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# Management of flabby ridge in complete denture

A Project Submitted to the College of Dentistry, Al-Mustaqbal University, Department of Prosthodontics, in Partial Fulfillment of the Requirements for the Degree of Bachelor of Dental Surgery

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# Certification of the Supervisor

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# Dedication

All praise is due to Allah, by whose grace good deeds are accomplished.

We dedicate this humble work to our parents,

And to everyone who played a role in helping us reach this academic stage,

To our respected teachers who never hesitated to provide us with knowledge and guidance,

And to all those who supported and stood by us throughout our academic journey.

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# Introduction

Flabby ridge, also known as a mobile or displaceable ridge, is a common clinical challenge encountered in dental practice. It refers to the excessive soft tissue found in an edentulous area, which often leads to poor denture retention, support, and stability. According to several studies, approximately 5% of edentate mandibles and 24% of edentate maxillae exhibit flabby ridges (Carlsson, 2017).

Various surgical interventions are employed for managing flabby ridges, including scalpel surgery to remove excess soft tissue or the use of a sclerosing agent before complete denture fabrication. Moreover, surgical ridge augmentation techniques are also suggested as potential methods for addressing flabby ridges. However, surgical excision of flabby tissue results in increased denture material bulk and the loss of stress-absorbing soft tissues, which can potentially cause trauma to the underlying tissues (Crawford et al., 2019).

The concept of conditioning edentulous ridge mucosa has gained momentum over the last several years. Frequent relining of the complete denture may be required because of soft tissue changes arising from underlying bone resorption. Patients with maxillary flabby ridges often have difficulty tolerating hard dentures, and inadequate retention and stability of a complete denture are frequently encountered. Therefore, the denture can be made more comfortable using a soft liner. However, the hardening of the soft liner over time, bacterial harboring, and debonding from the denture base are major drawbacks of soft lining materials. The introduction of liquidsupported dentures has provided an alternative to conventional complete denture prostheses in cases suffering from inflamed tissues and severely resorbed edentulous ridges (Watson and Br Dent, 2020).

A liquid-supported denture provides an alternative treatment option because its soft and flexible intaglio surface allows better distribution of masticatory load stress. Liquid-supported acrylic complete dentures can be useful as a permanent solution for edentulous patients with atrophied ridges, serving as a useful alternative to soft relining materials.

Surgical removal of excess tissue, implant-retained prostheses, or non-surgical prosthetic techniques using special impression methods and impression materials may all be considered. The best approach depends on the patient's health, finances, and the condition of the remaining ridge, and management often begins with conservative measures such as tissue conditioning.

Construction of dentures over a flabby foundation poses a significant challenge to the prosthodontist when rehabilitating patients with flabby ridges. Several therapies have been suggested for such cases, including surgical excision of the flabby mass, implant-supported dentures, or conventional prostheses without surgery (Bansal et al., 2019).

# The Aim of the Study

This review aim to;

1- To identify etiological 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 Literature Review

## 1. Flabby ridges

### 1. Definition of Flabby Ridge

A flabby ridge, also referred to as a fibrous ridge, is a localized area of mobile, displaceable soft tissue commonly found on the maxillary or mandibular alveolar ridges. This condition develops when hyperplastic fibrous tissue replaces the underlying alveolar bone, resulting in a resilient and highly mobile mucosal surface. Flabby ridges are frequently observed in long-term denture wearers, particularly in the anterior maxillary region, where chronic denture-induced trauma and masticatory forces contribute to the development of this soft-tissue mobility .
(Crawford, R. W., & Walmsley, A. D. (2005)


**Figure 1 : (A) Flabby vs. (B) Normal maxillary ridge tissue (Labban, 2017)**

The reported prevalence of flabby ridges varies among studies, with approximately 24% of edentulous maxillae and 5% of edentulous mandibles demonstrating this clinical finding. The presence of such mobile tissue poses significant challenges in complete denture fabrication. Masticatory forces may displace the denture-bearing tissues, compromising the peripheral seal and resulting in reduced denture retention. Additionally, impression procedures can inadvertently

distort the flabby tissue if conventional techniques are used, leading to inaccurate master casts and compromised denture stability. (Lynch, C. D., & Allen, P. F. (2006)


**Figure 2 : Intraoral examination: (a) flabby tissue in the maxillary anterior region and (b) fibrous hyperplastic mass.**

Successful management of flabby ridges requires the use of specialized impression techniques designed to avoid displacement of the mobile tissue while simultaneously compressing the normal denture-bearing areas for optimal support. Numerous impression methods have been proposed in the literature to address this issue and improve the prognosis of complete dentures fabricated for patients exhibiting this condition. Hobkirk, J. A. (1986)

