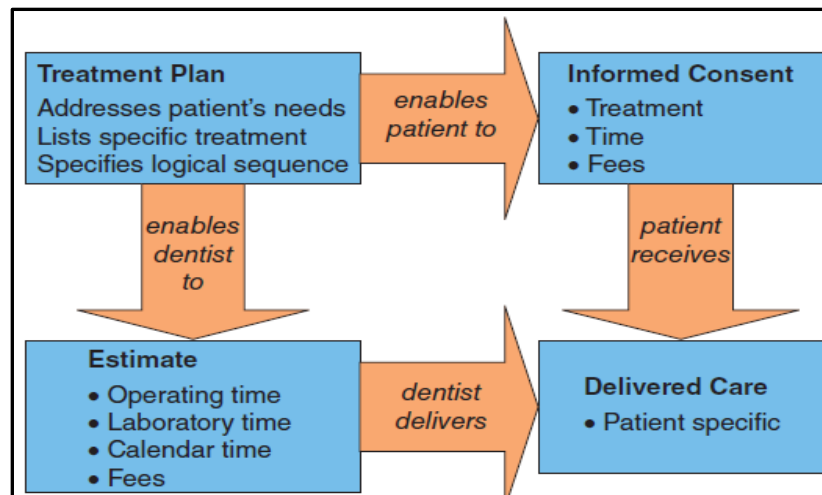
Preprosthetic surgery is important so we can prepare and modify the soft and hard tissues of the jaws for a well-tolerated and comfortable prosthesis that can restore function, aesthetics and facial harmony (**Pedlar and Frame, 2007**).

**Preprosthetic surgery objectives are to help to (Pedlar and Frame, 2007):**

- 1- Reestablish jaws function (mastication, swallowing and speech).
- 2- Preserve and/or enhance the structure of the jaw.
- 3- Enhance the patient's sense of well-being and facial aesthetics.

## 1.4 Treatment planning for preprosthetic surgery

No procedures should be done without a treatment plan designed to sequence and address the problem list of the patient (**Rahn *et al.*, 2009**). After all the intraoral and general physical and dental conditions have been recorded and radiographs, casts, and other visual aids are in hand, they can be interpreted and the treatment plan can then be developed (**Figure 1.1**)(**Zarb *et al.*, 2013**).



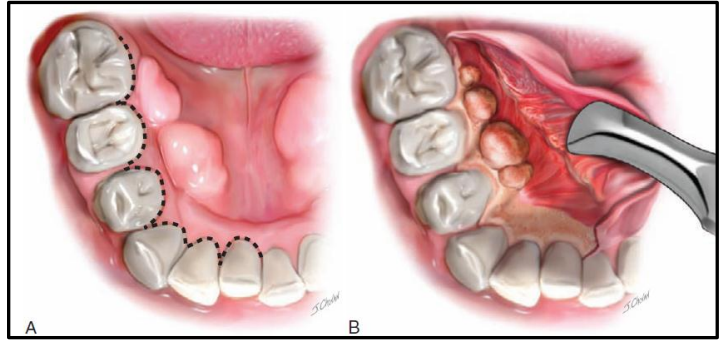
**Figure 1.1:** why treatment plans (**Zarb *et al.*, 2013**).

## 1.5 Flap types

Full thickness mucoperiosteal flap is the clinician's tool for satisfactory exposure. For the majority of the procedures in edentulous areas crestal incision is recommended (**Figure 1.2**). When teeth are present and the surrounding soft tissues need to be included in the flap, a sulcular incision sharply to bone is recommended (**Figure 1.3**). For most procedures envelope flaps are usually adequate but if more access is needed releasing incisions can be done. The flap base must be wider than the crestal aspect in order not to compromise the blood supply. After incision the flap is reflected (**Figure 1.3**). After we complete the surgical procedure; flap is repositioned, irrigated and sutured (**Rahn *et al.*, 2009**).



**Figure 1.2:** Midcrestal incision for full thickness mucoperiosteal flap (Verma, 2020).



**Figure 1.3:** (A) Sulcular incision. (B) Flap reflection (Kademani and Tiwana, 2016).

## 1.6 Surgical Guides

If moderate bone recontouring is needed and the treatment plan requires precision in the amount and location of bone removal, then surgical guides may be helpful (**Figure 4**). The areas of concern are outlined and modified on the duplicated diagnostic cast to achieve the ideal ridge form. Then clear guide can be fabricated. After bony recontouring, the surgical guide is then placed over the area of interest with the flap repositioned, and then areas where soft tissue blanching are noted, which represent areas where more bone removal and recontouring are needed. This procedure is repeated until no soft tissue blanching exists beneath the clear surgical guide and the surgical guide is stable when seated (**Rahn *et al.*, 2009**).



**Figure 1.4:** Modified Surgical Guide fabricated without cast trimming, for the reduction of alveolar bone height to overcome limited interocclusal distance. (Geramipannah *et al.*, 2017)

## 1.7 Commonly Used Preprosthetic Procedures

Common preprosthetic procedures include procedures done on soft or hard tissue (**Fragiskos, 2007**).

### 1.7.1 Hard tissue procedures

These procedures correct hard tissue lesions or abnormalities which can be classified into two categories:

- a. Those that can be smoothed with alveoloplasty immediately after teeth extraction such as sharp spicules and bone edges, or those detected and recontoured in an edentulous alveolar ridge.
- b. Congenital abnormalities, such as torus palatinus, torus mandibularis and multiple exostoses (**Fragiskos, 2007**).

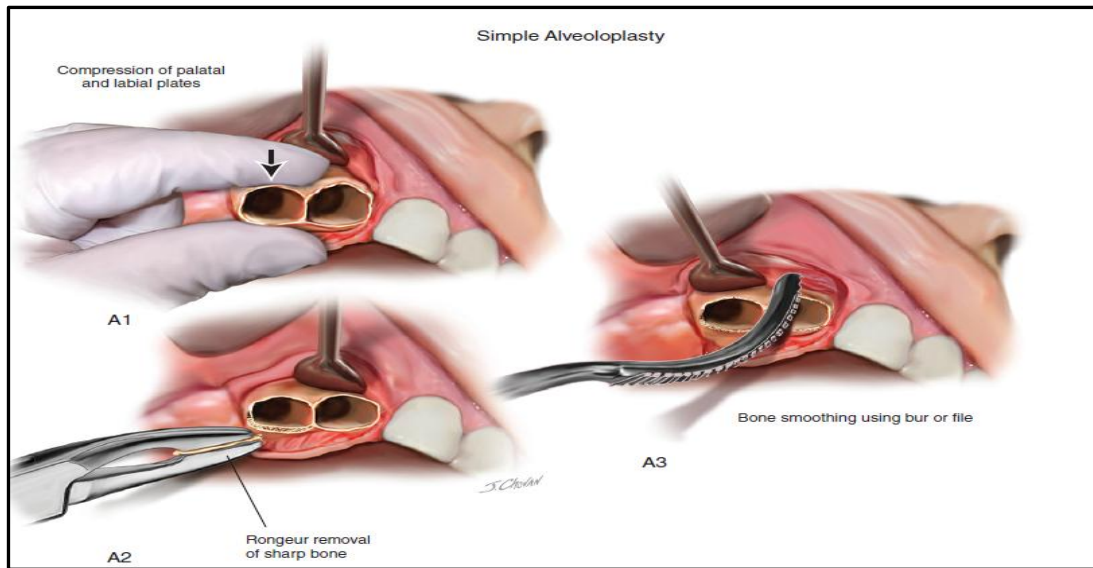
#### 1.7.1.1 Ridge alveoloplasty with extraction(s)

Alveoloplasty in general is the surgical procedure undertaken in order to smooth or recontour the alveolar bone, and hence facilitate better healing as well as the successful placement of prosthesis (**Fragiskos, 2007**).

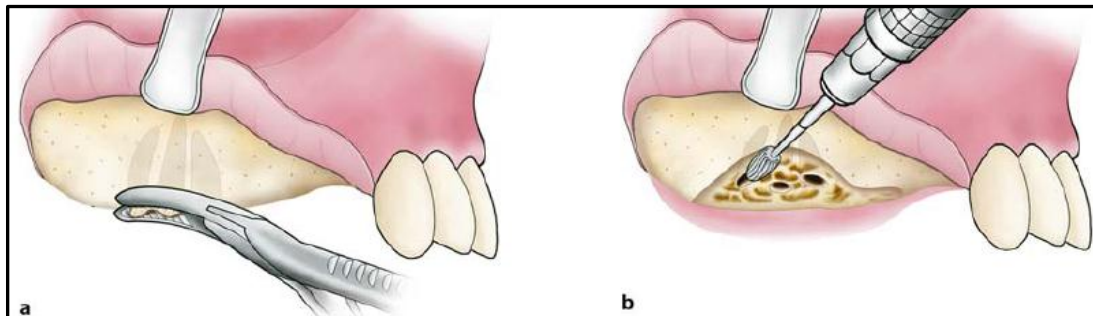
Simple alveolar recontouring after extractions consists of socket compression (**Figure 1.5**), however, one must avoid over compression and over reduction of irregularities to preserve the height and width of the ridge (**Miloro et al., 2011**).

If more than finger compression is required, a full thickness flap should be elevated. Depending on the amount of recontouring required, we can decide whether to use bone file, side cutting rongeur or surgical handpiece and bur for greater recontouring (**Figure 1.6**) (**Rahn et al., 2009**), sometimes if there are gross irregularity in the alveolar margins or if the alveolar ridge is high, parts of the mucosa

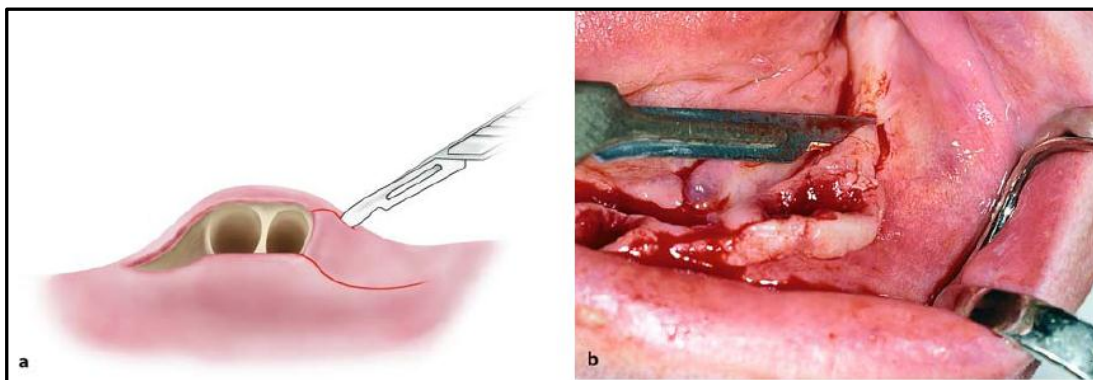
may need to be removed with wedge-shaped incisions, mesial and distal to the postextraction sockets (**Figure 1.7**) (**Fragiskos, 2007**).



**Figure 1.5:** simple alveoplasty (**Kademani and Tiwana, 2016**).



**Figure 1.6:** alveoplasty. (A) With bone rongeur. (B) With surgical hand piece (**Fragiskos, 2007**).



**Figure 1.7:** Removal of wedge-shaped portions of mucosa from the alveolar ridge, from the area mesial and distal to the postextraction socket (**Fragiskos, 2007**).



### **1.7.1.2 Intraseptal alveoloplasty**

Alveoloplasty is accomplished by removing intraseptal bone and collapsing buccal cortical plate (**Hupp *et al.*, 2019**). This procedure is indicated when the ridge has satisfactory height and contour but presents an unacceptable undercut that extends to the base of the labial vestibule. This procedure is best done at the time of extraction or early in the postoperative period (**Rahn *et al.*, 2009**).

Intraseptal alveoloplasty is performed as follow; after extraction, the crestal tissue is slightly reflected, the intraseptal bone is removed, then digital pressure is used to greenstick fracture the labiocortical plate, so that the undercut is eliminated and crest of the ridge is narrowed (**Figure 1.8**) (**Rahn *et al.*, 2009**).

If significant resistance is encountered small vertical cuts can be made to facilitate repositioning of the fractured segment (**Hupp *et al.*, 2019**).

