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Ministry of Higher Education
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College of Dentistry**



Management of Flabby Ridge in Complete Denture

A project submitted to

*The Department of Prosthodontics College of Dentistry, University of
Baghdad, in partial fulfillment for the degree Bachelor in Dental Surgery*

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Declaration

I certify that this undergraduate project entitled
“Management of Flabby Ridge in Complete Denture” was prepared by
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Dedication

To my lovely *mother & father*, for their patience, support & being the No. 1 believers in me.

To my *late grandmother*, the woman who I have always aspired to be.

To *Ali Adel Faisal*, for being a mentor, brother & most importantly, my dearest friend.

To my *big family*, this is for you ...

Ali N. Saleh

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Introduction

Introduction

An adequate dentition is of importance for well-being and life quality. However, edentulism is still a major public health problem worldwide. It is a debilitating and irreversible condition and is described as the “final marker of disease burden for oral health” (Cunha-Cruz et al., 2007).

Ill-fitting denture causes a constant trauma to the underlying tissue resulting in unsupported hypermobile tissue and its common finding in long-term denture wearers (Crawford et al., 2005).

Ideally, the masticatory mucosa overlying the residual ridges must be neither too thin nor too thick, the ideal average thickness being about 1.5 to 2 mm (Dong et al., 2015).

Excessive movable mucosa over the residual alveolar ridge (*i.e* flabby ridge) is a perplexing problem for both the patient and prosthodontist and it has long been believed that the condition is caused by the presence of opposing natural teeth to a maxillary edentulous anterior area (Stavreva , 2020).

Palmqvist et al. in 2003, debunked this when he conducted a comprehensive review of studies investigating flabby ridges cases and reported that there was no evidence to support the belief that bone resorption in the anterior maxilla is related to the presence of anterior mandibular teeth.

This probably not surprising when the many complex factors influencing bone metabolism are considered (Kovacić et al., 2010).

Introduction

Construction of dentures over flabby foundation poses a great challenge to a prosthodontist while rehabilitating patients with flabby ridges. So many therapies that are suggested in such cases include surgical excision of flabby mass, implant-supported dentures or conventional prosthesis without surgery **(Bansal et al., 2014)**.

Several impression techniques are proposed in the literature for recording flabby ridges with the minimum amount of tissue displacement. These techniques include, muco-compressive (displacive, entire denture bearing tissues are displaced), muco-static (non-displacive, denture bearing tissues are not displaced) and selective pressure impression (denture bearing tissues are selectively displaced) **(Srivastava et al., 2019)**.

Aim of this review

This review aim to;

- 1-** To identify **etioloical factors** of the flabby ridge condition in the edentulous patients.
- 2-** To determine the most appropriate **type of treatment** for edentulous patients with flabby ridges.

Chapter One
Review of the Literature

*Review of the Literature**1.1 Complete edentulism*

Edentulism is defined as the *absence or complete loss all natural dentition teeth*. Tooth loss has long been considered an inevitable part of the aging process (GPT9, 2017).

Although the prevalence of complete tooth loss has declined over the last decade, edentulism remains a major disease worldwide, especially among older adults (Douglass et al., 2002).

Tooth loss can have negative impacts on facial appearance, speech, and compromises the integrity of the dentition and can lead to clinically significant deficits in masticatory function and nutrition (Brennan et al., 2008).

The replacement of missing teeth by appropriately designed prostheses is in demand, and is required to maintain a good health status and normal life (Tyson et al., 2007). Studies hypothesized that edentulism could be more prevalent in women than in men (Müller et al., 2007).

Zaigham and Muneer, in 2010 and also Abdel-Rahman et al. in 2013 proposed that dental caries and periodontal disease were the main causes of tooth loss in early childhood and adolescence. Kisely et al., in 2016 and Yoo et al., in 2019 both proposed that mental diseases such as depression and general diseases such as diabetes mellitus and were also linked to tooth loss.

Alcoholics were found in a study to have a higher prevalence of dental caries, periodontitis, teeth loss and mucosal lesions compared with non-alcoholic subjects (Priyanka et al., 2017). Moreover, current smokers present a higher risk of tooth loss than former smokers (Souto et al., 2019).

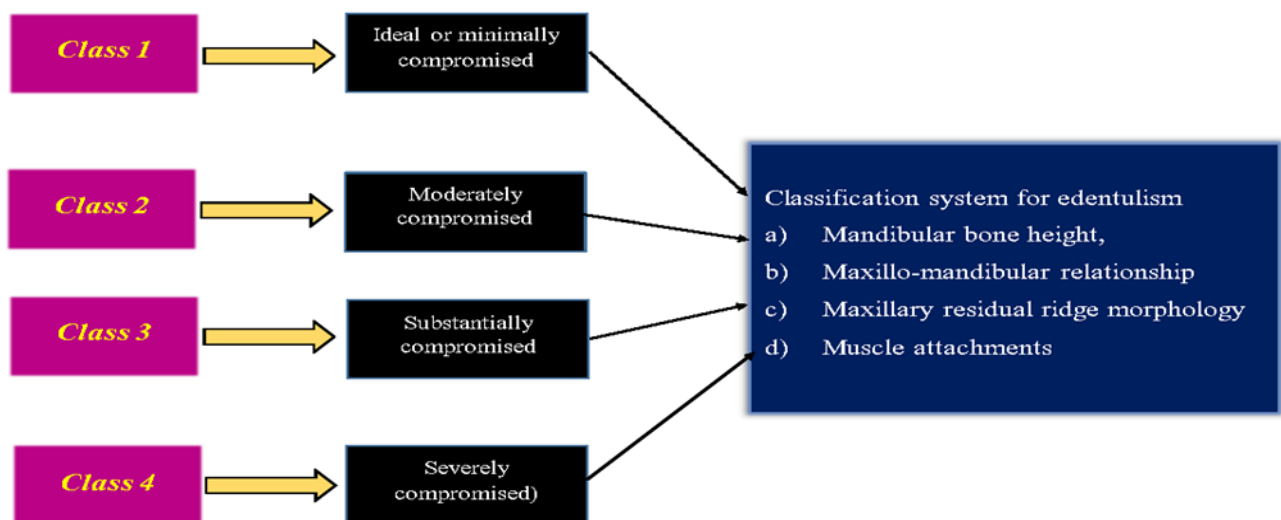
Studies show that edentulism is closely associated with socioeconomic factors and is more prevalent in poor populations (Buchwald et al., 2013).

In 2015–2018, the prevalence of complete tooth loss was 12.9% among adults aged 65 and over and increased with age (C.D.C., 2019).

An association between education level and oral health conditions in elderly habitants of Helsinki could be demonstrated in the study of Siukosaari et al. in 2005 they showed that subjects with a high education level had more remaining teeth.

1.2 Prosthodontic diagnostic index (PDI) for complete edentulism

The American College of Prosthodontists' standardized system for edentulism classification. The system uses four diagnostic parameters to categorize the complexity of an edentulous patient's therapy (Figure 1.1)



(Figure 1.1) Classification system for completely edentulous patients (McGarry et al., 2002)

(GPT9, 2017):

These **four criteria** identify patients as;
Class 1 (ideal or minimally compromised).
Class 2 (moderately compromised).
Class 3 (substantially compromised).
Class 4 (severely compromised). (GPT9, 2017)

1.3 Outcome of poor treatment or ill fitted dentures

Dental and prosthetic conditions have a substantial effect on Oral Health-related Quality of Life. Prevention of tooth loss at an early stage and denture-related treatments (adjustment of dentures) seem to be important to maintain high Oral Health-related Quality of Life among the aged nursing home populations (Klotz et al., 2017).

A poorly fitted prosthesis can give rise to a plethora of problems like pain, discomfort in mastication and speech, sore spots, epulis fissuratum and unsupported hypermobile tissue or flabby ridges (Figure 1.2) (Mohan et al., 2013).