## 1.2 Prevalence of Flabby Ridge

The prevalence of flabby ridges has been widely investigated due to their significant impact on the success of complete denture therapy. Reported rates vary across populations, largely influenced by factors such as duration of edentulism, denture-wearing habits, and the quality of residual ridge support. Studies have demonstrated that flabby ridges occur more frequently in the maxillary arch compared to the mandibular arch, owing to differences in bone density, occlusal loading patterns, and the susceptibility of the anterior maxilla to resorptive changes ).Khan, Z., Jaggers, J. H., & Shay, J. S. (1981)

The condition is observed in up to 24% of edentulous maxillae and approximately 5% of edentulous mandibles, making it a relatively common clinical finding in prosthodontic practice. Long-term denture wearers are particularly prone to developing flabby ridges, especially when opposing natural teeth or ill-fitting dentures exert uneven or excessive forces on the supporting tissues. Such chronic mechanical stress contributes to alveolar bone resorption and subsequent soft-tissue hyperplasia, ultimately resulting in mobile and compressible denture-bearing areas. (Kelly, E. (1972)

Variability in prevalence across studies is also attributed to diagnostic criteria, differences in population age distribution, and the frequency of complete denture use. Despite this variability, the presence of flabby tissue remains a significant concern due to its potential to compromise the support, retention, and stability of complete dentures. This underscores the importance of early detection and appropriate management during prosthodontic rehabilitation.(Allen, F. (2005).

## 1.3 Classification of management of flabby ridges

Flabby ridge is managed by following method:

1. Surgical removal of fibrous tissue before conventional prosthodontics
2. Implant retained prosthesis

- Fixed
- Removable

3. Conventional prosthodontics without surgical intervention.

### 1.3.1 Surgical removal of the fibrous tissue

The outcome of this method is firm denture bearing area which enhances the stability of future prosthesis. As with any surgical treatment option, the health of the patient must be taken into consideration. Removal is contraindicated in circumstances where little or no alveolar bone remains (Grant & Johnson, 1992).

It can be argued however that the fibrous part of the ridge has a cushioning effect that reduces trauma to the underlying bone, which therefore should not be removed. The removed tissue often requires prosthetic replacement by denture base material; this can increase the bulk and weight of the prosthesis. Retention is also adversely affected by the significant loss of the sulcus depth which is important in aiding border seal (Basker & Davenport, 2002). For conventional prosthodontics, preservation of what is remain is more important. The flabby ridge may provide substandard retention for the denture base, it may be more desirable than no ridge at all (Carlsson, 1998).

### 1.3.2 Implant retained prostheses

a) Fixed prosthesis

b) Implant retained overdenture.

Fixed and removable implant-retained prostheses have potential benefits compare to conventional prosthodontics. It enhanced the stability, retention, and oral function. An implant-retained overdenture, in comparison to a fixed prosthesis, is initially economic and the surgery is often more straightforward. However, the recurrent cost due to maintenance can be considerable. Implants in the maxilla, which has a higher prevalence of flabby ridge, are not as successful as in the mandible. The success rates for maxillary implants have been shown to be as low as 78.7% (Lynch & Allen, 2006).

It is thought that this could be due to the placement of shorter implants into highly vascular, poor volume, low-density bone (Watson et al., 1997). The diminished alveolar bone volume in this subject group may result in restrictions on suitable implant sites or the need for bone augmentation (Basker & Davenport, 2002).

In terms of both time and finance, the initial cost and long-term maintenance costs of these restorations can be high (Dunnen et al., 1998). Factors considered while going for implant retained prosthesis are fear of surgery, discomfort, and inconvenience, general health of the patient, and risk of surgical complications or implant failure.

### 1.3.3Conventional prosthetic management

Uncontrolled displacement of the mobile fibrous tissue from its resting position, forces exerted during conventional impression taking, results in a record of distorted denture bearing area. This problem can be managed by following impression technique:

Mucodisplacive impression technique is use to compress the loose flabby tissue to allow functional support from it by replicating the contour of the ridge during compression by occlusal forces. Where as Mucostatic impression technique is achieve support from the other firm areas of the arch and maximizes retention. At present, the published evidence does not support the superiority of either of these techniques over the other. To over come this problems, the following techniques are useful.

**Choice of technique**

**1.3.3.1.One part impression technique (Selective perforation tray)**

It has been suggested that if the degree of mucosal displacement is minimal, then this modified conventional technique may be considered (Lamb, 1993).

Preliminary impressions are taken in stock trays using low-viscosity alginate after appropriate border correction.