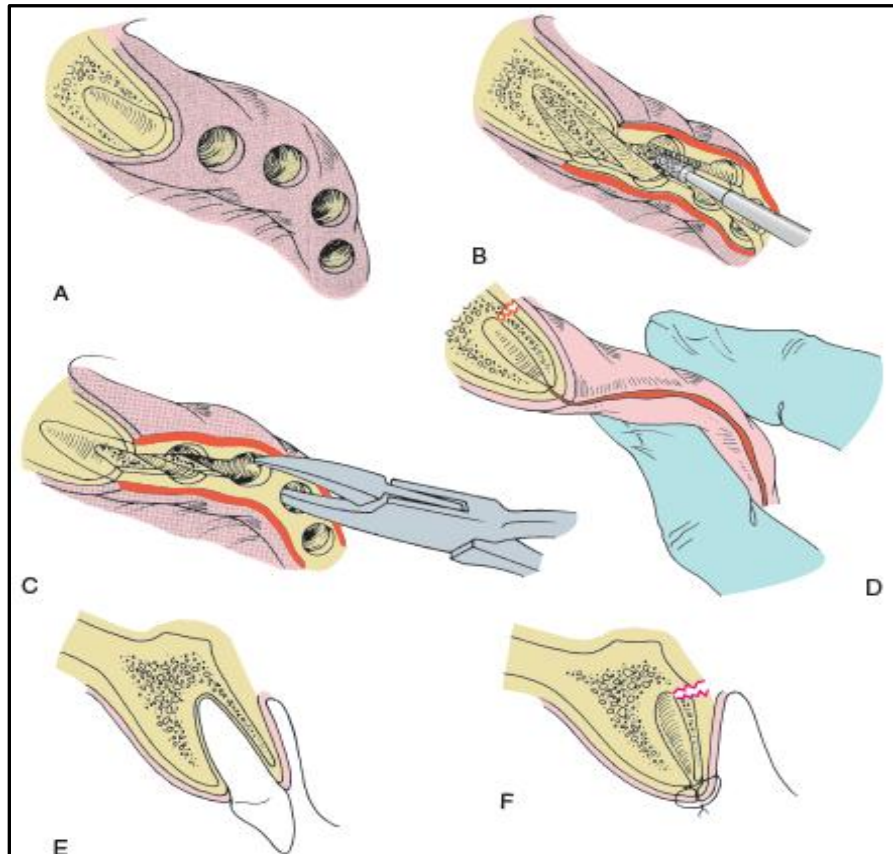
After repositioning of the fragment, smoothing, irrigation and suturing can be performed. Surgical stent or soft-tissue-lined immediate denture can be used to maintain the repositioned bony segment until the initial healing has taken place, after about two weeks (**Rahn *et al.*, 2009**).

#### **Advantages of this technique (Hupp *et al.*, 2019):**

- 1- Reduction of the labial prominence of the alveolar ridge can be done without significant reduction of the height of the ridge.
- 2- Muscle attachments to the alveolar ridge can be left undisturbed.
- 3- Postoperative bone resorption and remodeling can be reduced because periosteal attachment to the underlying bone is maintained (it result in a better long-term maintenance of the height of the alveolar ridge compared with labiocortical bone removal (**Michael and Barsoum, 1976**)).

## Main disadvantages of this technique:

Is the overall reduction in ridge thickness, which results in a too thin ridge to accommodate future implant placement. Therefore, if this technique is to be used, labial dimension reduction should be only enough to reduce or eliminate undercuts in areas where implants are not to be placed (Miloro *et al.*, 2011).



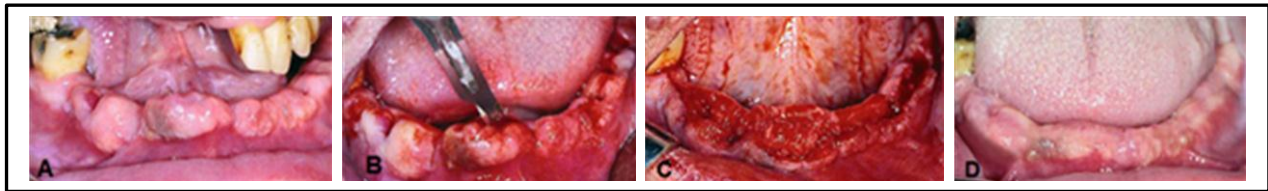
**Figure 1.8:** Intraseptal alveoloplasty. (A) View of the alveolar ridge, demonstrating a slight facial undercut. (B) Minimal mucoperiosteal flap elevation followed by intraseptal bone removal using bur and handpiece. (C) Rongeur intraseptal bone removal. (D) Digital pressure used to fracture the labiocortex in a palatal direction. (E) Cross-sectional view of alveolar process. (F) Cross-sectional view of alveolar process after tooth extraction and intraseptal alveoloplasty. By fracturing of the labiocortex in a palatal direction, labial undercut can be eliminated without vertical height reduction of the alveolar ridge (Hupp *et al.*, 2019).

### 1.7.1.3 Edentulous ridge alveoloplasty without extractions

This procedure is performed to eliminate sharp (knife-edged) ridges and removal of undesirable contours, undercuts, or prominences (**Rahn et al., 2009**), that occur when bone recontouring after extraction is not performed (**Fragiskos, 2007**).

Sometimes diagnostic casts, and the fabrication of surgical guides, are recommended when the maxillary or mandibular edentulous ridges require multifocal, moderate, or greater amounts of recontouring (**Rahn et al., 2009**).

Edentulous ridge alveoloplasty procedure performed as follows ( **figure 1.9**); Crestal incision is made, then full thickness flap is elevated and recontouring is performed. Digital palpation with the flap in place is done to see whether the desired endpoint is achieved, followed by irrigation and suturing (**Rahn et al., 2009**).

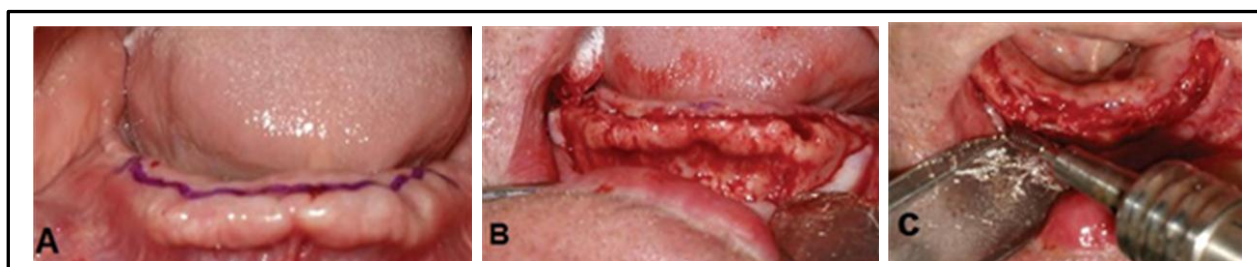


**Figure 1.9:** Edentulous ridge alveoloplasty. (A) Bone irregularities of residual alveolar ridge. (B) Crestal incision. (C) Surgical field after bone smoothing and excess soft tissue removal. (D) Satisfactory smooth ridge 20 days after the surgical procedure (**Fragiskos, 2007**).

### 1.7.1.4 Buccal and lateral palatal exostosis

Buccal exostoses appear as a row of smooth bony nodules along the facial alveolar process of the mandible and/or maxilla. Palatal exostoses occur along the lingual aspect of the maxillary molars. Exostoses are usually asymptomatic, although trauma to the thin overlying mucosa sometimes can result in superficial ulceration. No treatment is required for most exostoses. However, surgical removal is indicated if repeated ulceration and pain occur or if the location of the lesion interferes with the fabrication of a dental prosthesis (**Neville et al., 2019**).

The procedure is performed as follow; A crestal is made (**Miloro *et al.*, 2011**) (**Figure 1.10 (A)**), full thickness flap is reflected (**Figure 1.10 (B)**), releasing incision can be made if needed, but in case of lateral palatal exostosis the releasing incision is not recommended because of the greater palatine and incisive branch, so the main incision should be longer to allow more tissue reflection. After the exposure of the irregularity, bone is recontoured (**Figure 1.10 (C)**), finally the area is irrigated and sutured (**Rahn *et al.*, 2009**).



**Figure 1.10:** Buccal exostoses removal. (A) Marking the crestal incision. (B) Full thickness flap Reflection. (C) Rotary instrument is used for recontouring of the exostosis. The retractor provides exposure and protection for the adjacent soft tissue (**Rahn *et al.*, 2009**).

#### 1.7.1.5 Removal of mandibular tori

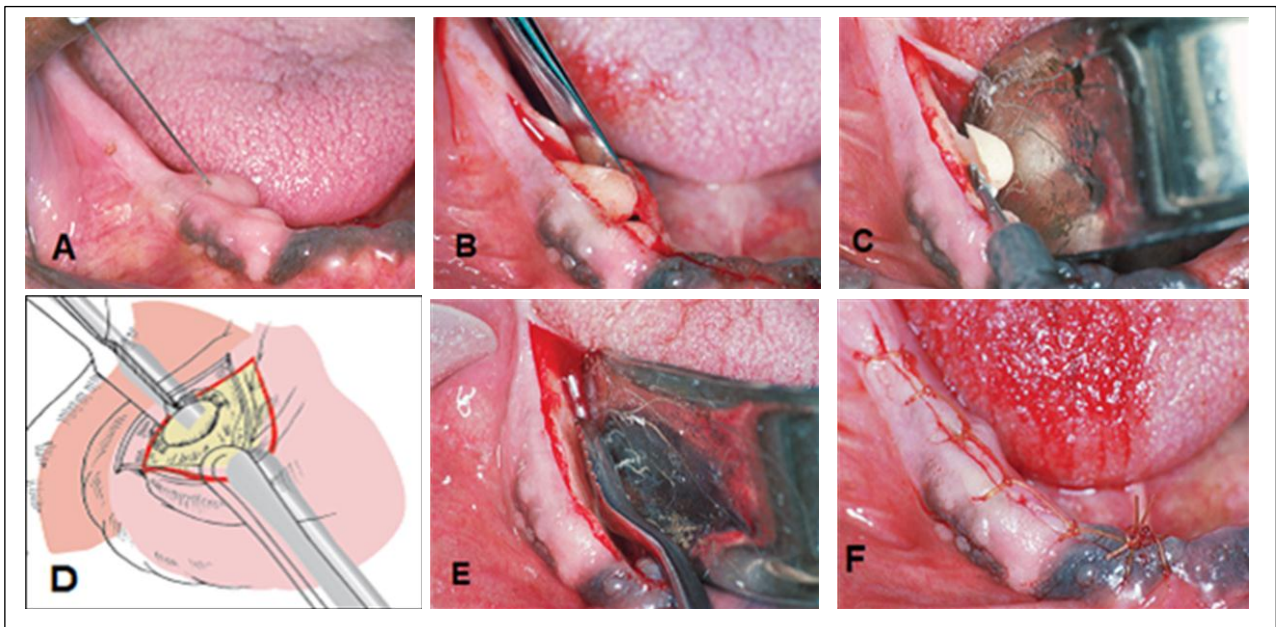
Mandibular tori along with maxillary tori are the two most prevalent type of osseous overgrowth intraorally (**Neville *et al.*, 2019**). mandibular tori etiology is unknown, but some suggest that it may be due to genetic factors, continued jaw bone growth, environmental factors and masticatory hyperfunction (**Jainkittivong and Langlais, 2000; Horning *et al.*, 2000**).

If the teeth are present, tori pose few or no problems, but sometimes tori can be large enough and interfere with tongue mobility and speech, also the thin mucosa covering the tori may be chronically irritated and ulcerated. In case of edentulous arch, tori may cause significant interference with removable prosthesis and often need to be removed (**Rahn, *et al.*, 2009**).

**Indications** of mandibular tori removal (**Chari and Shaik, 2016**):

- 1- when tori become so large and cause difficulty in eating or speech impairment.
- 2- when mucosa ulceration occur as a result of trauma and fails to heal.
- 3- to facilitate removable partial and complete dentures construction.

The procedure is done as follow (**Figure 1.11**); crestal incision (sulcular incision if teeth are present) is made and full thickness lingual flap is reflected. tori is removed with bone file and rongeur or rotary instrument and bur or mallet and osteotome (especially if pedunculated). Bone smoothed and the flap is repositioned and sutured. Rolled 4x4 gauze can be placed over the sutured flap below the tongue to reduce postoperative edema and hematoma formation (**Rahn et al., 2009**).