Ill-fitting dentures are also a risk factor for the development of oral cancer (Singhvi et. al, 2017).

Denture stomatitis is perhaps a result of the denture acting as a reservoir of candidal organism was found in a study. Also, Denture fitting and xerostomic factors are perhaps not primary factors. Thus there is no association between the fungal presence in the tissue and the clinical symptoms of DS. Therefore, treatments for DS should first focus on sanitization of an existing denture or fabrication of a new denture (Altarawneh et. al., 2012).



(Figure 1.2) (A) Epulis Fissuratum (Huppert et al., 2018) and (B) Denture Stomatitis (junior dentist, 2021)

1.4 Unsupported hypermobile tissue or (Flabby ridge)

Flabby ridge (displaceable ridge/fibrous ridge) is a clinical condition that affects the retention, stability and support of a prosthesis. According to **GPT-9**, it is an “excessive tissue” or a “movable tissue”. It is a tissue adaptation to overcome the changes caused by residual ridge resorption in providing adequate support which relining procedures will otherwise do.

Flabby ridge is actually replacement of alveolar bone by fibrous tissue with poor denture supporting properties, most commonly seen in the anterior maxillae as a result of combination syndrome (Kelly Syndrome) due to excessive load of the residual ridge (**Carlsson, 1998**).

Flabby ridges are composed of mucosal hyperplasia and loosely arranged fibrous connective tissues as well as denser collagenase connective tissue. In the soft tissue, varying amounts of metaplastic cartilage &/ or bone has been reported (**Zarb, Bolender, 2003**).

Flabby ridges could arise as a result of unplanned or uncontrolled dental extractions, long term denture wear without maintenance, poor systemic health, trauma from the denture base, malocclusion, and ridge resorption or due to aberrant forces on the prosthesis (**Crawford, Walmsley, 2005**).

It had been found that in 24% of edentulous maxillary arches and 5% of edentulous mandibles, mostly the anterior region. Often related to the degree of bone resorption and in severe cases this can be to the level of the anterior nasal spine (**Lynch et al., 2006**).

Patients commonly complain of an ill-fitting removable prosthesis and mucosal discomfort. Denture stability and support are significantly compromised due to the mobility of the underlying soft tissue (**Bindhoo et al., 2012**).

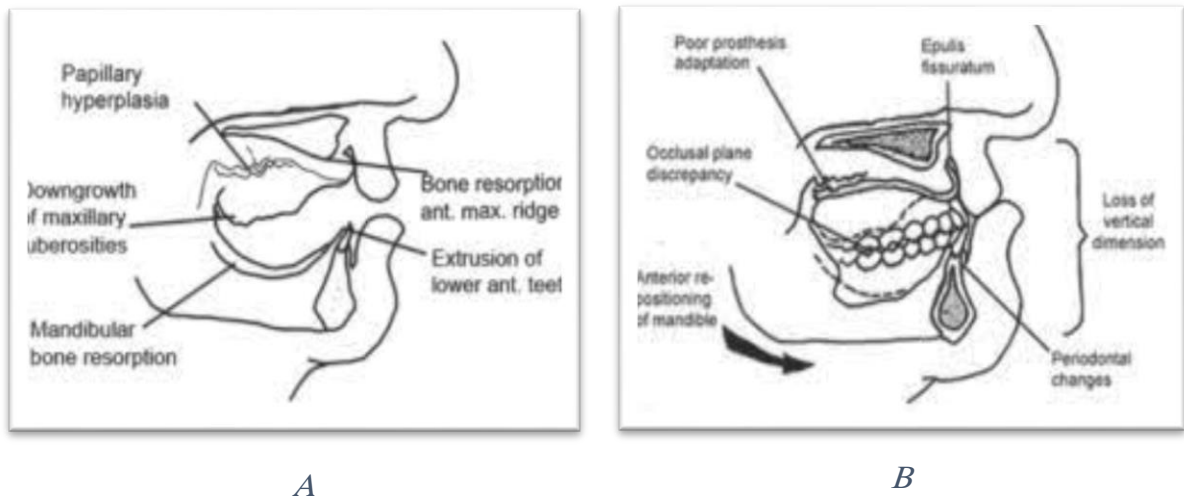
Each patient wore a complete maxillary denture opposed by mandibular teeth and a distal extension removable partial denture. The observations included alveolar bone resorption in the anterior maxilla, enlargement of the tuberosities and bone resorption underneath the mandibular denture bases. Although the flabby ridge may provide poor retention for the denture, it may still be better than no ridge at all. The cause of this problem is the lack of posterior seal and excessive bony resorption beneath the mandibular partial denture (**Kelly, 1972**).

Kelly in 1972 also suggested the term “combination syndrome” to describe the clinical features, including (Figure 1.3 and 1.4 (A)):

- Loss of bone from anterior part of maxillary ridge.
- Overgrowth of tuberosities.
- Papillary hyperplasia in the hard palate.
- Extrusion of lower anterior teeth.
- Loss of bone under partial denture base.

Saunders et al, in 1979 described 6 additional changes associated with this syndrome. They include (Figure 1.3 and 1.4 (B)):

- Loss of vertical dimension of occlusion.
- Occlusal plane discrepancy.
- Anterior spatial repositioning of mandible.
- Poor adaptation of prosthesis.
- Epulis Fissuratum.
- Periodontal changes.



(Figure 1.3) (A) Five changes described by Kelly and (B) Six additional changes described by Saunders *et al.* (Kelly, 1972)



(Figure 1.4) Prosthetic field examination (A) maxillary with frontal flabby ridge; (B) mandible Kennedy class I edentation (Ștefănescu *et al.*, 2021)

Enlarged tuberosities may have other causes than those described by Kelly as part of combination syndrome. Enlarged tuberosities are often seen together with supra-erupted maxillary molars. In situations where mandibular molars have been lost, the opposing maxillary molars may supra-erupt as part of the alveolar process resulting in enlarged tuberosities that are unrelated to denture use (Figure 1.5) (Lee *et al.*, 2020).



A



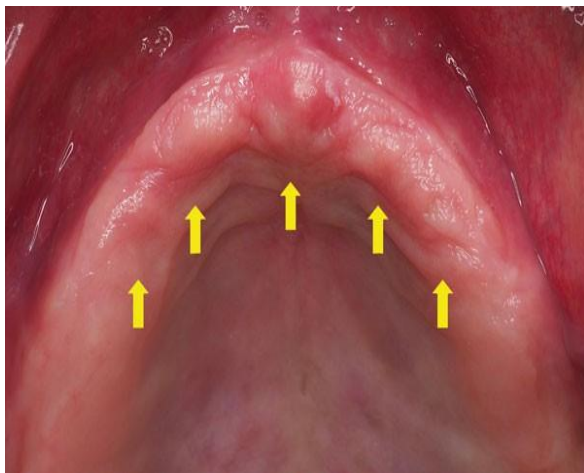
B

(Figure 1.5) (A) Flabby vs. (B) Normal maxillary ridge tissue (Labban, 2017)

1.5 Examination

The initial consultation should involve a thorough examination of the alveolar ridge and overlying soft tissue anatomy. Ideally, the patient presents with a well-rounded ridge that is adequate both in height and width. Additionally, any abnormalities in the mucosal architecture must be noted (Figure 1.6). (*Bansal et al., 2014*)

Practitioners must therefore pay particular attention to patients presenting with an edentulous anterior aspect of maxilla opposing preserved mandibular anterior teeth. However there are some reports of posteriorly located flabby ridges (Figure 1.7). (*Bansal et al., 2014*)



(*Figure 1.6*) Anterior 2/3 of an edentulous maxillary arch with evidence of fibrous tissue (yellow arrows). (*Imran, 2018*)



(*Figure 1.7*) Flabby tissue in the maxillary posterior region (*Imran, 2018*)

The flabby ridge, on the surface of the bone support of complete edentulous prosthetic fields, can have various locations and structures, thus imposing a classification (Figure 1.8) (*Ștefănescu et al, 2021*):

Depending on location:

- upper frontal edentulous ridge (very often)
- upper fronto-lateral edentulous ridge (often)
- maxillary tuberosity (rare)
- lower frontal edentulous ridge (very often)
- lower fronto-lateral edentulous ridge (rare)
- retromolar pad (often)

Depending on the structure:

- Hyperplastic, keratinized, with high antero-posterior and supero-inferior thickness
- Atrophic, thin, small antero-posterior thickness and increased supero-inferior length apparently histological normal appearance at inspection, but with increased mobility in all directions.