A spaced special tray is fabricated from the primary cast for use with a low viscosity impression material, such as impression plaster, low-viscosity silicone, or alginate.

Pressure on the unsupported, displace-able soft tissue can be minimized further by the use of perforations in the tray overlying these areas (Figs 1 to 3)

**Fig. 3: Undisplaced mandibular ridge**

**Fig 4: Displaced mandibular ridge**

**Fig 5: Perforated special tray**

**Controlled lateral pressure technique**

Controlled lateral pressure technique was advocated by many authors for use with a fibrous (unemployed) posterior mandibular ridge (McCord & Grant, 2000). In this technique 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 remove the greenstick related to the fibrous crestal tissues and the tray is perforated in this region. Light-bodied silicon impression material is then syringed onto the buccal and lingual aspects of the greenstick and the impression is gently inserted. The excess material is extruded through the perforations and theoretically, the fibrous ridge will assume a resting central position having been subjected to even lateral pressures.

**Palatal splinting using a two-part tray system**

For recording displaceable anterior ridge in maxiialry arches, Osborne described an impression technique (Osborne, 1964). The main goal of this technique is to maintain the contour of the easily displaceable tissue while the rest of the denture bearing area is recorded with the help with previous denture a primary cast is fabricated. From this, a palatal tray is fabricated with wax being used to create space on the palatal aspect of the mobile area and extending to the ridge crest around the arch. In this acrylic resin palatal tray, a low viscosity zinc oxide paste impression is taken of the palate. An upward force is maintained until it is apparent that the mobile ridge is just beginning to have pressure applied to it. Once this has been set, a second special tray impression is made completely encompassing the first tray. It should be inserted from in front, backward, and the presence of the supporting zinc oxide should prevent backward displacement of the mobile ridge.

A neat modification of this approach was described by Devlin in 1985 (Devlin, 1985), 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 using a stop, thereby allowing for a pre-planned even thickness of impression material (Figures 4–10).

Fig 6: Wax spacer

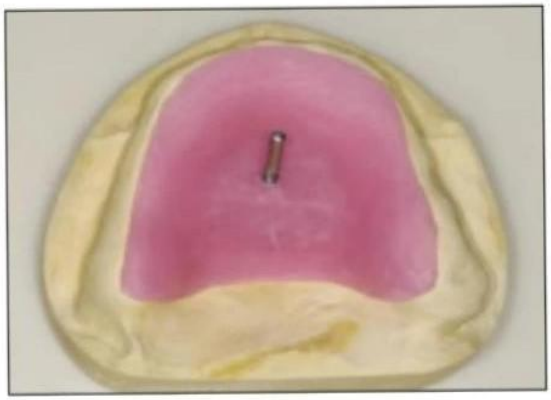

Fig 7: Palatal tray with proclined guidance rod & stop

Fig 10: Palatal impression using ZOE

Fig 8: Second tray

Fig 11: Second encompassing impression using silicone impression material

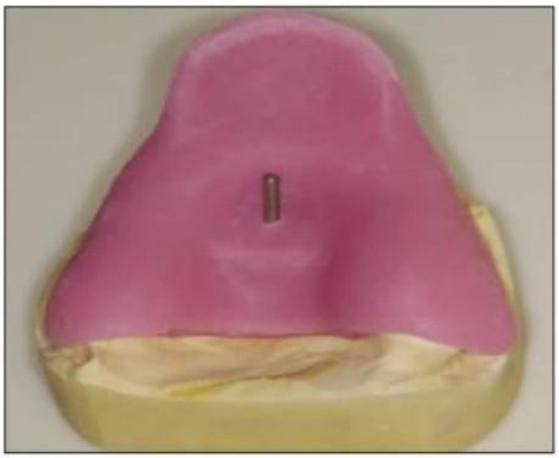

Fig 9: Both tray seated on cast

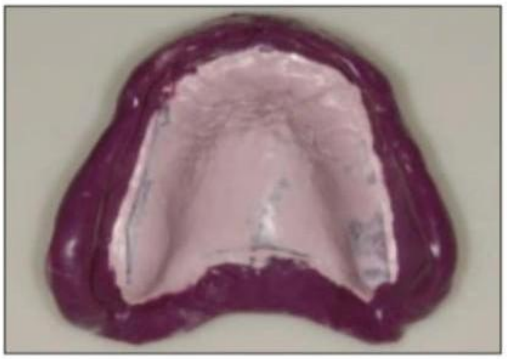

Fig 12: Finished impression

Selective composition flaming with impression compound Material In this method, first make a impression with alginate and pour A cast which reproduces a relatively undistortated ridge. In This cast now make an another impression with impression

Compound by using stock tray. After making an impression, the impression periphery is carefully softened and functionally trimmed. The fibrous part of the ridge can be outlined on the impression surface. The composition overlying the firm denture bearing areas is softened with a flame before the tray is seated under heavy pressure, attempting to replicate functional force. By performing the impression in this way, the original relatively undistorted shape of the fibrous tissues is retained while the tissues more capable of functional denture support are recorded in a displaced state (Lamb, 1993).