**Figure 1.11:** Removal of mandibular tori. (A) After block, infiltration anesthetic administered subperiosteally, causing ballooning of thin mucoperiosteum over the tori (This facilitates flap reflection). (B) Flap reflections after incision. (C) Fissure bur and handpiece used to create a small trough between the ridge and torus mandibularis. (D) Small osteotome to complete the removal of torus from the mandible. (E) Bone file used to smooth the bone. (F) Suturing with continuous interlocking sutures (**Hupp et al., 2019**).

### 1.7.1.6 Removal of maxillary tori

Maxillary tori may appear as a single or multiloculated bony mass in the palate. In the dentate patient, they rarely cause a problem and therefore rarely indicated for removal. Nevertheless, tori may need removal in case of repeated overlying mucosal trauma and interference with normal speech and mastication (**Miloro *et al.*, 2011**).

In partially edentulous patients when implant is not an option, palatal tori can complicate prosthetic treatment therefore tori removal is indicated, especially if large and extending to the posterior limits of the hard palate, as it is a better option (at least from prosthodontic perspective) (**Sawyer *et al.*, 1979**), than to manage it using U-shaped palatal major connector, but if the tori is small and don't interfere with the major connector of choice then we can leave it (**Carr and Brown, 2016**).

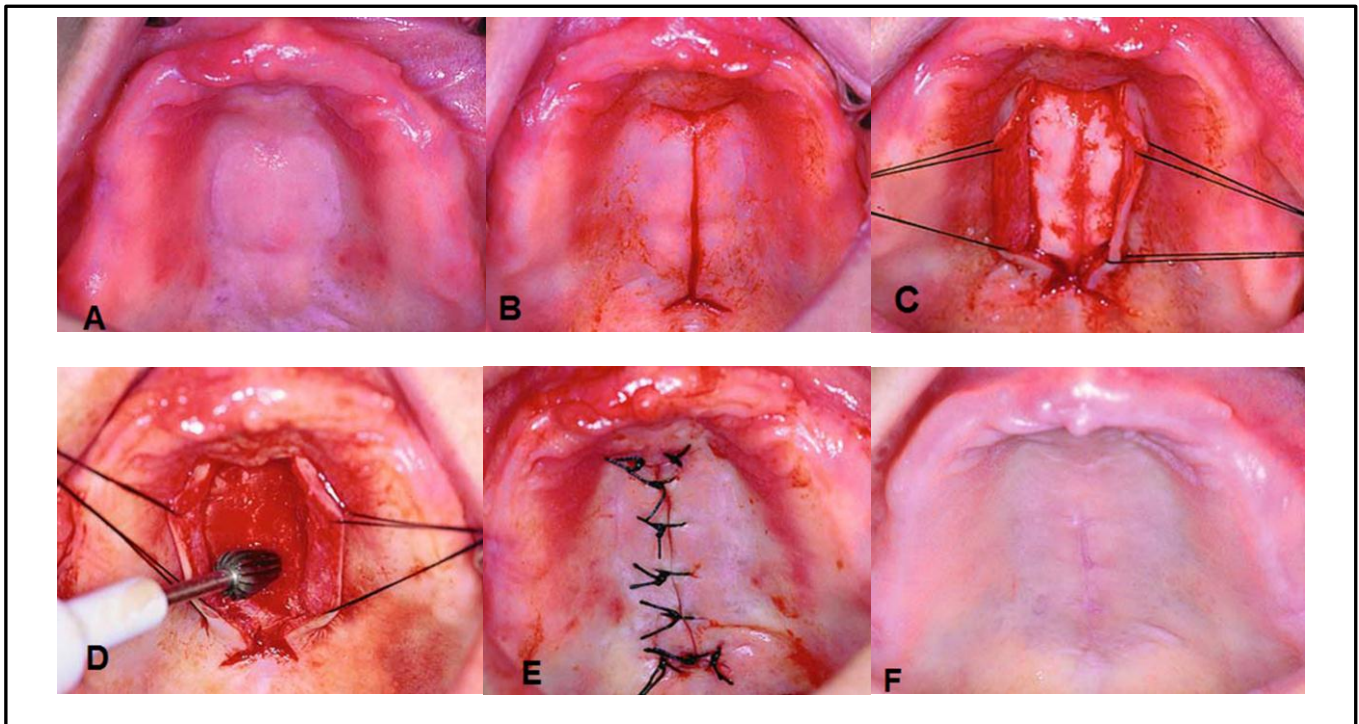
In completely edentulous patients, palatal tori may represent a significant problem in maxillary complete denture fabrication and wearing, especially if large and positioned more posteriorly compromising the posterior palatal seal so it need to be removed, so generally tori removal depend on its size (**Rahn *et al.*, 2009**).

Procedure for tori removal is as follow (**Figure 1.12**); first bilateral greater palatine and incisive blocks supplemented by infiltration of the overlying mucosa to help in hemostasis and hydrodissection (**Miloro *et al.*, 2011**). Incision is now made; the most commonly used incision design is a “double-Y” and consists of midline, two anterior and two posterior oblique incisions (**Kademani and Tiwana, 2016**).

After incision, flap elevation and dissection is carefully performed and stay subperiosteal to avoid palatal blood supply injury. Torus is removed, the desirable end point is that the palatal vault should be smooth, confluent with no undercuts or elevations. Redundant tissue removal, if needed, can now be performed. Hematoma formation in the palate is a great concern, but can be prevented to some extent by



applying pressure with the placement of a temporary denture with soft liner or surgical guide with soft liner (**Rahn et al., 2009**).



**Figure 1.12:** Removal of maxillary tori. (A) Maxillary torus. (B) Double-Y incision. (C) Flap retractions by traction suture. (D) Bone smoothing after tori removal. (E) Suturing. (F) Postoperatively immediately after suture removal (**Fragiskos, 2007**).

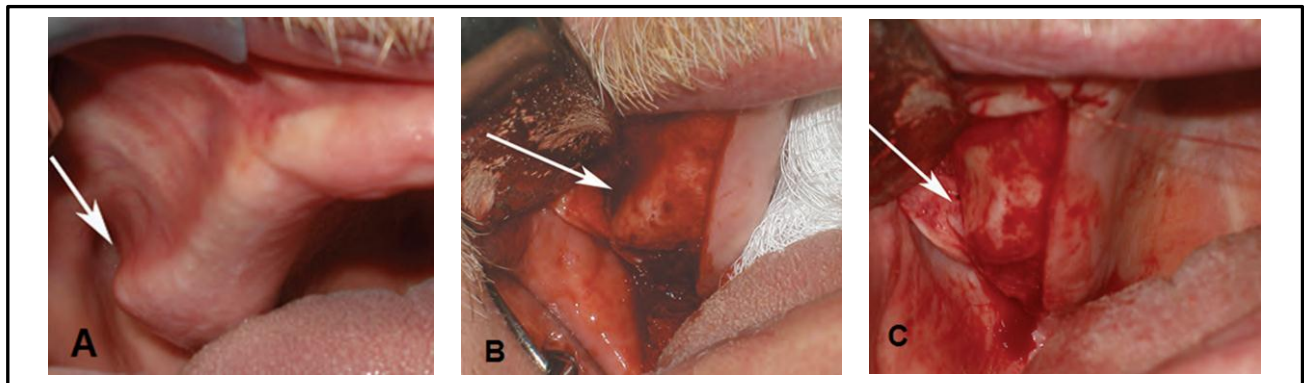
#### 1.7.1.7 Maxillary tuberosity reductions

Maxillary tuberosity excess may result from excess bone, soft tissue or both. We can differentiate between these causes by panoramic radiograph that can discriminate soft tissue from bone which will also give idea about the proximity to the maxillary sinus or probing with local anesthesia needle (**Hupp et al., 2019**), here we will focus on the bony excess and soft tissue excess will be discussed later.

The excess can be in the vertical or horizontal plane. Vertical excess can interfere with proper occlusal plane orientation, teeth arrangement and encroach on the interarch space. Horizontal excess may create undercut, limit the buccal flange

thickness between the tuberosity and the coronoid process and can also cause problems in path of insertion (**Chari and Shaik, 2016**).

Maxillary tuberosity reduction is done as follow (**Figure 1.13**); Crestal incision is made, the soft tissue is dissected, retracted and protected. Bone recountoring is done using bone file, ronger or by bur, if alot of bone need to be removed, surgical guide need to be considered. Maxillary sinus may pneumatize into the tuberosity and the sinus membran may be exposed, but as long as the membrane is intact this doesn't represent a problem (**Rahn et al., 2009**).After bone removal, the bone is smoothed and the area is irrigated, the flap is readapted and excess soft tissue is removed in an elliptical fasion, finally tension-free suture is used to obtain primary closure (**Hupp et al., 2019**).



**Figure 1.13:** Maxillary tuberosity reductions. (A) Arrow point a lateral undercut on the tuberosity. (B) Tissue flap is reflected to expose bony undercut that need recountoring. (C) Arrow points the recontoured buccal bone and the undercut is eliminated (**Rahn et al., 2009**).

### 1.7.1.8 Reduction of Mylohyoid ridge

In the mandible after extraction, resorption and remodeling of the residual alveolar ridge occur because of lack of stressing and functional remodeling, however; the mylohyoid ridge remains relatively intact because it gives attachment to the mylohyoid muscle, so the mylohyoid ridge become a prominent feature in the posterior mandible (**Rahn et al., 2009**).



Mylohyoid ridge reduction is indicated in these cases:

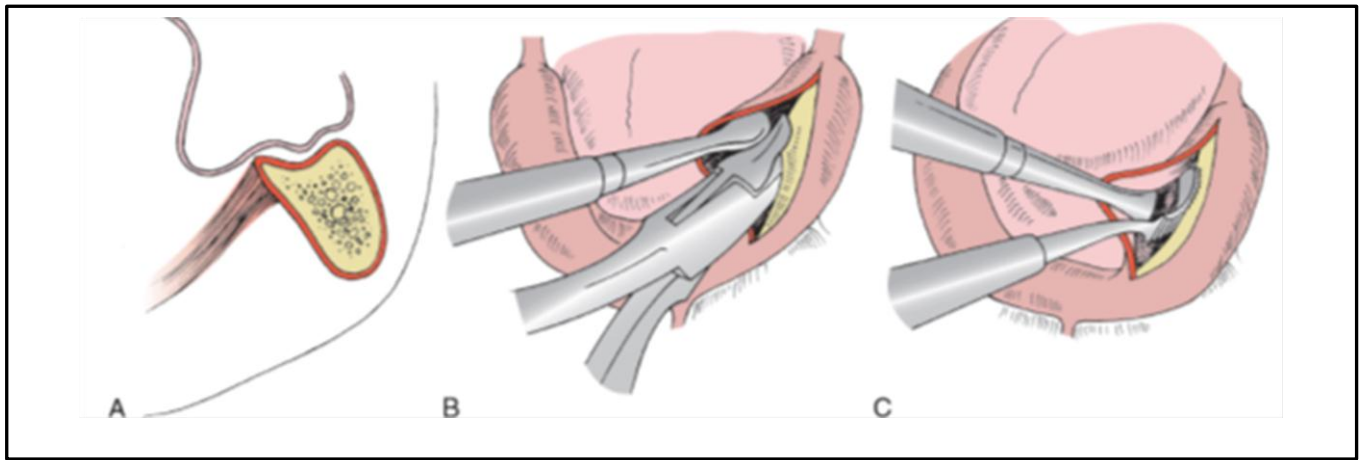
- 1- Limitation of the posterior extension of the lingual denture flange in the posterior mandible.
- 2- The mucosa overlaying the mylohyoid ridge is thin and easily irritated by the denture flange.
- 3- The muscle attachment cause problems with denture retention, and it is often responsible for dislodging the denture (**Chari and Shaik, 2016**).

**Gillies (1956)** stated that mylohyoid ridge reduction should be performed whenever it is found to be at the same level of the alveolar process as or higher, however; nowadays with dental implant and advanced grafting procedure only few indications for mylohyoid ridge reduction are present. In cases of severe residual ridge resorption, the mylohyoid ridge and the external oblique ridge may represent the most prominent areas of the mandible posteriorly, with the residual alveolar ridge present as a concave structure. In such cases, augmentation, instead of removal of the mylohyoid ridge, may be more beneficial (**Hupp et al., 2019**).