(Figure 1.8) (A) Fronto-lateral, hypertrophied, hyper keratinized flabby ridge, with high antero-posterior mobility, large thickness, rhomboidal incisive papilla, “drop” appearance, low-insertion labial frenum, deep palatal arch in the anterior portion, neutral tuberosities, an oblique zone; (B) lower prosthetic field with flabby ridge in the lower frontal area, atrophic, with hyperplasia of the vestibule groove by continuous trauma due to the edge of a lower prosthesis without maintenance and stability. (Ștefănescu et al, 2021)

1.6 Etiological factors for flabby ridge

There are several factors (Anne, 2017):

- 1) Long term denture wear without maintenance.
- 2) Trauma from denture base.
- 3) Ill-fitting dentures.
- 4) Malocclusion.
- 5) Poor systemic health.
- 6) Unplanned extractions.
- 7) Ridge resorption.
- 8) Aberrant forces on prosthesis.
- 9) Combination syndrome.

1.7 Treatment Planning

When planning treatment for patients with edentulous maxillae and a partially edentulous mandible, the risk of development of the combination syndrome must be recognized. So, the aim of treatment should be to lessen the possibility for displacive forces during function by careful attention to impression surface details and occlusal contacts with the mandibular dentition. In the case of the latter, the clinician must also decide on the merits of providing posterior occlusal support (**Misch, 2011**).

1.7.1 Systemic and dental considerations

- 1) Review medical and dental history.
- 2) Thorough clinical and radiographic evaluation of both hard and soft tissues associated with prosthesis wear.
- 3) Resolution of any inflammation, if present.
- 4) Evaluation of patient's caries susceptibility, periodontal status and oral hygiene.
- 5) Factors to be considered in tooth to be used as abutment. (Tooth vitality, morphologic changes, number of roots, bony support, mobility, crown-root ratio, presence and position of existing restorations, position of teeth in the arch, the availability of retention and guide planes.) (**Urdaneta et al., 2012 ; Salentijn et al., 2014**)

1.8 Clinical significance of flabby ridge

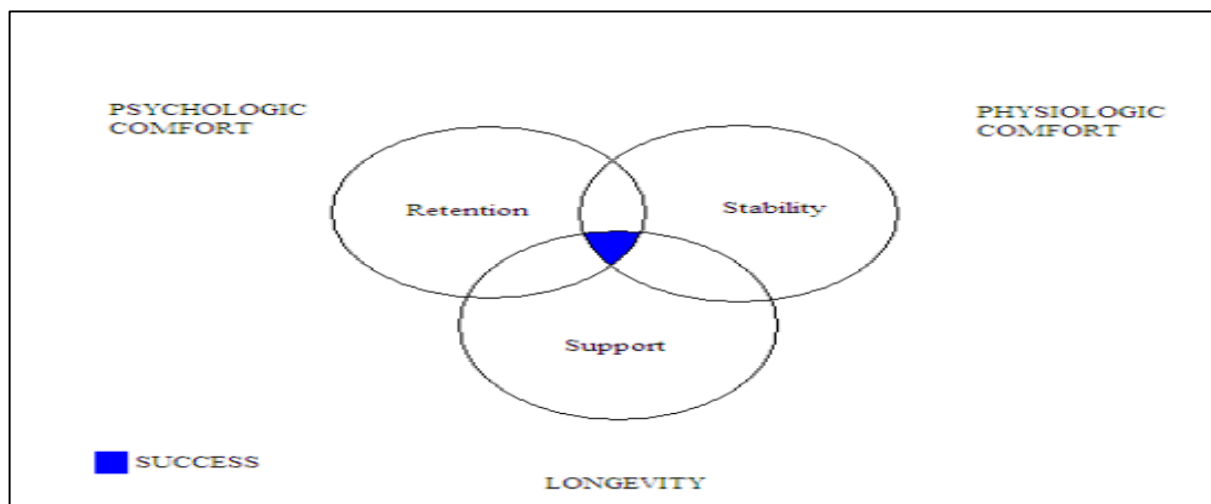
The most significant clinical problems that associated with edentulous flabby ridge are (Allen et al., 2005):

- a) Retention/stability of the maxillary complete denture.
- b) Lack of posterior inter-occlusal space.

Achieving retentive complete dentures relies on interplay between forces of retention, stability and support. To describe these succinctly;

- 1) Retention depends on forces which resists displacement of the denture away from the denture bearing area.
- 2) Stability relies on avoiding forces likely to displace the denture laterally or antero-posteriorly.
- 3) Support is provided by factors which resist displacement of the denture into the denture-bearing tissues (GPT9, 2017).

There is an “interplay” as mentioned before between these factors (Figure 1.9), which must be borne in mind when planning complete replacement denture. When anterior maxillary ridge is flabby, the main problem is poor support for the denture which becomes displaced during function and retention and stability are compromised (Palmqvist et al., 2003).



(Figure 1.9) Relationship between retention, stability and support that affect the retention of complete denture prosthesis (Pocketdentistry, 2021)

1.9 Management strategies

The main approaches to the management of the flabby ridge are (**Binimol et al, 2022**);

- ❖ Conservative Approach.
- ❖ Prosthetic Approach
- ❖ Surgical Approach
- ❖ Implant Retained Prosthesis

1.9.1 Conservative Approach. (Recovery Program)

Can be summarized in (**Binimol et al, 2022**):

A. Tissue rest.

The prosthesis should be removed from the mouth for at least 8 hours a day for a few days before starting adequate treatment.

B. Soft tissue massage.

Washcloth, soft brush, sugarless gum to recover the blood supply, patient should massage the soft tissues two or three times a day. Instruct the patient to rinse using mouth wash or even use dissolving one-half teaspoon of table salt in a half glass of warm water.

C. Modification of the denture by flange and occlusal adjustment.

Diagnose and remove any pressure areas or sore spots using pressure-indicating paste (PIP) and topical & systemic anti-fungal medications. Correction of occlusal disharmonies by clinical remounting and restoring (VDO) the occlusal vertical dimension.

D. Tissue conditioning.

Relining the old prosthesis with soft tissue conditioners before fabricating new dentures (not as effective as rest, but patients prefer). The tissue conditioner acts as a cushion, absorbing the occlusal loads, enhancing their distribution to the supporting tissues, and stimulating healing of the inflamed mucosa. It should be changed every 72 hours.

1.9.2 Prosthetic Approach

If the condition persists after conservative management then the prosthetic approach may be employed (**Binimol et al, 2022**):

- Impression techniques.