Fig 13: Undisplaced maxillary ridge


Fig 16: Impression compound

Fig 14: Displaced maxillary ridge

Fig 17: Marking of fibrous tissue boundaries

Fig 15: Iimpression of primary cast

Fig 18: Transfer of compound impression

# 2. Two-part impression technique

### 1. Mucostatic and mucodisplacive combination

Most commonly used method for recording displaceable tissues. This technique was first described by Osborne in 1964 for mandible arches. This is a popular technique where many authors ensured that the pressure exerted by the tray does not cause distortion of the mobile tissues (Allen & McCarthy, 2003).

In this method, first make a primary impression and marked the displaceable tissue on impression which can be transferred on primary cast. Now a close-fitting special tray fabricated with cold-cured resin in which flabby ridge area is left uncovered. An alternative method described by Hobkirk, McCord and Grant, involves the removal of acrylic from a complete special tray creating a window over the displaceable area (McCord & Grant, 2000).

An appropriate border correction is done with green stick compound supported mucosa is recorded with zinc oxide-eugenol or medium-bodied silicone. An impression of the displaceable mucosa is then recorded by applying or syringing a thin mix of impression plaster or light-bodied silicone. Modification of the special tray after the more viscous impression material has been used to record the whole of the denture bearing area (including the displaceable area) previously described by McCord and Grant, could conceivably cause a degree of distortion in adjacent areas (McCord & Grant, 2000).

The design of this modified special tray can vary from a completely uncovered section of the arch to a window overlying the unsupported mucosa. In the fibrous anterior maxilla, modification of the handle position is often required. A rim handle design has the benefit of aiding the prevention of unset impression material falling to the back of the mouth when the patient is supine. The advantage of a window design means that the appropriate border correction can be undertaken and checked around the entire sulcus before the second stage of the impression is completed.

## 1.4 Etiology of Flabby Ridge

Flabby ridge, also known as a mobile or displaceable ridge, is primarily the result of multiple local and systemic factors that affect the alveolar bone and overlying soft tissue. Understanding its etiology is essential for effective preprosthetic and prosthodontic management. Several factors contribute to the development of flabby ridges, including long-term denture wear, trauma, illfitting prostheses, occlusal forces, and systemic health conditions (Anne, 2017; Carlsson, 2017).