Mylohyoid ridge reduction is done as follow (**Figure 1.14**); crestal incision is made. The flap is elevated to expose the mylohyoid ridge and muscle, the muscle is detached, reattachment will occur during healing, the ridge is reduced and the area is irrigated and sutured. After flap closure denture with soft relines is used to displace the detached mylohyoid muscle inferiorly by its lingual flange (**Rahn et al., 2009**).

#### **1.7.1.9 Reduction of genial tubercle**

Genial tubercle consists of superior and inferior pair. The superior pair gives insertion to the paired genioglossus muscles while the inferior pair gives insertion to the paired geniohyoid muscles (**Rahn et al., 2009**).



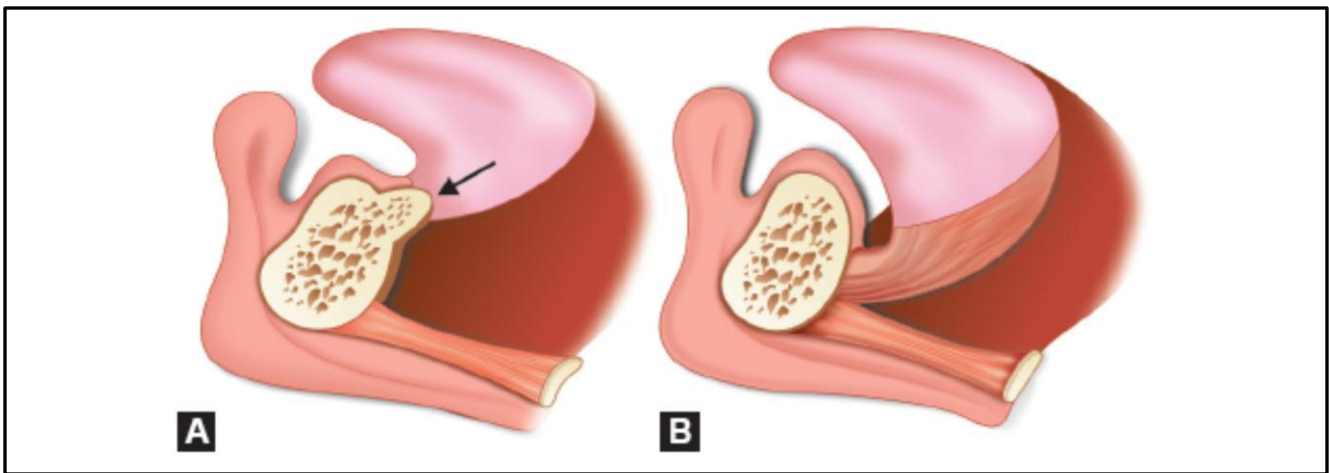
**Figure 1.14:** Mylohyoid ridge reduction. (A) Cross-sectional view of mandible, showing concave residual ridge superiorly (Generally this can be best managed by bone augmentation with alloplastic material but, in rare cases, mylohyoid ridge reduction may also require). (B) Crestal incision and exposure of the lingual aspect of the mandible for bone removal. Rongeur or handpiece and bur can be used for bone removal. (C) Bone file used to fine-tune the bone (**Hupp *et al.*, 2019**).

After teeth lose form the anterior mandible, resorption and remodeling of the residual ridge occur due to absence of stressing and functional loading, but the genial tubercle remain intact because of the muscles attached to it, so the genial tubercle can be a very prominent structure in the mandible anteriorly and interfere with denture construction and seating. The clinician keep in mind that this surgical site is situated between the tongue and the lip, in which both of them are moving structures, so wound dehiscence is possible (**Rahn *et al.*, 2009**).

If the genioglossus muscle activity cause lower denture displacement or if the mucosa overlying the tubercle cannot tolerate the denture flange in this area, then the genial tubercle may have to be reduced and the genioglossus muscle detached, to reattach randomly more inferiorly (**Zarb *et al.*, 2013**).

Before decision is made to remove genial tubercle, augmentation of the anterior portion of the mandible should be considered. If augmentation is preferred over reduction, the tubercle should be left without reduction to add support to the graft material in this area (**Hupp *et al.*, 2019**).

The procedure of genial tubercle reduction (**figure 1.15**) is done as follow; crestal incision is made and flap is elevated lingually to expose the genial tubercle and genioglossus muscle attachment. Muscle attachment is detached, and then bone is removed and smoothed. Genioglossus muscle is left to reattach randomly more inferiorly. Surgical site is copiously irrigated and then sutured (**Hupp *et al.*, 2019**).



**Figure 1.15:** Genial tubercle reductions (**Malik, 2021**).

#### **1.7.1.10 Implants**

A dental implant is a structure made of alloplastic materials implanted into the oral tissues to provide retention and support for a fixed or removable dental prosthesis (**Gupta *et al.*, 2022**). Implantology is based on the principle of **osseointegration** which is defined as the direct connection between living bone and a load-carrying endosseous implant at the light microscopic level (**Per-Ingvar, 2005**).

#### **Importance of dental implant:**

Implants allow us to replace the teeth that have been lost by artificial teeth. Teeth are required for mastication, to facilitate breakdown of food in the mouth allowing for adequate nutrition to be achieved through a balanced diet. Teeth also contribute to self-esteem, phonation, and aesthetics (**Rushworth and Kanatas,**

2020). Implant can also be used to retain extraoral prosthesis such as auricular prosthesis (Veeraiyan, 2017).

**Advantages of dental implant (Veeraiyan *et al.*, 2003):**

**1- Preservation of bone:** The implant stimulates the bone like a natural tooth thereby preventing the progress of residual ridge resorption.

**2- Improved function:** Implants designed so that the harmful effects of forces are minimized. Chewing efficiency is greater than other prosthetic replacements.

**3- Aesthetics:** Implants provide a natural emergence profile (appearance of the tooth as if it emerges directly from the soft tissues).

**4- Stability and retention:** Are better due to osseointegration.

**5- Comfort:** Implants are more comfortable as the extent of the flanges of the final prosthesis can be reduced.

**Disadvantages of implants (Ahmad, 2012):**

1- Special training and contact with various dental specialists (oral surgeon, prosthodontist and periodontist) is mandatory.

2- Medical history may complicate and contraindicate surgical procedures.

3- Failure may cause local morbidity, and involve further surgical trauma to rectify problems.

4- Protracted surgical phases may deter many patients.

5- Costly.

6- Unsuitable for very young patients.

### **Indications for Implants (Veeraiyan, 2017):**

- 1- Partial edentulism
- 2- Complete edentulism
- 3- Maxillofacial defects
- 4- Orthodontic tooth movement.

### **Contraindication of dental implant (Hupp *et al.*, 2019):**

There are absolute and relative contraindications of dental implant, the absolute contraindications are often limited in duration once the acute illness is resolved or the uncontrolled metabolic disease is controlled.

#### **Absolute contraindication includes:**

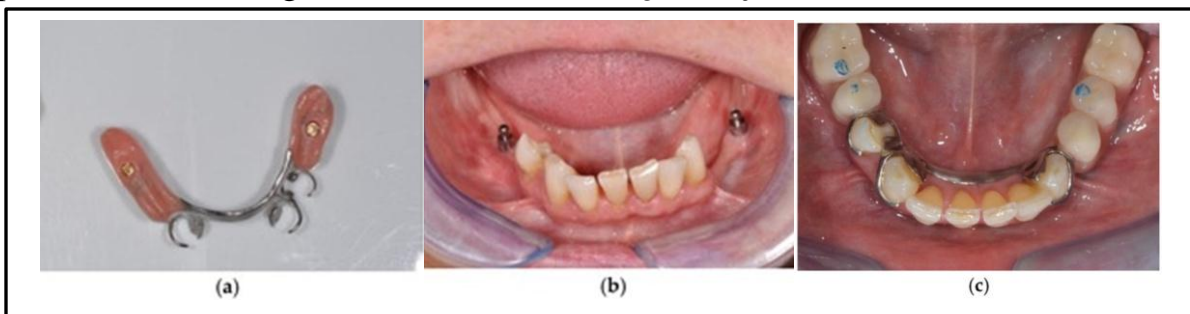
- 1- Acute illness, uncontrolled metabolic disease.
- 3- Bone and/or soft tissue pathology/ infection.

#### **Relative contraindication includes:**

- 1- Diabetes.
- 2- Parafunctional habits.
- 3- Neurological, psychological, psychiatric disorder.
- 4- HIV and AIDS.
- 5- Patient on bisphosphonate therapy/ chemotherapy.
- 6- Irradiation of the head and neck.
- 7- Osteoporosis.

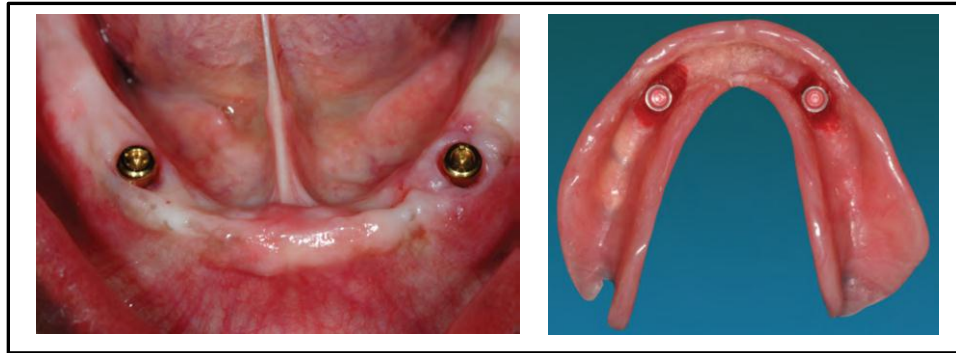
## Applications of dental implant:

1- Dental implant can be used with RPD to improve the performance and the biomechanical behavior of the free end saddle (**figure 1.16**). Placing implant in well-studied sites prevents bone resorption, increase the retention and the stability of the RPD, reduce the stress and the number of retainer on the anterior teeth, in addition to be more comfortable and more accepted by patients (**Ouni *et al.*, 2020**). A limited number of implants can be used to improve unfavorable removable partial denture design and construction (**Mijiritsky, 2007**).



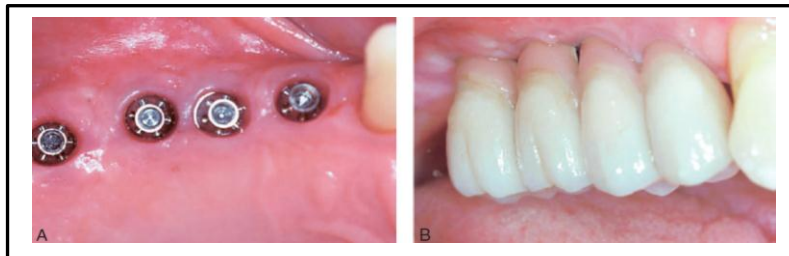
**Figure 1.16:** Implant-assisted removable partial denture. (A) Extraoral view of the converted prosthesis including the matrices for the ball abutments. (B) Intraoral view with ball abutments mounted on the implants. (C) Intraoral view of the converted implant-assisted removable partial denture (**Abou-Ayash *et al.*, 2022**).

2- Dental implant can be used with removable complete denture (implant overdenture) (**Figure 1.17**). Dental implants help to improved retention, stability and according to design even support can be improved compared with conventional prostheses. Among the disadvantages; there are still changes in the ridge under the tissue-supported part of the denture so those elements must be monitored and corrected if the prosthesis becomes unstable. Even though the implants themselves stabilize the bone and soft tissue near them, relines or rebases will be needed to compensate for the areas that remain tissue supported (**Rahn *et al.*, 2009**).

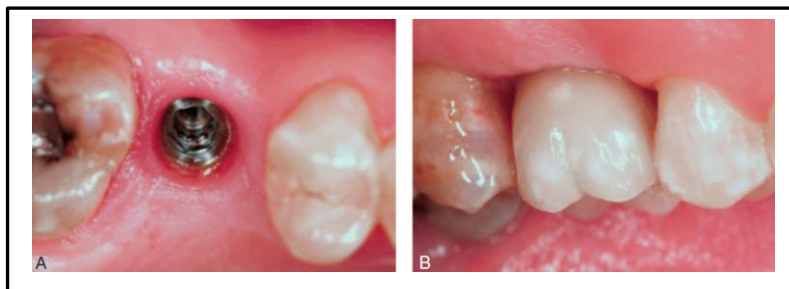


**Figure 1.17:** Implant retained overdenture. The left image show 2 implants used to support the denture. The right picture showing implant retained overdenture (**Rahn *et al.*, 2009**).