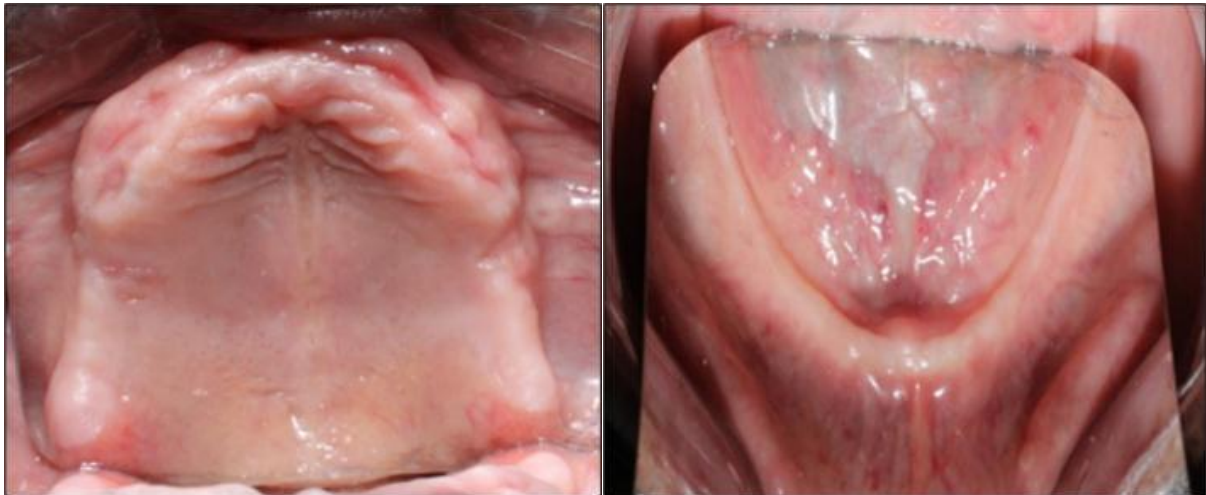
If the flabby tissue is compressed during conventional impression making, it will later tend to draw back and dislodge the resulting overlying denture. To obtain optimal support, an impression technique is essential which will compress the non-flabby tissues, and, at the same time, will not displace the flabby tissues. Numerous impression techniques have been suggested in the past decades to help record a suitable impression of a flabby denture-bearing area. When considering these, it is important to realize that all impressions for complete dentures could be categorized in three ways:

- The muco-static technique (non-displacive).
- The muco-compressive technique (displacive).
- The selective pressure impression technique where some denture-bearing tissues are displaced and others are not.

Currently, the reported studies do not clearly support the excellence of either of these techniques over the other. The following techniques have been described to manage flabby tissues.

A. Window technique.

The use of a close-fitting tray with a window cut in the tray around the fibrous ridge area. This design enables a close-fitting impression to be taken of the firm areas of the mouth, whilst impression plaster can be used to record the fibrous part. An impression is taken in impression paste (mucodisplacive). Once this has been set it is left in place and impression plaster (or any light body impression material - mucostatic) is painted over the flabby ridge (Figure 1.10). (**Binimol et al, 2022**)



(Figure 1.10) Intra-oral view of maxillary ridge with flabby area in the anterior region and Intra-oral view of mandibular ridge. (Ștefănescu et al, 2021)

1. A Preliminary impression was made with alginate material using perforated edentulous stock trays.
2. A maxillary cast was poured and the flabby ridge area was marked, followed by fabrication of custom tray [spaced (2 mm), tissue stops] with two posterior handles (Figure 1).
3. The anterior window in the marked area was outlined using bald parker no 15 before curing the tray material to facilitate removal of the window at a later stage (Figure 1.11).
4. The tray was tried in the patient mouth and the flanges were adjusted to be 2 mm shorter than the depth of sulcus using a slow-speed motor and carbide acrylic trimming bur.
5. Border molding was performed using the conventional technique with green stick impression compound following which a maxillary impression was made using monophasic polyvinylsiloxane impression material (Figure 1.12). (Hakeem et al, 2022)



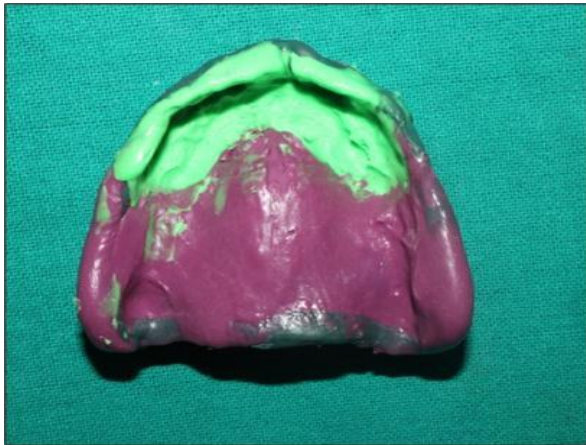
(Figure 1.11) Special tray with window cut. (Hakeem et al, 2022)



(Figure 1.12) Secondary impression recorded with monophasic polyvinylsiloxane impression material. (Hakeem et al, 2022)

6. The impression was evaluated carefully for defects and any excess material on the periphery was removed. In addition, the impression material in the area of flabby ridge was carefully removed using scalpel blade.
7. The impression was re-seated in the patient mouth and a light body PVS impression material was injected starting from one of the side of the window to the other side (Figure 1.13).
8. A master cast was poured from the impression (by using Beading, boxing and pouring) and occlusal rims was fabricated for maxilla-mandibular relation procedure (Figure 1.14 (a) and Figure 1.14 (b)).
9. Following try-in, a maxillary and mandibular conventional complete denture was completed (Figure. 1.15, Figure. 1.16, and Figure. 1.17) (Hakeem et al, 2022)

A common clinical challenge in this technique is the difficulty in uniform application and control of low viscous impression material on flabby tissues due to gravitational forces and different dental chair positions (maxillary arch). In addition PVS materials are preferred by clinicians as they are available in different viscosities suitable for muco-static and muco-compressive flabby ridge impressions. (Yunus et al. 2008)



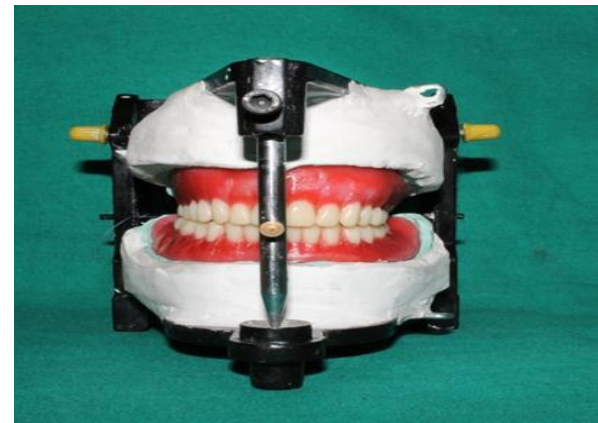
(Figure 1.13) Flabby tissue recorded with light body elastomeric impression



(Figure 1.14 (a)) Recording orientation of occlusal plane using fox plane



(Figure 1.14 (b)) Recording Maxillo-mandibular relation



(Figure 1.15) Teeth arrangement



(Figure 1.16) Try in



(Figure 1.17) Denture insertion

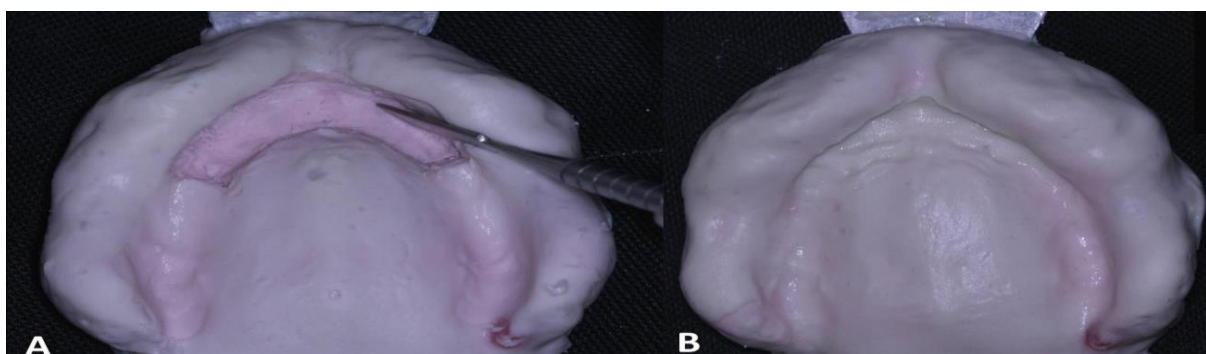
B. One-part impression technique (Selective perforation tray)

A spaced special tray is prepared for use with a low viscosity impression material, such as impression plaster, low-viscosity silicone or alginate. Pressure on the unsupported, displaceable soft tissue can be minimized further by the use of holes in the tray overlying these areas. (Binimol et al, 2022; Verissimo et al, 2020)

1. Verify the flabby ridge (Figure 1.18).
2. Perform the preliminary impression of the edentulous maxilla with irreversible hydrocolloid impression material.
3. Remove a window related to the flabby ridge at the maxillary anterior region with a lecron instrument (Figure 1.19A). Refinement of the primary impression with alginate, proportionated with an increase of 50% more water in volume than recommended by the manufacturer, overlaid at the previous impression (Figure 1.19B).