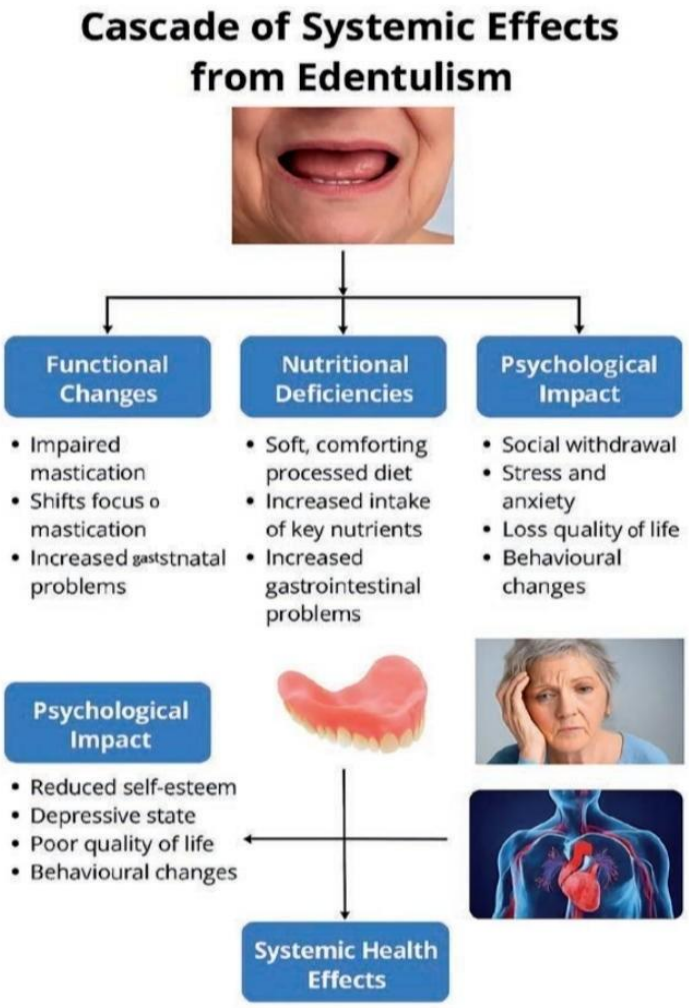


Figure : Cascades of systemic effects from edentulism

## 1.4.1 Ridge Resorption

Residual alveolar ridge resorption is a chronic, cumulative, and irreversible process that occurs following tooth loss. Without the mechanical stimulation of natural teeth, the alveolar bone undergoes progressive atrophy. Mandibular resorption occurs at a faster rate than maxillary resorption, leading to anatomical changes such as knife-edge ridges and loss of vertical facial height. This resorption reduces denture stability and contributes to the formation of flabby ridges, especially in edentulous areas with extensive bone loss (Atwood, 1971; Carlsson, 2017).

### 1.4.2 Fibrous Tissue Hyperplasia

The replacement of resorbed alveolar bone with hyperplastic fibrous tissue is a characteristic feature of flabby ridges. This soft tissue proliferation occurs due to chronic mechanical irritation from dentures or abnormal functional forces, and it leads to mobility of the ridge mucosa. Histologically, the fibrous tissue may be loosely attached and easily displaceable, complicating prosthetic retention and stability (Anne, 2017; [1–3]).

### 1.4.3 Ill-fitting Dentures **Ill-fitting or aged dentures**

are a significant etiological factor for flabby ridge development. Continuous use of a misfitting prosthesis induces trauma, chronic irritation, and inflammatory changes in the supporting mucosa, resulting in tissue hypertrophy and ridge displacement. In addition, impressions made over deformed or flabby tissue often result in unstable prostheses, which further accelerate bone resorption and compromise denture support (Carlsson, 2017; [1–4]).

### 1.4.4 Traumatic Occlusion

Abnormal occlusal forces, including anterior overloading and malocclusion, can traumatize the underlying osteomucous tissues. Traumatic occlusion leads to localized fibrous hyperplasia, mucosal irritation, and eventual flabbiness of the alveolar ridge. Proper occlusal adjustment and balanced force distribution are critical to prevent these changes, especially in patients with complete dentures (Anne, 2017; [1,3,5–8]).

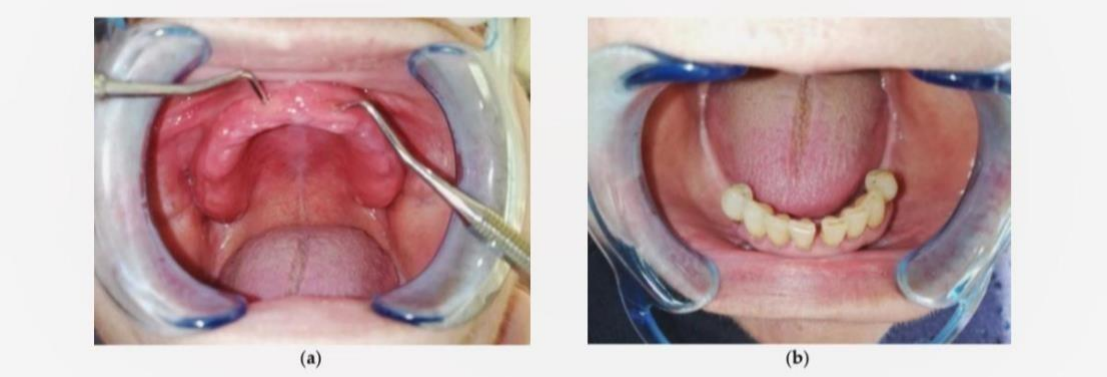


Figure 5. Prosthetic field examination (a) maxillary with frontalflabby ridge; (b) mandible Kennedy class I edentation.

### 1.4.5 Systemic Factors

Systemic health conditions, such as osteoporosis, diabetes mellitus, and nutritional deficiencies, can influence alveolar bone metabolism and mucosal resilience. Poor systemic health may exacerbate bone resorption and impair tissue healing, contributing to the formation of flabby ridges. Additionally, edentulous patients with systemic comorbidities are at higher risk of malnutrition, sarcopenia, and secondary complications that affect prosthetic rehabilitation outcomes (Walls & Steele, 2014; [13,15–16]).

## 5. Factors Influencing Ridge Resorption (Taylor et al., 2021)

### 1. Anatomic Factors

1. The rate of vertical bone loss in a broad, high ridge is slower than that of a small ridge .

2. The denser the bone, the slower the rate of resorption.

### 1.5.2 Metabolic Factors

1.Bone metabolism is dependent on cell metabolism, especially osteoblasts and osteoclasts .