3- Dental implant can be used with FPD. The main indications for implant-supported restorations in patients with partial edentulism are the free-end distal extension when no posterior abutment is available (**Figure 1.18**) and long edentulous spans. In both these situations, the classic dental treatment plan would include a removable partial denture. However, with the advent of dental implants, the patient can benefit from fixed restorations. In addition, in the short edentulous span, single dental implants (**Figure 1.19**) are a popular option to preserve tooth structure on either side of the edentulous space (**Rosenstiel *et al.*, 2022**).



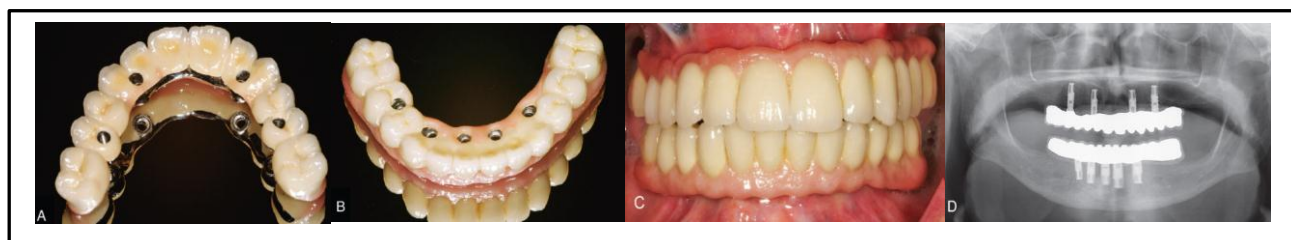
**Figure 1.18:** Implant-supported fixed prosthesis. (A) Four dental implants. (B) Implant supported fixed dental prosthesis (**Rosenstiel *et al.*, 2022**).



**Figure 1.19:** Single-tooth implant supported prosthesis. (A) Single-tooth implant. (B) Implant crown replacing a single missing tooth (**Rosenstiel *et al.*, 2022**).



4- Fixed full arch implant supported prosthesis (**Figure 1.20**). An implant-supported fixed prosthesis can, instead, put the patient at more ease, both physically and psychologically as many patients who are treated with removable complete dentures report that they do not always feel comfortable, especially when they have to remove the denture to perform oral hygiene maneuvers (**Noè *et al.*, 2022**). Fixed implant-supported prostheses usually need five to nine implants in the mandible and six to 10 implants in the maxilla. However; some patients demanding fixed implant-supported prostheses are not able to medically or economically afford complex bone grafts and/or a greater number of implants. In these situations we might consider All-on-4 protocol (**Siadat *et al.*, 2018**).



**Figure 1.20:** Fixed full arch implant supported prosthesis. (A and B) Implant supported prostheses. (C) Intraoral view of prostheses. (D) Panoramic radiograph (**Zarb *et al.*, 2013**).

### **Procedure of implant placement**

After careful preoperative assessments including the chief complain, taking both medical and dental history, intraoral examination, and radiographic examination, treatment plan is now developed. When placing implant into the jaw bone the implant should be surrounded by at least 1 to 1.5 mm of bone all around. It should be 1.5 mm from roots of adjacent teeth and 3 mm from adjacent implant (**Hupp *et al.*, 2019**).

Dental implant is placed as follow:

- 1- Surgery to insert the implant and waiting period for the osseointegration and healing of the soft tissue to occur.



- 2- Making impression.
- 3- Establishing jaw relation.
- 4- Set-up of teeth.
- 5- Dentures fabrication and delivery (**Soratur, 2006**).

#### **1.7.1.11 alveolar augmentation/ bone grafting**

Alveolar augmentation is a procedure used to alter the contour of the residual ridge (**Veeraiyan *et al.*, 2003**), it is considered in case of reduced alveolar height and width, where implant placement would otherwise be problematic (**Fragiskos, 2007**).

#### **Importance of alveolar augmentation**

- 1- To provide adequate bony support for implant placement; insufficient bone maybe a result of bone atrophy following extraction, sinus pneumatization, congenital defects, etc. (**Hupp *et al.*, 2019**).
- 2- Restoration of optimum/near optimum ridge height, width and form, vestibular depth and optimum denture bearing area, and also establishment of proper interarch relationship.
- 3- Improvement of retention and stability of the denture and also improve patient comfort for wearing the denture (**Malik, 2021**).

#### **Materials used for Augmentation of Alveolar Ridge:**

- 1- **Autogeneous bone graft** (bone harvested from the same individual); such as iliac crest, rib grafts.
- 2- **Allogenic bone grafts** (bone harvested from another individual); such as freeze dried cadaver bone.

- 3- **Xenografts** (bone harvested from animals); such as bovine bone (**Malik, 2021**).
- 4- **Bone Morphogenetic Proteins (BMPs)**; family of protein factors that have applied to reconstruction of the maxillofacial skeleton (**Hupp et al., 2019**).

## **Mandibular Augmentation**

### **A- Superior border augmentation:**

#### **Indication:**

- 1- When severe mandibular resorption 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 (**Hupp et al., 2019**).

**Current techniques for superior border augmentation** of the mandible frequently involve some combination of block grafting, supplemented with an allogeneic material such as freeze-dried bone mixed with BMP (**Hupp et al., 2019**) (**Figure 1.21**).

### **B- Inferior border augmentation:**

This technique is rarely used, but generally **Indicted** to prevent and manage of fractures of the atrophic mandible (**Chari and Shaik, 2016**).

## **Maxillary Augmentation**

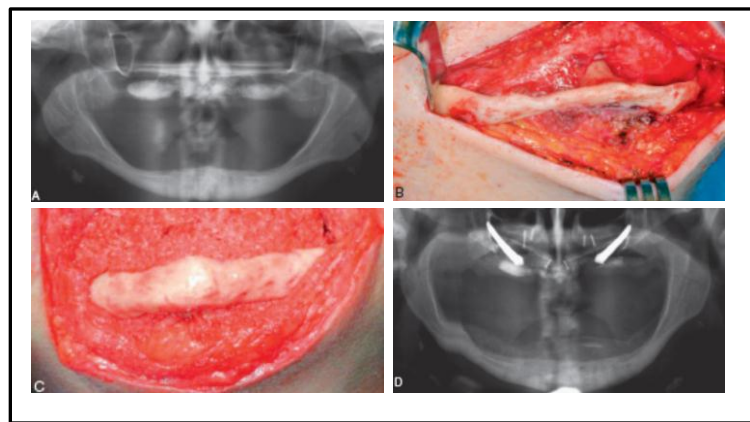
### **A- Onlay Bone Grafting**

**Indicted primarily** in case of; severe resorption of the maxillary alveolus that results in the absence of a clinical alveolar ridge and loss of adequate palatal vault form (**Hupp et al., 2019**).

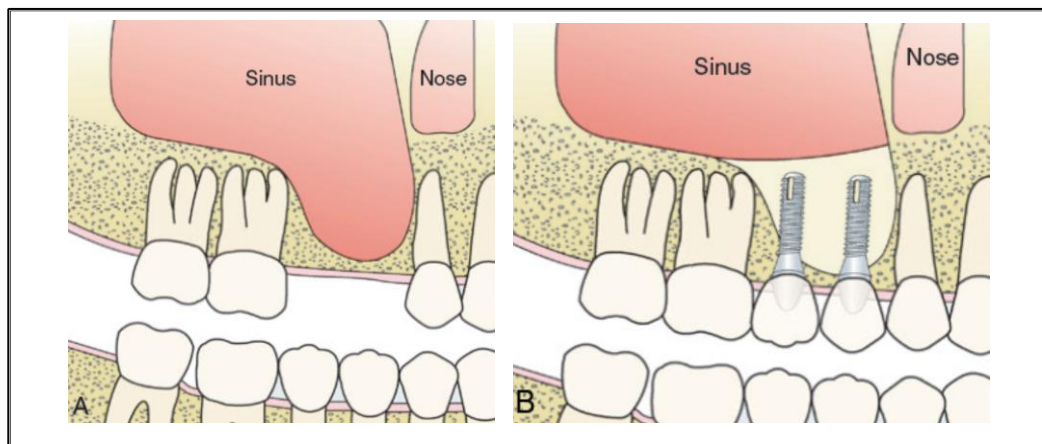
## B- Sinus Lift

It is bony augmentation procedure that places graft material inside the sinus cavity but external to the sinus membrane, either by the lateral window technique or by the vertical technique (**figure 1.22**) (**Hupp *et al.*, 2019**).

**Indicted** when the alveolar ridge has adequate height and width, but extension of the maxillary sinuses into the alveolar ridge may prevent placement of implants in the posterior maxillary area (**Hupp *et al.*, 2019**).



**Figure 1.21:** Augmentation of atrophic edentulous mandible. (A) Preoperative radiograph. (B) Surgical exposure (C) Bone graft in place. (D) Six-month postoperative radiograph. Note that the bone graft area is not as dense as underlying bone. When implants are placed and stress is applied, the density will increase (**Hupp *et al.*, 2019**).



**Figure 1.22:** Sinus lifts procedure. (A) Diagram illustrating pneumatization of the maxillary sinus into the alveolar ridge with inadequate bone support for reconstruction. (B) Elevation of the sinus membrane, implant placement, and grafting of area around implants below the sinus membrane (**Hupp *et al.*, 2019**).

## **1.7.2 Soft Tissue Procedures**

Many of soft tissue abnormalities doesn't represent problem when teeth are present unless they are pathologic or inflammatory in nature or interfere with dentition alignment such as upper labial frenum (**Hupp *et al.*, 2019**).

After teeth are lost, bone resorption and remodeling occur, and the soft tissue and muscular attachments change and interfere with the planned prosthodontic treatment, so removal or alteration is often needed if we intend to construct a removable prosthesis. Nowadays with the use of dental implant, surgical alteration of these attachments is indicated less often (**Miloro *et al.*, 2011**).

Hyperplastic tissues can occur in the denture bearing and peripheral tissue area, as a result of chronic irritation and trauma caused by ill-fitting prostheses. These hyperplastic tissues compromise the denture fitness and stability, as well as causing patient discomfort (**Rahn *et al.*, 2009**).