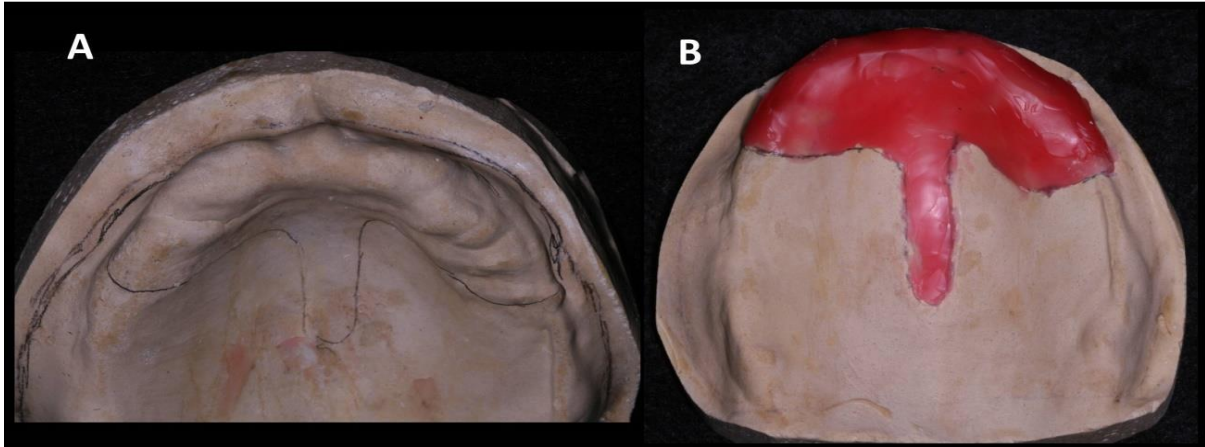


(Figure 1.18) Anterior flabby tissue. (Verissimo et al, 2020)



(Figure 1.19) (A) Confection of a window at the flabby tissue area, (B) Primary impression refined with alginate. (Verissimo et al, 2020)

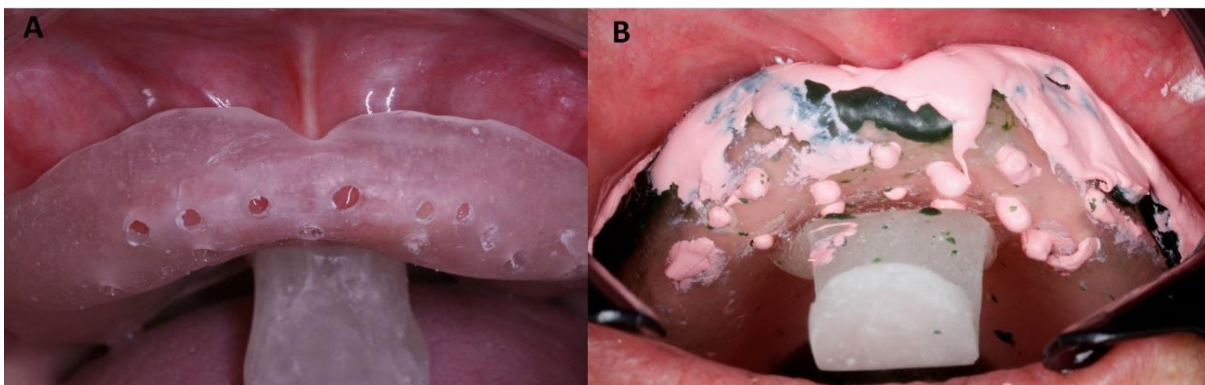
4. Obtain the primary plaster cast (Figure 1.20A) and relieve with wax spacer 07 with approximately 1mm thickness at the anterior maxilla



(Figure 1.20) (A) Primary anatomic cast flabby ridge marking at the maxillary anterior region, (B) Relief made in wax spacer 07. (Verissimo et al, 2020)

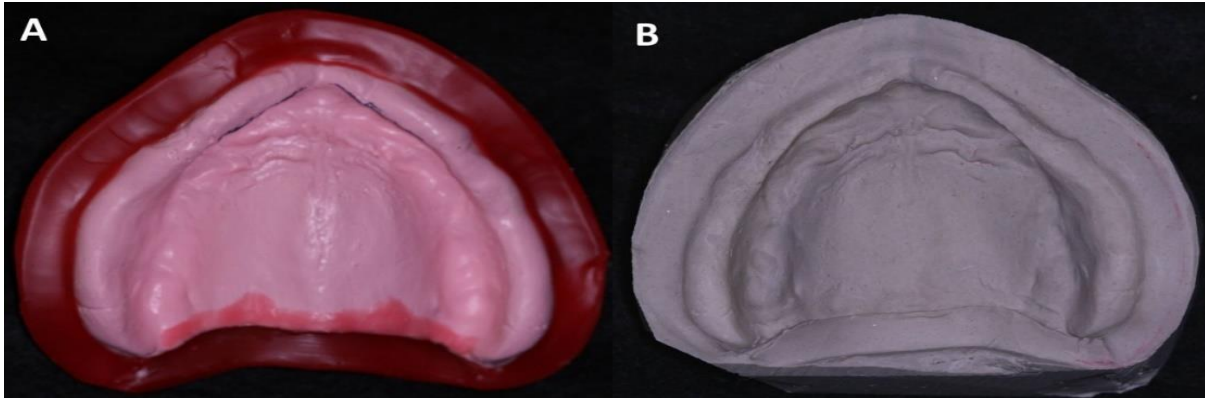
flabby ridge area (Figure 1.20B).

5. Fabricate the custom tray in colorless self-curing acrylic resin and perform perforations with a dental hand piece in the flabby ridge area with a carbide spherical bur (2 mm diameter) with 5mm of space between the holes (Figure 1.21A).
6. Obtain the peripheral impression with low-fusing modelling compound stick, functional impression with zinc and eugenol paste (Figure 1.21B) and post-dam confection in wax spacer 07.



(Figure 1.21) (A) Custom tray perforated at the flabby ridge anterior region and intraoral tray evaluation, (B) Functional impression with zinc oxide and eugenol paste over the vestibule peripheral mold with low-fusing impression compound. (Verissimo et al, 2020)

7. Perform the beading with utility wax, 2 mm apart from the custom tray edge (Figure 1.22A) and obtain the functional cast in dental plaster (Figure 1.22B).