2. Parathyroid hormone (PTH) imbalance

3. Postmenopausal osteoporosis

4. Continuous synthesis of local prostaglandins

5 .Hypervitaminosis A and D

6. Hypovitaminosis C

**3. Mechanical Factors**

**4. Functional Factors**

1. Frequency, direction, and strength of forces acting on bone

2. Bruxism

**1.5.5 Prosthetic Factors**

1. Type and fit of prosthesis

2. Duration of prosthodontic treatment

3. Hours of prosthesis wearing per day

4. Occlusal disharmony

5. Lack of prosthodontic treatment (disuse atrophy)

Treatment of atrophied ridges is a clinical challenge faced by dentists worldwide. The clinical condition of a resorbed maxillary ridge may present with sunken cheeks, a flat (atrophic) mandibular ridge, and increased interarch space.

Treatment options for such conditions may begin with preprosthetic surgeries, followed by conventional complete denture prostheses, implant-supported prostheses, or complete denture prostheses. In addition, hollow maxillary complete dentures may be used, which are lighter in

weight and more comfortable compared with conventional complete dentures due to the reduction in the amount of acrylic resin during denture fabrication.

# 6. Different Techniques for Fabrication of Hollow Dentures

## 1. Hollow Denture Using the Two-Flask Technique

The hollow maxillary complete denture can be fabricated using the two-flask technique described by Fattore et al. (1988), which is a variation of the technique originally described by Chalian and Barnett (1972) for fabrication of the hollow bulb portion of obturator prostheses using autopolymerized acrylic resin shims.

In this technique, the try-in maxillary denture is invested and dewaxed. Baseplate wax is then adapted to both the tooth side and the cast side of the dental flask. New flasks, whose halves fit the original flask, are selected and placed over the original flask containing the teeth and cast with wax adapted over them. Dental stone is poured into the alternate halves of the flask and invested.

Following dewaxing, pigmentation is carried out on the teeth side of the mold cavity so that it can be transferred to the labial surface of the final denture. The flasks are then packed with high- impact heat-cure acrylic resin and cured. Both halves of the original flask now contain processed acrylic resin shells.

The two halves are fitted together to remove any acrylic resin that may interfere with complete flask closure. A rope of heat-cure acrylic resin is then adapted around the borders of the cured acrylic resin shell on the tooth side of the flask. After trial closure, the two halves of the flask are

closed and cured using a long curing cycle. Once processed, the denture base is finished and polished (Bhushan et al., 2019).

Reducing the weight of a maxillary prosthesis has been shown to be beneficial, particularly when constructing an obturator for the restoration of large maxillofacial defects. Given the extensive volume of denture base material used in patients with large maxillofacial defects or severe residual ridge resorption, reduction in prosthesis weight may be achieved by making the denture base hollow.

Historically, weight reduction approaches have involved the use of a solid three-dimensional spacer, such as dental stone, cellophane-wrapped asbestos, silicone putty, or modeling clay, during laboratory processing to exclude denture base material from the planned hollow cavity. Multiple and separate pieces of the prosthesis are polymerized around the spacer. Following initial polymerization, the solid spacer is removed, and the individual pieces of the prosthesis are joined using autopolymerizing acrylic resin repair techniques.

Fattore et al. described a variation of the double-flask technique for obturator fabrication by adding heat-polymerizing acrylic resin over the definitive cast and processing a minimal thickness of acrylic resin around the teeth using a different drag. Both resin portions were then joined using heat-polymerized acrylic resin. Holt (1981) processed an acrylic resin shim over the residual ridge and used a spacer. The resin was indexed, and the second half of the denture was processed against the spacer and shim. After removal of the spacer, the two halves were luted with autopolymerized acrylic resin using the indices to facilitate accurate positioning.

The primary disadvantage of these techniques is that the junction between the two previously polymerized portions of the denture occurs at the denture borders. This long junction increases the risk of fluid seepage into the denture cavity. Furthermore, this junction is a common site for post-insertion adjustment, further increasing the risk of leakage. Another disadvantage is the difficulty in accurately gauging resin thickness in the cope area (Bansal et al., 2014).