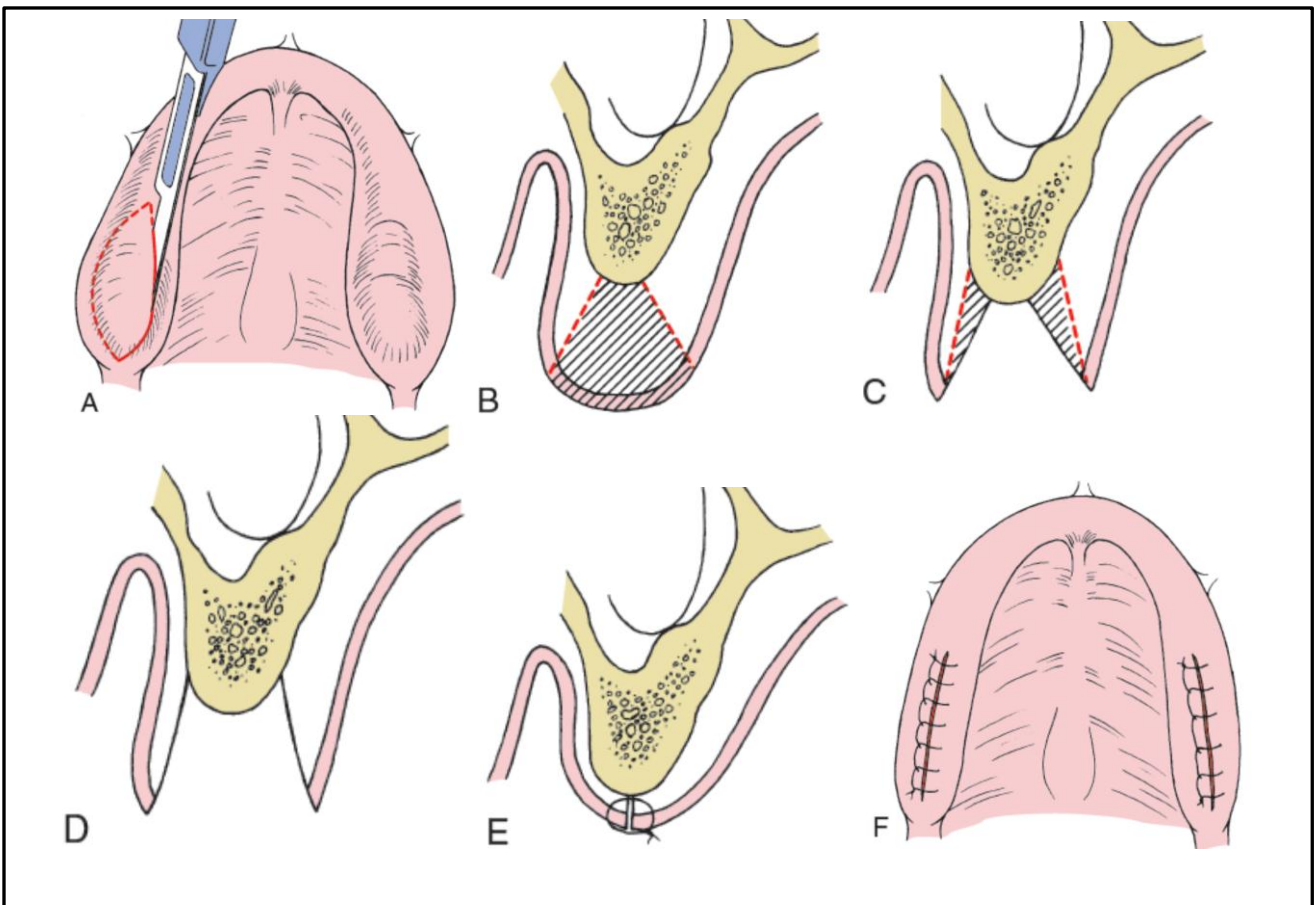
Long-term treatment planning before any soft tissue surgery is mandatory. Soft tissue that initially appears to be flabby and excessive may be useful if future ridge augmentation is necessary (**Hupp *et al.*, 2019**).

### **1.7.2.1 Maxillary Soft Tissue Tuberosity Reduction**

The importance of soft tissue maxillary tuberosity reduction is to provide adequate interarch space for proper denture construction in the posterior area and a firm mucosal base of consistent thickness over the alveolar ridge. Maxillary tuberosity reduction may require the removal of bone (already discussed in hard tissue procedures) and soft tissue to achieve the desired result (**Hupp *et al.*, 2019**).

To determine if the reduction will be primarily bone or soft tissue, an OPG or soft tissue sounding with the anesthesia needle can help (as already discussed). If lots of tissue removal is anticipated, a surgical guide is recommended (**Rahn et al., 2009**).

The surgical procedure is done as follow (**Figure 1.23**); elliptical incision is made over the tuberosity and this section of tissue is removed, the medial and lateral margins of the excision must be thinned to remove excess soft tissue, which allows further soft tissue reduction and provides a tension-free soft tissue closure. Wound closure by interrupted or continuous suturing techniques (**Hupp et al., 2019**).



**Figure 1.23:** Maxillary soft tissue tuberosity reduction. (A) Elliptical incision around soft tissue to be excised in the tuberosity area. (B) Soft tissue area excised with the initial incision. (C) Undermining of buccal and palatal flaps to provide adequate soft tissue contour and tension-free closure. (D) View of final tissue removal. (E–F) Soft tissue closure (**Hupp et al., 2019**).

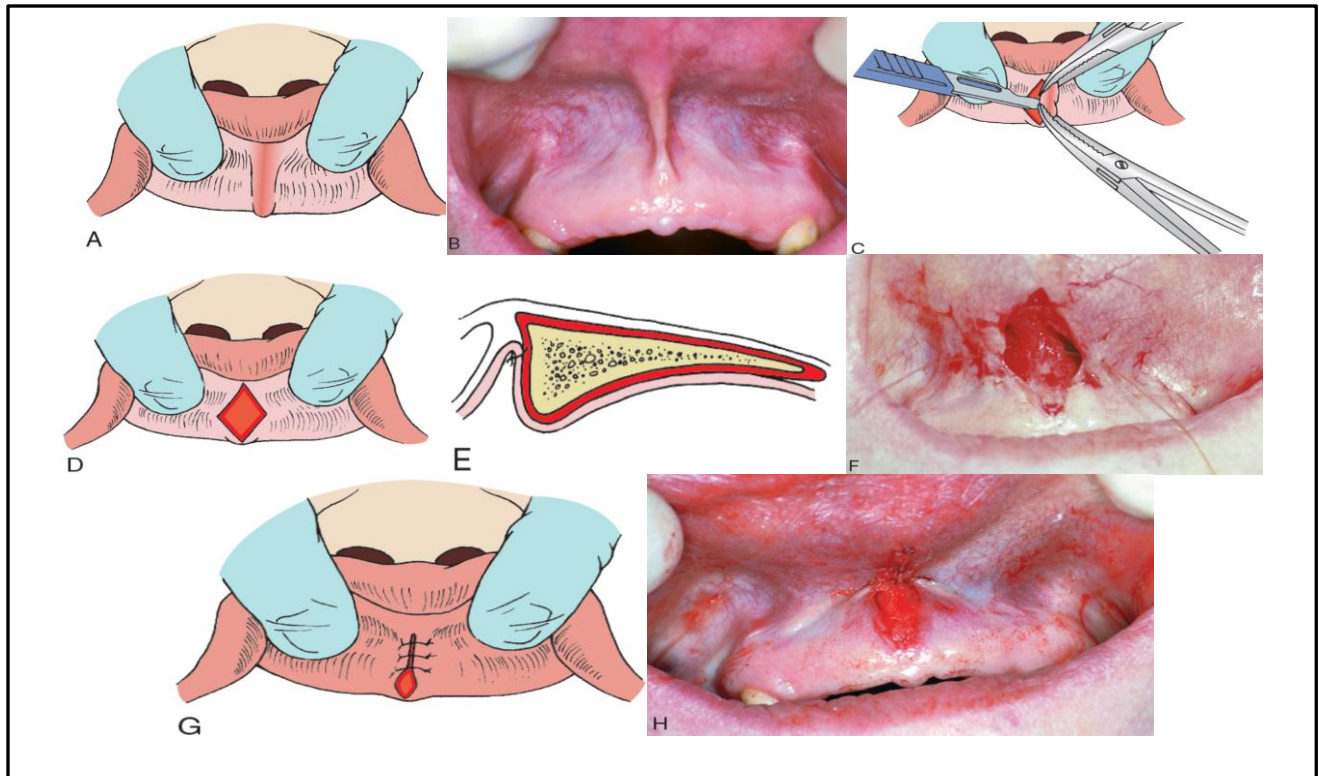
### 1.7.2.2 Labial Frenectomy

Labial frenum attachments consist of thin bands of fibrous tissue covered with mucosa extending from the lip and cheek to the alveolar periosteum. In dentate individuals, frenum attachments rarely cause a problem, except for causing a midline diastema. In edentulous individuals, frenum may interfere with fitness and stability, produce discomfort, and dislodge the overlying prostheses (**Miloro *et al.*, 2011**).

**Frenectomy** is complete frenum removal, including its attachment to the bone, and it may be required in the correction of an abnormal diastema. **Frenotomy** is frenum relocation, usually in a more apical position (**Newman *et al.*, 2018**).

Frenectomy is often **indicated** when; highly attached frena can cause loss of border seal that deprives the retention of the upper denture and also when a deep labial notch on the denture to accommodate such prominent frena will weaken the denture and increase the chance of midline fracture (**Chari and Shaik, 2016**).

There are many frenectomy techniques but **simple excision technique** using two curved hemostat is recommended for simple frenectomy and it's done as follow (**Figure 1.24**); infiltration anesthesia around the frenum is usually adequate. Injecting directly into the frenum may distort the anatomy. After anesthesia, two curved hemostats are placed with the curved sides against the tissues over the superior and the inferior aspect of the frenum. The clinician will cut through the upper aspect of the frenum using the curvature of the upper hemostat as a guide. This is repeated for the lower hemostat. A suture is placed through the wound margin engaging the periosteum in the depth of the vestibule right below the ANS to maintain the vestibular depth. Additional sutures are placed to close the wound in a linear manner (**Rahn *et al.*, 2009**).



**Figure 1.24:** Simple excision of the maxillary labial frenum. (A–B) Eversion and exposure of the frenal attachment area. (C–D) Excision along the lateral margins of the frenum. Tissue is removed, exposing underlying periosteum. (E–F) Suture placement through mucosal margins and periosteum. (G–H) Wound closure. Tissue removal in areas adjacent to attached mucosa sometimes prevents complete primary closure at the most inferior aspect of wound margin (Hupp *et al.*, 2019).

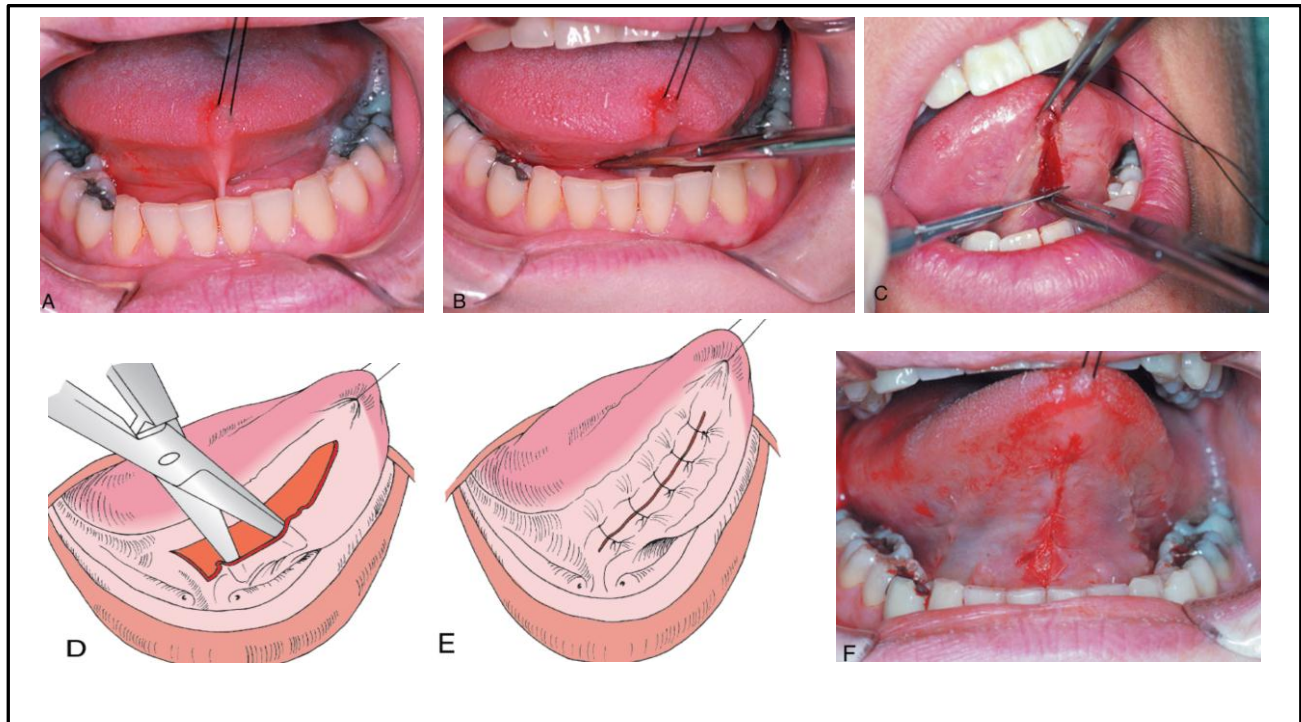
### 1.7.2.3 Lingual Frenectomy

Lingual frenal attachment usually consists of mucosa, dense fibrous connective tissue, and, the superior fibers of the genioglossus muscle. This attachment binds the tongue tip to the posterior aspect of the mandible. Even if no prosthesis is required, abnormal attachments can affect speech (Hupp *et al.*, 2019). After teeth lose, prominent lingual frenum can cause lower denture instability. As a tongue function test, the patient should be able to touch the upper lip with the tongue tip without lower denture dislodgement. Otherwise, **frenectomy is indicated** (Chari and Shaik, 2016).