(Figure 1.22) (A) Beading with utility wax, (B) Maxillary functional cast. (Verissimo et al, 2020)

C. Controlled lateral pressure technique

This technique was recommended by several authors for use with a fibrous (unemployed) posterior mandibular ridge. They explain a technique in which tracing compound (green stick) is used to record the denture bearing area using a correctly extended special tray. A heated instrument is then used to separate the greenstick associated with the fibrous crestal tissues and also the tray is perforated this region. Light body silicone impression material is then syringed onto the buccal and lingual aspects of the greenstick and the impression inserted. The excess material is squeezed out through the holes and theoretically the fibrous ridge will assume a resting central position having been subjected to even lateral pressures (Figure 1.23). (McCord, 2000)



(Figure 1.23) Controlled lateral pressure technique. (Ashish, 2016)

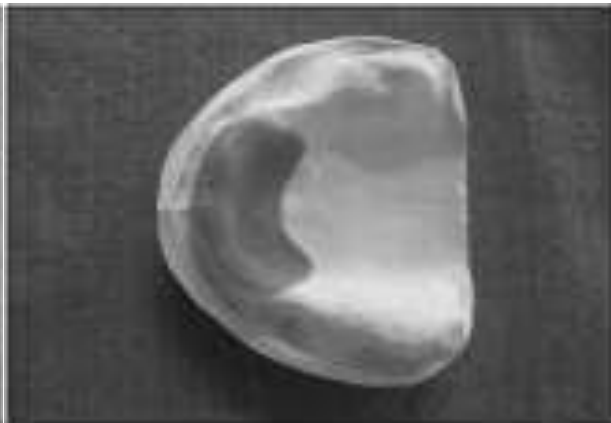
D. Palatal splinting using a two-part tray system

In 1964, Osborne described this procedure involving two overlying impression trays used for recording maxillary arches with displaceable anterior ridges. A primary model is made using the fitting surface contour of a previous denture. From this a palatal tray is fabricated with wax being employed to make space on the palatal aspect of the mobile area and lengthening to the ridge crest on all sides of the arch. In this palatal tray, a low viscosity zinc oxide paste impression is taken of the palate. An upward force is sustained until it is apparent that the mobile ridge is just beginning to have pressure applied to it. Once this has set, a second special tray impression is taken completely enclosing the first tray. It should be inserted from in front, backwards, and also the presence of the supporting zinc oxide should prevent backward displacement of the mobile ridge (Figure 1.24, 1.25, 1.26, 1.27, 1.28, 1.29, 1.30 and 1.31).

In 1985, Devlin described an accurate modification of this approach, in which a locating rod is positioned in the center of the palatal tray, but proclined to allow the second special tray impression to be guided in an oblique upward and backward direction to envelope the palatal tray. The palatal tray accurately locates the second part special tray employing a stop, thereby providing a preplanned even thickness of impression material.



(Figure 1.24) Flabby Ridge In Maxillary Anterior Area. (Jain et al, 2015)



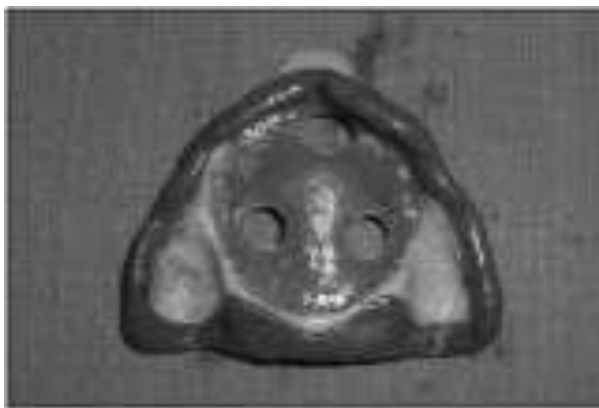
(Figure 1.25) Wax Spacer Over Flabby Area. (Jain et al, 2015)



(Figure 1.26) Palatal Tray With Acrylic Stops. (Jain et al, 2015)



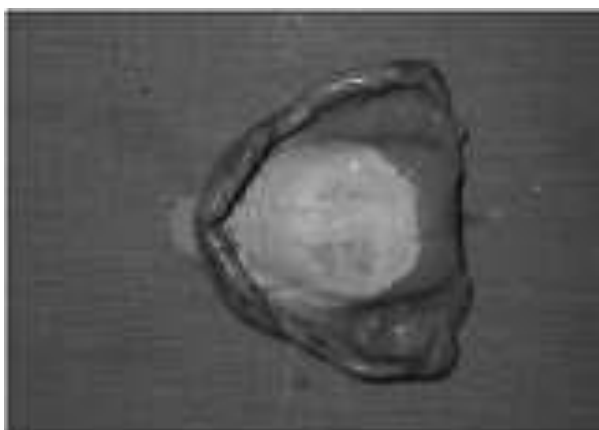
(Figure 1.27) Custom Tray Envelop Palatal Tray. (Jain et al, 2015)



(Figure 1.28) Border Molding In Custom Tray. (Jain et al, 2015)



(Figure 1.29) Palatal Tray With Final Impression. (Jain et al, 2015)



(Figure 1.30) Custom Tray With Final Impression. (Jain et al, 2015)



(Figure 1.31) Denture In Occlusion. (Jain et al, 2015)

E. Selective composition flaming

Watt and McGregor first described it, then revisited by **Lynch and Allen**. A 3-4 mm spaced rigid special tray is prepared and used to take a composition impression of the primary cast. The impression periphery is carefully softened and functionally trimmed. The fibrous part of the ridge is outlined on the impression surface. Before the tray is seated under heavy pressure, the composition overlying the firm denture bearing areas is softened with a flame attempting to replicate functional force. By performing the impression through this way, the initial relatively undistorted shape of the fibrous tissues is retained while the tissues more capable of functional denture support are recorded in a displaced state. (**Lynch, Allen, 2003**)

- A primary impression is taken in a mucostatic impression material (e.g. Impression plaster or alginate) and cast in stone.
- A spaced special tray for an impression compound impression is then constructed on this model.
- The tray is loaded with compound and an impression taken of the model of the patient's mouth.
- This reduces the risk of displacing the flabby ridge. The tray is then warmed and placed in the patient's mouth.
- It is adapted and border moulded to the tissues, and should be quite retentive.
- The impression is removed and warmed all over apart from the flabby ridge area. The impression is retaken, the flabby ridge is compressed but not distorted as the other portions of the impression compound sink into the tissues.
- A wash impression may be taken in impression paste to obtain maximum detail and retention and stability (Figure 1.32). (**Nayar et al, 2014**)



(Figure 1.32) Selective flaming of composition. (Ashish, 2016)

F. Two part impression technique: mucostatic and mucodisplacive combination

This popular technique is first described by **Osborne in 1964** for use in the maxillary and mandible, which ensures pressure exerted by the tray does not cause distortion of the mobile tissues. The displaceable tissue is marked on the impression and transferred to the primary cast. A close-fitting cold-cured or light-cured acrylic base is formed so as that the flabby ridge area is left uncovered. Impression is recorded in zinc oxide-eugenol or medium-bodied silicone. An impression of the displaceable mucosa is then recorded by applying or syringing a thin mixture of impression plaster or light-bodied silicone.

Modification of the special tray after the more viscous impression material has been used to record the entire of the denture bearing area (including the displaceable area). Within the fibrous anterior maxilla, modification of the handle position is usually required. A rim handle design has the advantage of aiding prevention of unset impression material falling to the rear of the mouth, when the patient is supine. The advantage of a window design implies that the acceptable border correction is undertaken and checked round the entire sulcus before the second stage of the impression is completed (Figure 1.33).



(*Figure 1.33*) Two part impression technique (Ashish, 2016)

Managing the occlusion

The basic treatment objective in treating these patients is to develop an occlusal scheme that discourages excessive occlusal pressure on the maxillary anterior region, in both centric and eccentric positions (Misch et al., 2011).

Kelly in 1972 argued that patients with flabby maxillary ridges are usually partially dentate in the opposing mandible, and posterior teeth may or may not be replaced with RPD (*Figure 1.34*). It could be argued that failure to provide mandibular RPD could cause tipping forces which lead unstable maxillary denture and cause fibrous replacement of the anterior maxillary ridge.

This was later disparaged by Palmqvist *et al.* in 2003, which he argued that there is little clinical to support this view.

Nonetheless, the decision on whether to replace missing mandibular posterior teeth should base on the particular needs of the individual patients. It is possible that sufficient occlusal contact remains to stabilize the maxillary denture, and thus replacement is not indicated (Allen et al., 2005).

Chapter One

Review of the Literature

If posterior support is deemed necessary, then the least damaging option should be chosen ; a transitional partial denture may also be indicated if it is felt that prognosis for the remaining natural dentition in the mandible is poor (Allen et al., 2005).