## 1.7 Clinical Features

Flabby ridge, also called a displaceable or fibrous ridge, is a mobile soft tissue located on the superficial aspect of the alveolar ridge. It often develops in edentulous patients, particularly in the anterior maxilla when opposing natural teeth, and is a feature of combination syndrome. (Pai et al., 2014; Lynch & Allen, 2004; Kelly, 1972)

### 1.7.1 Mobility of Tissue

Flabby ridges exhibit high mobility under manual palpation. The degree of movement depends on the thickness of the fibrous tissue and the underlying bone resorption. Mobility is clinically significant when displacement exceeds 2 mm under pressure, compromising denture support. (MacEntee, 1996; Bindhoo et al., 2012; Pai et al., 2014)

(a) (b)

Figure 3. (a) Maxillary prosthetic field, with well-formed high ridges, voluminous tuberosities, slightly retentive vestibulo-Distal, voluminous maxillary torus located posterior, flabby ridge apparently normal histological appearance at inspection,But with increased mobility; (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.

## 1.7.2 Displacement Under Load

Flabby ridges are easily displaced under occlusal forces due to poor support, leading to loss of peripheral seal and compromised retention of dentures. (Pai et al., 2014; Crawford & Walmsley, 2005)

## 1.7.3 Associated Mucosal Changes

The mucosa overlying flabby ridges may exhibit hyperplasia, keratinization, or inflammation, depending on trauma from ill-fitting dentures or long-term wear. Erosive lesions or stomatitis can develop in neglected cases. (Desjardins & Tolman, 1974; Carlsson, 1998; Crawford & Walmsley, 2005)

## 1.8 Problems Associated with Flabby Ridge

Flabby ridges can compromise complete denture prosthodontics by affecting retention, stability, occlusion, and patient comfort. (Lynch & Allen, 2006; Bansal et al., 2014)

## 1.8.1 Loss of Retention

Due to the mobility of the ridge, dentures lose peripheral seal, leading to poor retention and frequent dislodgement during function. (Pai et al., 2014; MacEntee, 1996)

### 1.8.2 Instability of Denture

Instability arises as the displaceable ridge moves under functional forces, causing rocking of the denture and uneven load distribution. (Crawford & Walmsley, 2005; Bansal et al., 2014)

### 1.8.3 Occlusal Inaccuracy

Flabby ridges contribute to occlusal discrepancies because tissue displacement alters the proper seating of dentures and the occlusal scheme. (Lynch & Allen, 2003; MacEntee, 1996)

### 1.8.4 Pressure Spots and Ulceration

Increased pressure on flabby ridges can result in ulceration, trauma, and discomfort for the patient. This often requires careful impression techniques to minimize tissue compression. (Desjardins & Tolman, 1974; Pai et al., 2014)

### 1.8.5 Impaired Function and Speech

Loss of denture stability and retention affects mastication, speech, and patient satisfaction. Proper management ensures improved esthetics, phonetics, and function. (Carlsson, 1998; Imbery et al., 1993)

Figure 2: extraoral examination ( Angular cheilitis)

## 9. Diagnostic Tools for Complete Denture Prosthodontics (Zarb et al., 2013)

### 1. Clinical Assessment

•A thorough intraoral and extraoral evaluation of soft tissues, residual ridges, occlusion, and patient factors using fundamental dental tools.

• Equipment: Tissue caliper, periodontal probe, explorer, and dental mirror. Examining the mucosa, tongue, and salivary flow both visually and tactilely. *Baseplates and occlusal rims for documenting jaw relationships. To transfer maxillomandibular orientation, use a facebow.

*Indications: Evaluation of tissue conditions (e.g., flabby ridges, hyperplastic tissue) and ridge morphology (e.g., Atwood's Orders I–VI, Cawood & Howell Class I–VI). Assessment of mucosal health (e.g., ulceration, denture stomatitis). Establishment of the freeway space, rest position, and vertical dimension of occlusion (VDO). Examination of tongue position, salivary flow, and neuromuscular coordination for the retention of dentures. The identification of parafunctional behaviors or disorders of the temporomandibular joint (TMJ).

• Uses: To direct impression techniques (such as mucostatic for flabby ridges), it classifies ridge resorption. Establishes the centric relation and VDO for precise occlusion setup. Evaluates aesthetic factors for denture design, such as smile line and lip support. Determines anatomical landmarks for border molding, such as the hamular notch and retromolar pad. For the purpose of treatment planning, assesses the patient's adaptability (e.g., gag reflex, psychological factors).

• Evidence: Clinical examination is the foundation for a comprehensive denture diagnosis (Zarb et al., 2013). It is essential for evaluating jaw relationships, mucosal health, and ridge morphology.

### 1.9.2 Imaging by Radiography

• Description: Denture planning and pathology detection depend on imaging to assess bone height, quality, and anatomical landmarks.

• Instruments: Panoramic Radiographs (OPG), Intraoral Periapical (IOPA) Radiographs, Cone Beam Computed Tomography (CBCT).