This procedure is done as follow (Figure 1.25); Electrocautery or a hemostat can be used to minimize blood loss and improve visibility. After hemostat removal, an incision is created through the area previously closed within the hemostat. Wound



edges are undermined, approximated and sutured. Careful attention must be given to Wharton's ducts and superficial vessels in this area (Miloro *et al*, 2011).



**Figure 1.25:** Lingual frenum release. (A) Traction suture placed in the tip of the tongue. (B) Hemostat used to compress the frenum area for 2 to 3 minutes allows improved hemostasis. (C) Incision made at the superior portion of frenal attachment through the serrations created by the hemostat to the inferior surface of the tongue. (D) Lateral borders of wound margin are undermined. (E-F) Soft tissue closure (Hupp *et al*, 2019).

#### 1.7.2.4 Unsupported Hypermobile Tissue

Redundant hypermobile tissue is often the result of ill-fitting dentures, ridge resorption, or both (Rahn *et al*, 2009). It is most commonly seen in anterior part of knife edge mandibular ridge (Chari and Shaik, 2016).

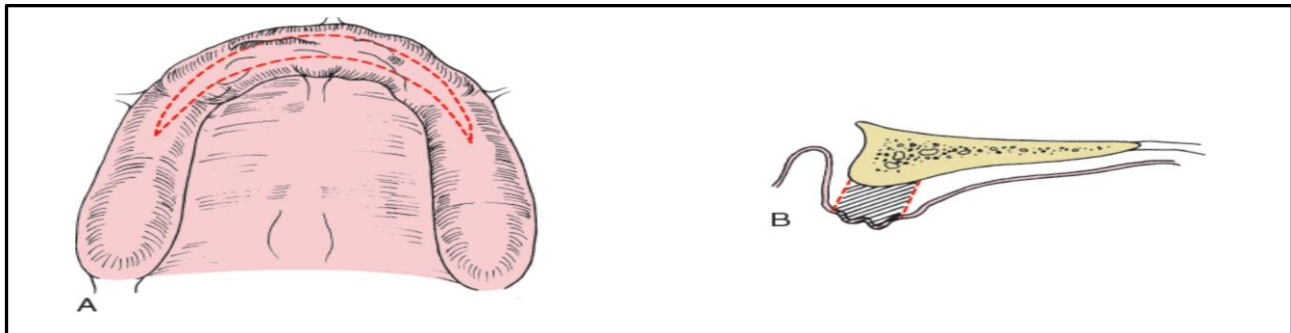
Before the excision of this tissue, a determination must be made whether the underlying bone should be augmented with a graft, and the management is as follow:



1- If a bony deficiency is the primary cause of soft tissue excess, then **augmentation** of the underlying bone is the treatment of choice.

2- If adequate alveolar height remains after reduction of the hypermobile soft tissue, then **excision may be indicated (Hupp et al., 2019).**

The surgical procedure is done as follow (**Figure 1.26**); two parallel incisions buccally and lingually are made sharply to the bone. The excised piece of tissue will be dissected from the bone and removed. The wound is irrigated, undermined and sutured. Care should be taken to avoid significant undermining of the buccal/facial aspects of the flaps, and loss of vestibular depth (**Rahn et al., 2009**). Impressions can usually be taken 3 to 4 weeks after surgery. One possible complication of this procedure is the obliteration of the buccal vestibule as a result of tissue undermining necessary to obtain tissue closure (**Hupp et al., 2019**).



**Figure 1.26:** Removal of hypermobile unsupported tissue. (A) Incisions outline for removal of the crestal area of hypermobile tissue. (B) Cross-sectional area demonstrating the amount of tissue to be excised (**Hupp, et al., 2019**).

#### **1.7.2.5 Inflammatory Fibrous Hyperplasia (Epulis Fissuratum)**

Epulis fissuratum is the sulcular epithelium hyperplasia due to chronic irritation from an ill-fitting denture or denture that has settled due to resorption. The hyperplasia is in the form of 2-folds; outer and inner folds and the sulcus in between may be ulcerated (**Chari and Shaik, 2016**). The anterior portion of the jaws is

affected much more often than the posterior areas and there is a pronounced women predilection (**Karimi et al., 2016**).

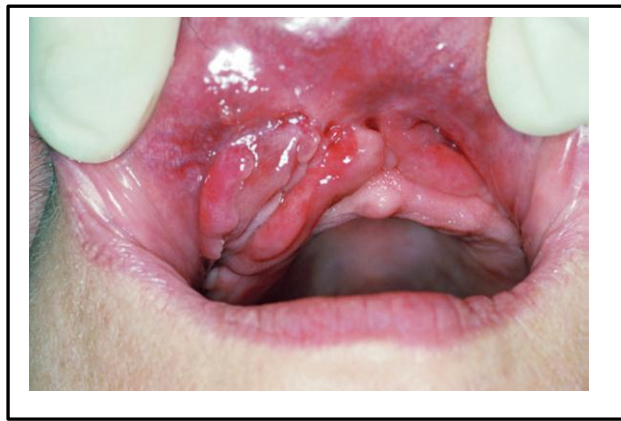
Inflammatory fibrous hyperplasia progresses in stages, and the management varies with the stage. In early stage Lesions, there is no significant fibrosis of the involved tissues, and nonsurgical therapies may be effective. In the later stages where there is significant fibrosis and hyperplastic changes (**Figure 1.27**), excision of the hyperplastic mass of tissue is **indicated (Rahn et al., 2009)**.

Early management consists mainly of adjustment and soft relin of the prosthesis. When there is little or no chance of eliminating the fibrous component, surgical excision is necessary. In most cases, when excision is indicated laser ablation with a carbon dioxide laser is the method of choice (**Miloro et al., 2011**).

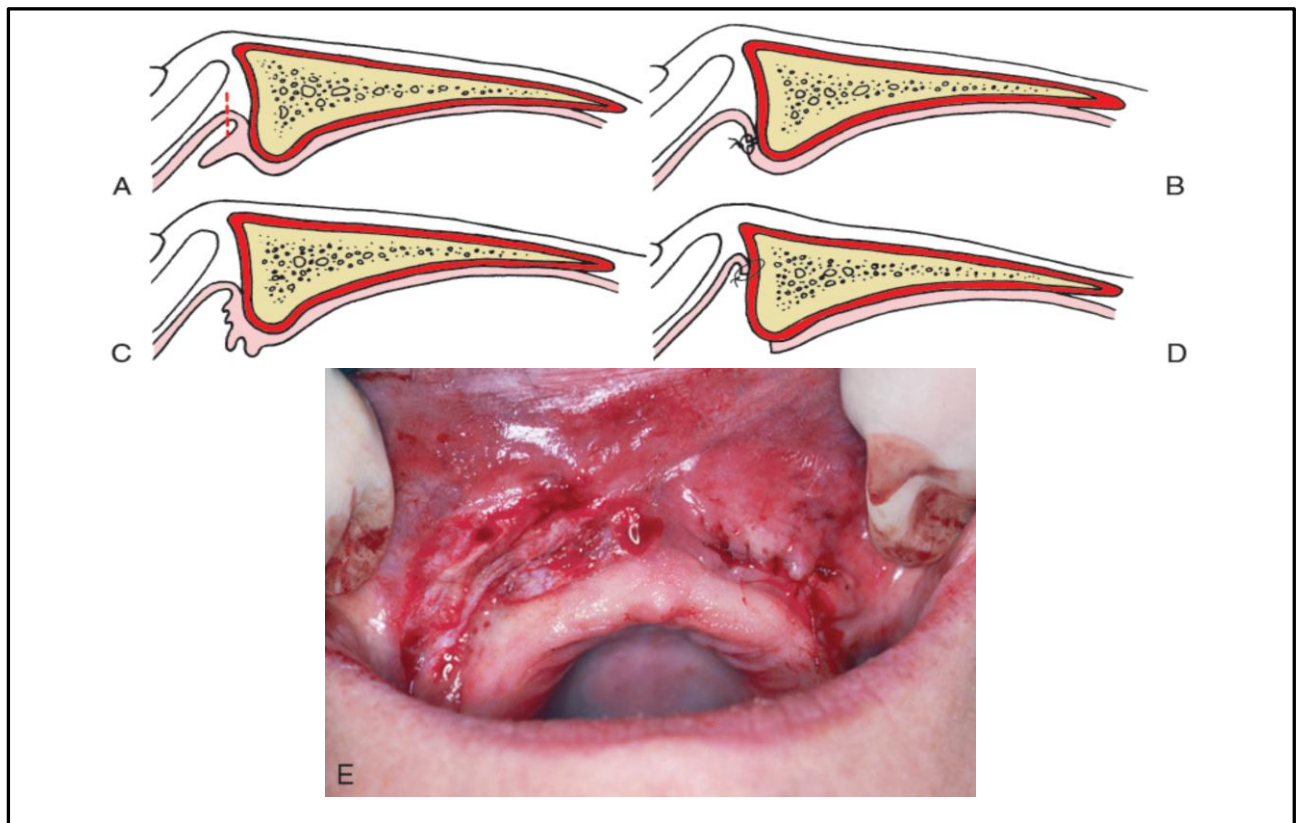
The use of CO2 laser for the surgical removal of epulis lesions has resulted in many significant improvements including:

- 1- Better healing and re-epithelialization with minimal postoperative pain and edema.
- 2- No bleeding and no need for sutures.
- 3- Less vestibular depth decreased compared to conventional surgery with scalpel blade (**Karimi et al., 2016**).

Excision with scalpel is done as follow; an incision is made at the base of the mass, but not through the periosteum, then the mass is dissected and removed. Closure is done either primarily by suturing the incision margins together (**Figure 1.28 B**), or left to heal by secondary intension (**Figure 1.28 D**). In order to minimize the loss of vestibular height with secondary intension healing, a surgical stent with an extended anterior flange, or the existing denture with the flange extended to engage the height of the vestibule can be used (**Rahn et al., 2009**).



**Figure 1.27:** Inflammatory fibrous hyperplasia of the vestibule, that need to be surgically removed (Hupp *et al.*, 2019).



**Figure 1.28:** Removal of inflammatory fibrous hyperplasia. (A) Small, well-localized area of fibrous hyperplasia, which can be removed by simple excision. (B) Closure of wound margins. (C) Large area of inflammatory fibrous hyperplasia. Removal and primary closure would result in elimination of the labial vestibule. (D) After supraperiosteal removal of excess tissue, the mucosal edge is sutured to the periosteum at the depth of the vestibule. (E) Postoperative view, the smaller well-localized area on the patient's left has been removed and closed primarily. The larger area of excessive tissue on the right has been removed, and the wound margin has been sutured to the periosteum at the depth of the vestibule, which leaves exposed periosteum (Hupp *et al.*, 2019).

### **1.7.2.6 Inflammatory Papillary Hyperplasia of the Palate (IPH)**

It is a benign lesion of the oral mucosa characterized by the growth of one or more nodular lesions, measuring about 2mm or less (**Figure 1.29**) (**Gual et al., 2017**).

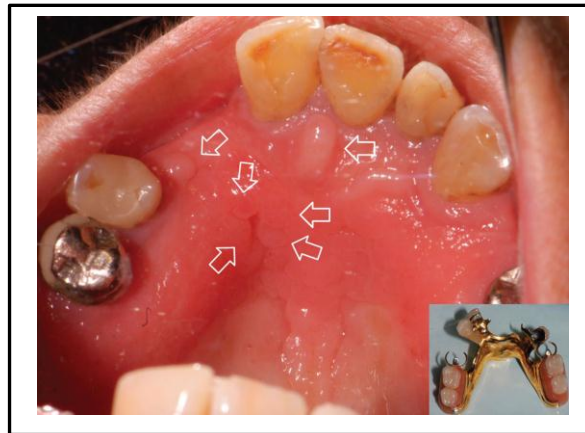
IPH is mostly asymptomatic and the mucosal color may vary from pink to red. IPH is associated with the use of removable upper dentures although it has been found in dentulous patients with no history of a dental prosthesis (**Orenstein and Taylor, 2014**). Poor oral hygiene and the continuous dentures use were found to be the most significant risk factors (**Gual et al., 2017**).