Finally, given the difficulties presented by the maxillary flabby ridge, it should be mentioned that prevention of tooth loss in the anterior maxilla is worthwhile. If the roots of the anterior teeth can be preserved, then fibrous replacement of the alveolar bone can be prevented (Jepson et al., 2001; Choi et al., 2015).

Provision of a complete overdenture in the maxilla and in turn preserving bone volume in the anterior maxilla, will prevent many of the problematic aftermaths (Allen et al., 2005).



(Figure 1.34) Mounted cast of flabby ridge case on the articulator (Flimban et al., 2014)

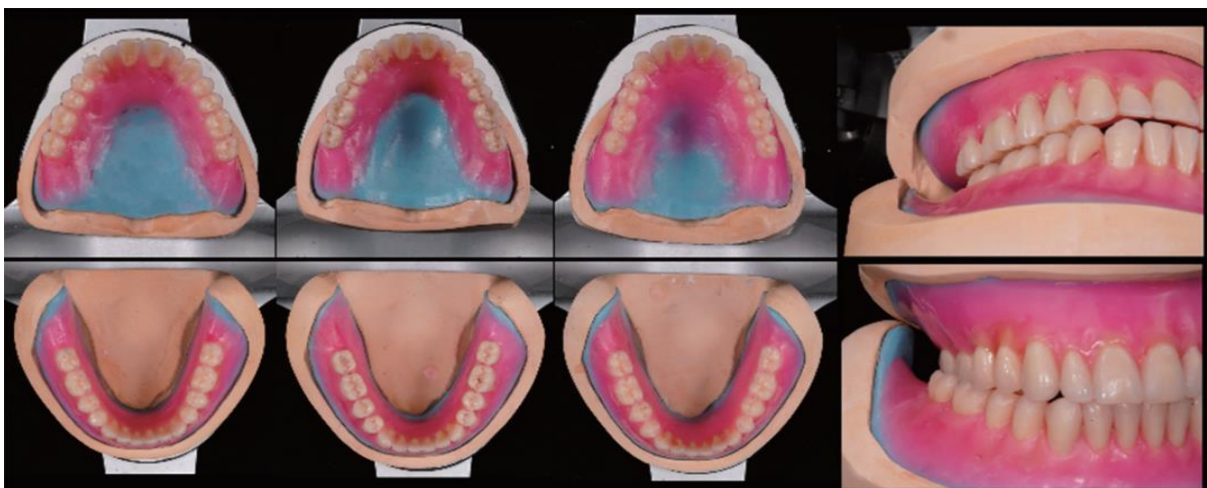
Try-in and Insertion

A systematic approach should be adopted at the wax trial and prosthesis insert stages to help identify errors that may have been introduced during processing. The wax trial provides an opportunity for the clinician to make any adjustments before processing the final prosthesis (*Figure 1.35*) (*Imran, 2018*).



(*Figure 1.35*) Trial denture. (*Lee et al., 2018*)

Initially, the dentures should be examined while seated on the articulated working casts (*Figure 1.36*). Subsequent assessment of denture extensions, adaptation to the denture bearing area, stability and retention can be performed intra-orally (*Imran, 2018*).



(*Figure 1.36*) Definitive denture tooth setup with semi-anatomic teeth and lingualized occlusion (*Lee et al., 2018*)

Occlusion should be reproducible and balanced in maximum intercuspation and excursive movements. The phonetics, soft tissue support, dento-facial aesthetics (**Figure 1.37**) and most importantly, patient perception, must not be overlooked. Finally, a two-week review period will allow the patient to trial the dentures and suggest minor alterations. Ideally, the clinician should aim for minimal overlap of maxillary denture teeth and the opposing mandibular incisor teeth (*Imran, 2018*).



(*Figure 1.37*) Post insertion, (A) Existing denture and (B) Provisional denture (*Lee et al., 2018*)

1.9.3 Surgical Approach

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.

Removal is contraindicated in circumstances where little or no alveolar bone remains (**Kamath, 2015**).

The removed tissue often requires prosthetic replacement by denture base material; this could increase the thickness and weight of the prosthesis. Retention is additionally adversely affected by the significant loss of the sulcus depth which is very important in aiding border seal (**Basker RM, 2002**).

Before the excision of the unsupported hypermobile tissue, a determination must be made 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 resorbed bony ridge with Hydroxylapatite or piece of bone from ribs and hip is the treatment of choice. If adequate alveolar bone height remains after the reduction of the hypermobile soft tissue, then excision may be indicated (*Figure 1.38 and 1.39*) (*Chiapasco et al., 2007; Zakhary et al., 2012*).

The impression making procedure can be done 3 to 4 weeks after surgery and prosthodontic treatment can be performed in its conventional manner (*Tolstunov et al., 2007*).



(Figure 1.38) (A) Flabby tissue in edentulous lower ridge of 64 years old patient (B) administration of the L.A. (*Oral and Maxillofacial Department– Baghdad Dental Teaching Hospital (UOB/COD), 2021*)

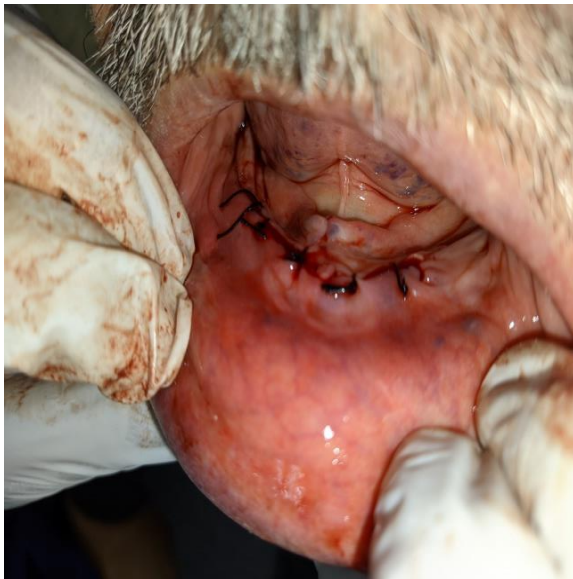


C



D

(Figure 1.38) (C) Surgical excision with blade No. 15 (D) suturing the wound. (Oral and Maxillofacial Department– Baghdad Dental Teaching Hospital (UOB/COD), 2021)

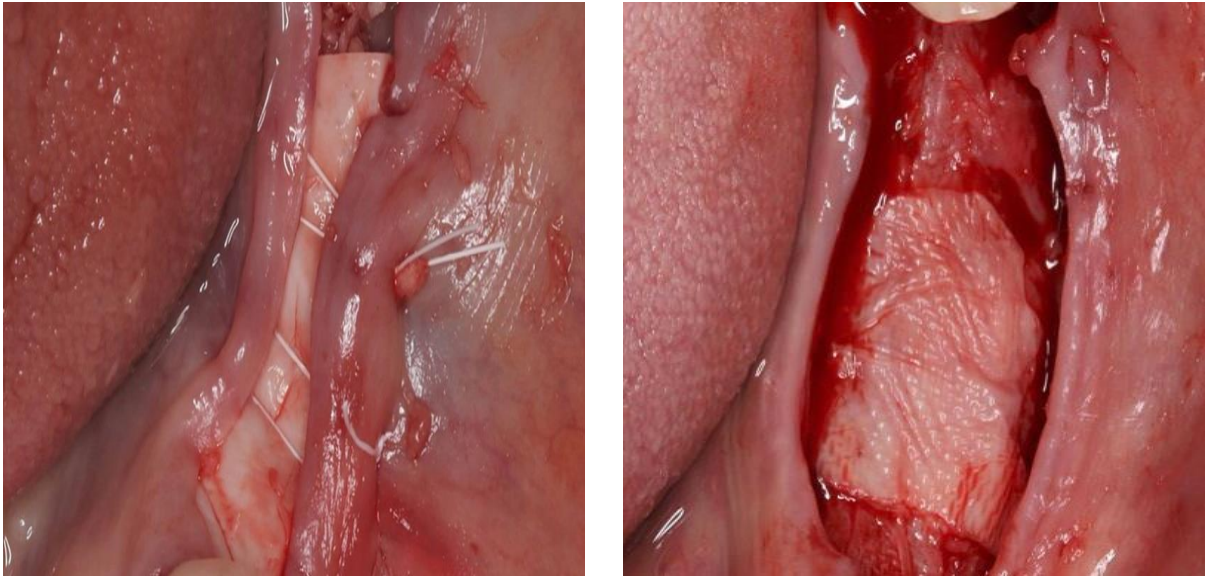


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(Figure 1.38) (E) Continuous or interrupted sutures (F) Excised hypermobile tissue. (Oral and Maxillofacial Department– Baghdad Dental Teaching Hospital (UOB/COD), 2021)