Most of the lesion will resolve itself with sufficient tissue rest, oral hygiene, and denture hygiene. Any residual lesions that fail to resolve require surgical removal (**Chari and Shaik, 2016**). Early stages are easily treated by prosthesis adjustments, tissue conditioner, improvement of oral hygiene practices and the use of antifungal therapy. Nocturnal prosthesis soaking in an antifungal solution can help decrease the overall colonization of the prosthesis (**Miloro et al., 2011**).

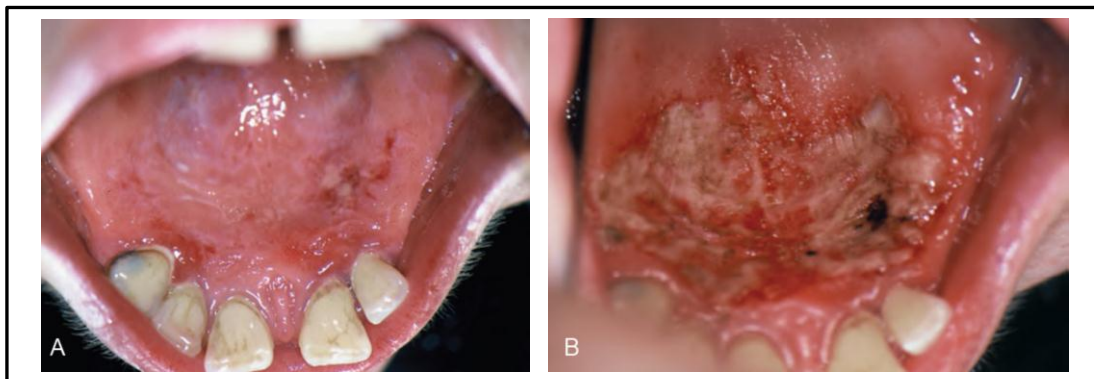
In proliferative cases necessitating surgical treatment, excision in a suprapariosteal plane is the method of choice. Many methods are acceptable, including sharp excision with a scalpel, rotary debridement (**Miloro et al., 2011**), loop electrocautery (**Guernsey, 1965**), and laser ablation with a carbon dioxide laser (**Starshak, 1980**), cryotherapy (**Figure 1.30**) (**Rahn et al., 2009**).

Because this is primarily an inflammatory disorder, there is no need to excise the full thickness of the palatal tissue. In any of the described treatment options, the superficial inflamed layers of the palatal mucosa are removed leaving the palatal periosteum intact to heal by secondary intension, the palate is covered with a surgical stent or denture with a soft tissue conditioner to assist with patient comfort and

provide coverage while secondary epithelialization takes place in the following 4 to 6 weeks (**Rahn et al., 2009**).



**Figure 1.29:** Inflammatory papillary hyperplasia. A case showing some injuries (marked by arrow) located under the framework (**Gual et al., 2017**).



**Figure 1.30:** Inflammatory papillary hyperplasia removal. (A) IPH of the palate, preoperatively. (B) Inflammatory papillary hyperplasia removed using cryotherapy (**Rahn et al., 2009**).

### 1.7.2.7 Soft tissue surgery for ridge extension of the mandible

Importance of soft tissue surgery for ridge extension of the mandible:

- 1- Provide an enlarged area of fixed tissue in the primary denture-bearing.
- 2- Improve extension in the area of the denture flanges by removing the dislodging effects of muscle attachments (**Hupp et al., 2019**).

## A. Transpositional Flap Vestibuloplasty (Lip Switch)

**Kazanjian (1920)** was the first to describe lingually based flap vestibuloplasty. In this procedure a mucosal flap pedicled from the alveolar ridge is elevated and sutured to the vestibular depth. inner lip healing is by secondary epithelialization.

This procedure has been modified and the use of a technique transposing a lingually based mucosal flap and a labially based periosteal flap (transpositional flap) has become popular (**Kethley and Gamble, 1978**).

**The primary indications** for this procedure; adequate anterior mandibular height (at least 15 mm) with inadequate facial vestibular depth from mucosal and muscular attachments in the anterior mandible, and adequate vestibular depth on the lingual aspect of the mandible. This procedure increases the anterior vestibular area, which improves denture retention and stability (**Figure 1.31**) (**Hupp et al., 2019**).

**Disadvantages** of these techniques include unpredictability of the amount of relapse, scarring in the depth of the vestibule, and problems with adaptation of the peripheral flange area of the denture to the depth of the vestibule (**Hillerup, 1979**).



**Figure 1.31:** Transpositional flap vestibuloplasty. (A) Preoperative photograph. (B) Result of surgery 6 months later (**Hupp et al., 2019**).

## B. Vestibule and Floor-of-Mouth Extension Procedures

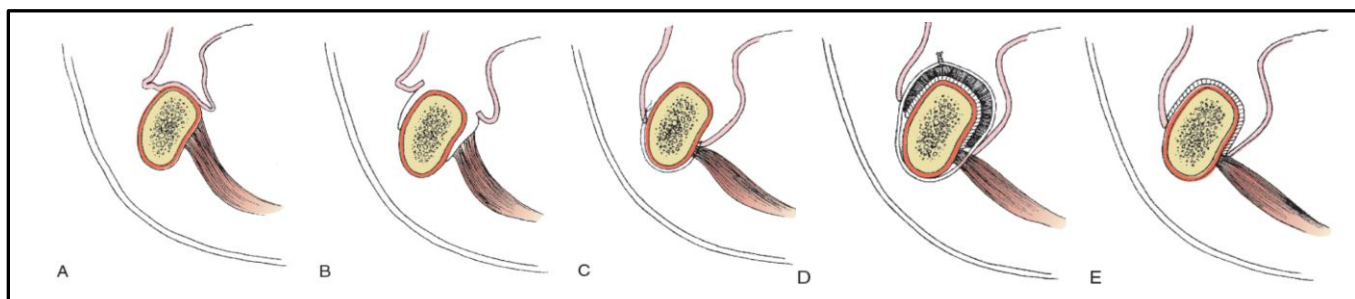
As with labial muscle attachments and soft tissue in the buccal vestibule, the mylohyoid and genioglossus attachments can also interfere with denture flange placement lingually (**Miloro et al., 2011**).



**Trauner (1952)** described detaching mylohyoid muscles from the mylohyoid ridge and repositioning them inferiorly, effectively deepening the floor of the mouth and relieving the mylohyoid muscle influence on the denture.

**MacIntosh and Obwegeser (1967)** later described the effective use of a labial extension procedure combined with the Trauner procedure to provide maximal vestibular extension to the buccal and lingual aspects of the mandible. After the two vestibular extension techniques have been performed, a skin graft can be used to cover the area of denuded periosteum (**Figure 1.32**).

The combination procedure effectively eliminates the dislodging forces of the mucosa and muscle attachments and provides a broad base of fixed keratinized tissue on the primary denture-bearing area (**Hupp *et al.*, 2019**).



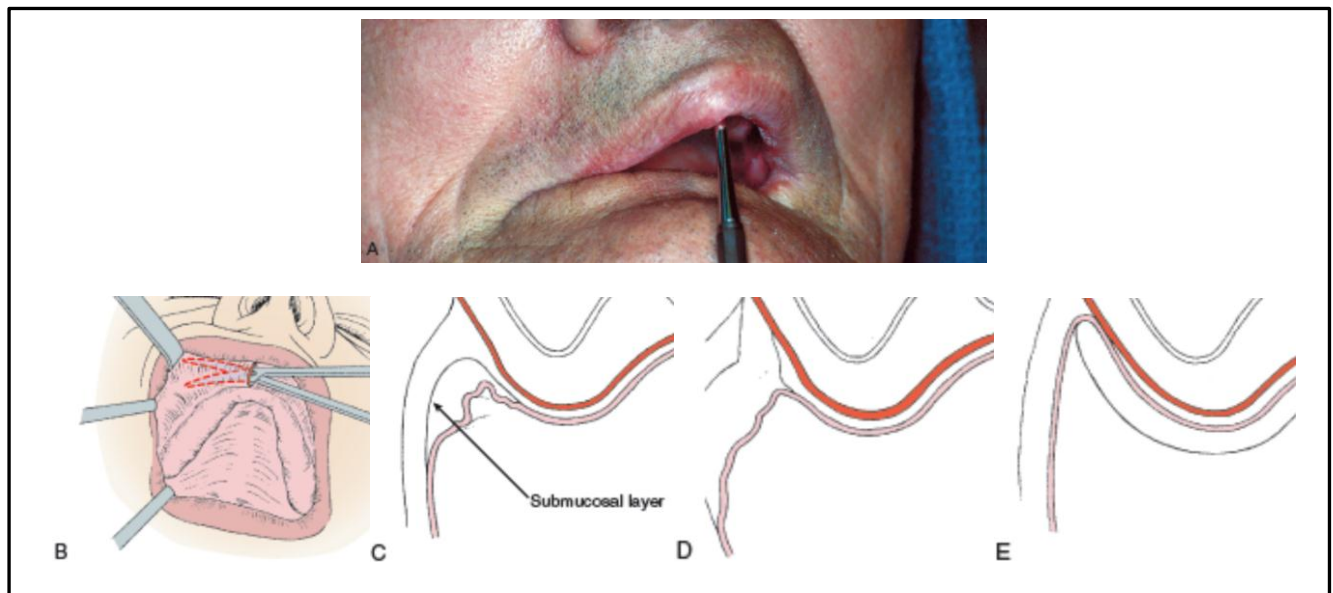
**Figure 1.32:** Labial vestibuloplasty, floor-of-mouth lowering procedure, and skin grafting. (A) Preoperative muscle and soft tissue attachments near the crest of the ridge. (B) A crestal incision is made. Buccal and lingual flaps are created by a suprapariosteal dissection. (C) Sutures are passed under the inferior border of the mandible, tethering the labial and lingual flaps near the inferior border of the mandible. (D) Graft held over the suprapariosteal dissection with a stent stabilized with circummandibular wires. (E) Postoperative view of newly created vestibular depth and floor-of-mouth area (**Hupp *et al.*, 2019**).

## 1.7.2.8 Soft tissue surgery for ridge extension of the maxilla

### Submucosal Vestibuloplasty

**Obwegeser (1959)** describe the procedure of submucosal vestibuloplasty (**Figure 1.33**), which may be the procedure of choice for correction of soft tissue attachment on or near the crest of the maxillary alveolar ridge. This technique is indicated when maxillary alveolar ridge resorption has occurred but the residual bony maxilla is adequate.

These techniques provide a predictable increase in vestibular depth and attachment of mucosa over the denture-bearing area. A properly relined denture can often be worn immediately after the surgery or after splint removal. Impressions can be completed 2 to 3 weeks after surgery (**Hupp *et al.*, 2019**).



**Figure 1.33:** Submucosal vestibuloplasty. (A) Mouth mirror placed in the maxillary vestibule and elevated against the anterior maxillary wall to the desired vestibular depth. (B) An anterior vertical incision is used to create a submucosal tunnel and then a supraperiosteal tunnel along the lateral maxillary aspects. (C) Cross-sectional view showing the submucosal tissue layer. (D) Excision of submucosal soft tissue layer. (E) Splint in place holding mucosa against the periosteum at the vestibular depth until healing occurs (**Hupp *et al.*, 2019**).



## **Chapter two:**

### **Conclusion**

Several abnormal bony or soft tissue conditions existing in the edentulous patient can be corrected by preprosthetic surgery, prior to construction of dentures, to facilitate prosthesis construction and enable the patient to function more successfully following prosthetic restoration.

The development and the introduction of new modalities to treat edentulous patient such as implant dentistry lead to shift in the type of the preprosthetic surgeries performed, so understanding the patient needs, desire, medical and financial status are of utmost importance to establish the base upon which the treatment plane can be formed.

The treatment plan and preprosthetic surgery that precede different treatment modalities are substantially different, for example; if implant is used, there is no need to remove tori or ridge undercut, but we may need to do a sinus lift procedure. Generally, bony abnormalities should be managed first and soft tissue correction is often delayed until bony augmentation and recontouring are complete.

Close coordination between clinicians of different specialties including surgeon, prosthodontist and periodontist etc., are essential to formulate a treatment plane and achieve the best possible overall result for the patient.

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