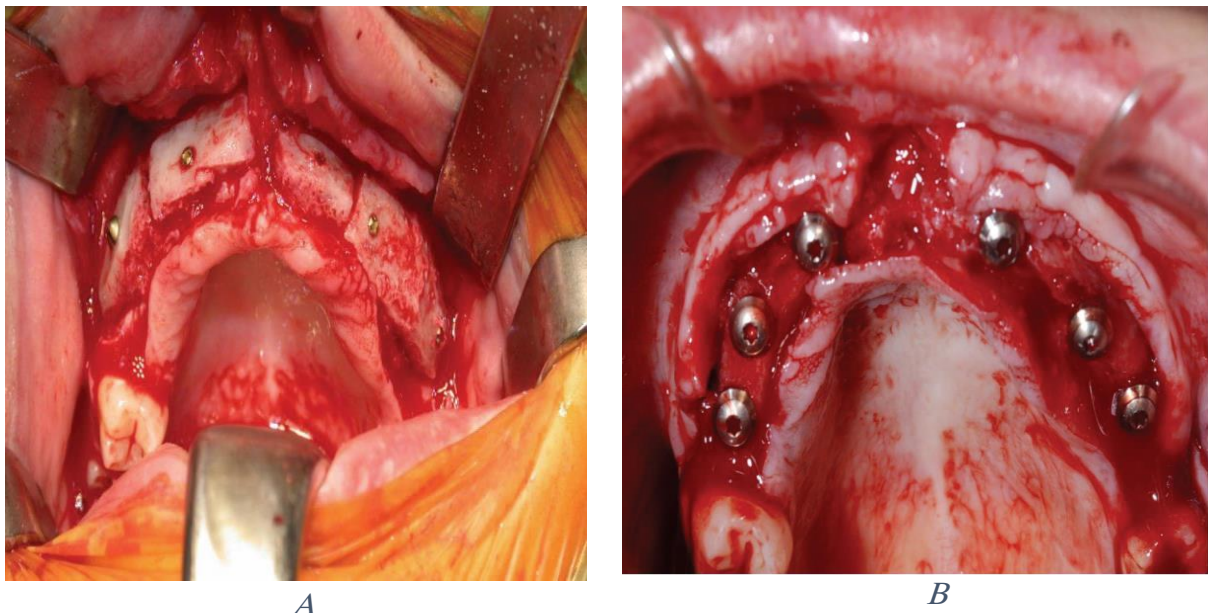
(Figure 1.39) Ridge augmentation and collagen membrane (Cucchi et al., 2020)

1.9.4 Implant Retained Prosthesis

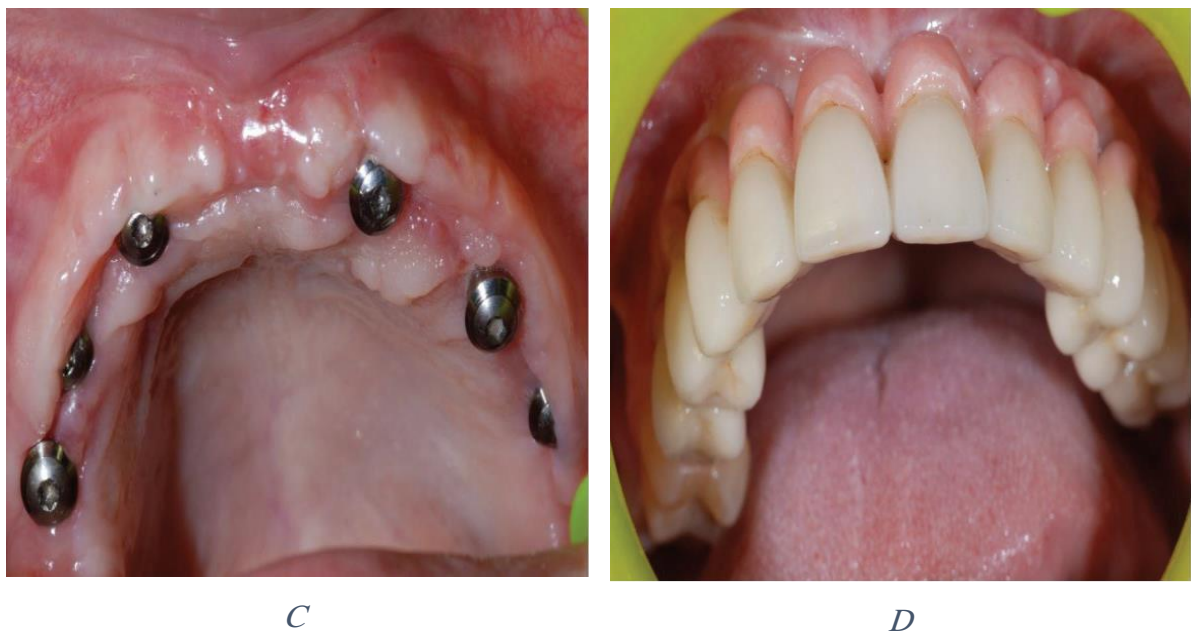
Fixed and removable implant retained prostheses offer potential benefits to several of the issues encountered with conventional prosthodontics (Watson et al, 2001).

Although implant-retained prostheses can overcome many of the problems associated with conventional dentures, they are not without significant difficulty for patients with flabby tissue in the maxilla. In most cases, there will not be sufficient bone volume for implant placement without bone grafting (within the maxilla, which has a higher prevalence of flabby ridge, aren't as successful as within the mandible The success rates for maxillary implants have been shown to be as low as 78.7%) (*Figure 1.39*) (Carlino et al., 2014).

Implants supported prosthesis can develop higher bite forces compared with traditional prosthesis and this can produce significant biomechanical stress to anterior maxilla. (Witter et al., 2001; Wennerberg et al., 2001)



(Figure 1.40) (A) Cancellous bone grafting material, consisting of autogenous bone that was harvested from the iliac crest and placed in the created subantral pocket (B) Implant insertion. (Carlino *et al.*, 2014)



(Figure 1.40) (C) tissue after healing (D) insertion of maxillary implant overdenture (Carlino *et al.*, 2014)

Chapter Two

Conclusions

Conclusions

Conclusions:

- 1.** Flabby tissue poses a difficult situation while rehabilitation of completely edentulous patients.
- 2.** The choice of treatment ultimately depends on the patient, the amount of time and money he is willing to spend for the treatment, his oral condition and his desire for fixed or removable prosthesis.
- 3.** Normal mucocompressive technique are likely to record the flabby tissue in distorted state which will lead to loss of stability and retention of prosthesis.
- 4.** Mucostatic techniques may not make the best use of the available tissue support and movement of the denture base relative to the support tissues may be a problem. All these limitations can be succeeded by the use of selective pressure or minimally displacive impression techniques
- 5.** Surgical excision and dental implant therapy are mandatory in some cases, but may not be feasible in some patients because of medical illness or expensiveness of treatment.
- 6.** Implementation of some modifications in current impression techniques and newly introduced materials with improved physical and handling properties, flabby ridges can be treated effectively without any additional visits of patients in clinical practice.

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