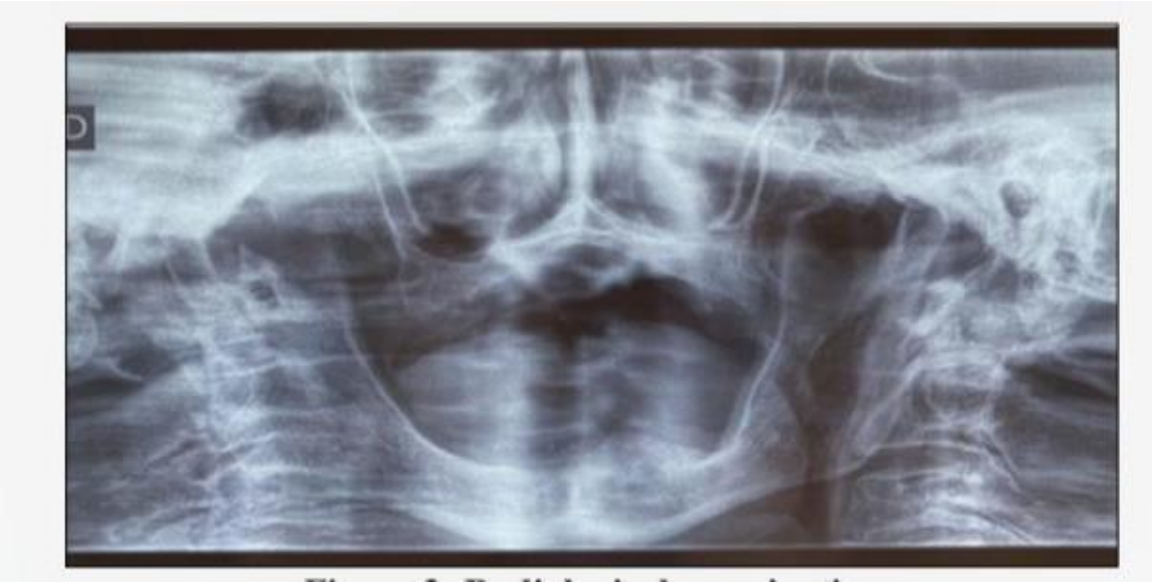

Figure 3: Radiological examination

• Indications: Measurement of residual ridge resorption (e.g., ACP PDI Type I–IV; Wical & Swoope's mild, moderate, and severe). Finding cysts, retained roots, or bony abnormalities that compromise the stability of a denture. Evaluation of the quantity and quality of bone for possible overdentures supported by implants. Assessment of maxillary sinus proximity, mental foramen, or mandibular canal for denture base design.

• Applications: OPG categorizes bone loss to forecast the prognosis of dentures. IOPA detects localized pathology that necessitates surgical intervention. CBCT directs implant placement or

ridge augmentation (Cawood & Howell Class VI). Ensures denture bases stay clear of important anatomical features, like the mental foramen.

• Proof: Wical & Swoope (1974) classified mandibular RRR using panoramic radiographs. CBCT accuracy in implant-supported dentures is highlighted by Tyndall et al. (2012).

### 1.9.3 Articulators and Diagnostic Casts

• Description: Occlusal dynamics, ridge morphology, and jaw relationships are replicated using stone or digital casts fixed on articulators.

• Instruments: Diagnostic casts from impressions (PVS, alginate), semi-adjustable articulators (Hanau, Whip Mix), facebow, wax rims, and record bases.

• Indications: Assessment of interarch space, undercuts, ridge morphology, denture base extension, VDO, and occlusion planning. Evaluation of functional and aesthetic aspects of trial dentures.

• Uses: Selects impression techniques, establishes VDO and occlusal plane, directs tray and border molding design, assesses function, phonetics, and aesthetics of trial dentures.

• Proof: Diagnostic casts are crucial for assessing ridge morphology and designing full dentures (Zarb et al., 2013; Sankeshwari, 2013).

Photography, DSD, and wax-ups enhance esthetic planning and patient acceptance, improving satisfaction.

Preventive Approach:

Periodontal, occlusal, and TMJ assessments identify risk factors (e.g., poor abutment support, TMD), preventing RPD failures.

Diagnostic Tools Specific for Maxillofacial Prosthodontics (Beumer et al., 2011).

## 1.10 PROSTHODONTIC MANAGEMENT OF FLABBY RIDG

Flabby tissues are managed by their severity. Different techniques applied for flabby ridge management, include surgical removal and augmentation, special impression techniques, balanced distribution of occlusal loads and implant therapy (Labban, 2017).

Conservative Approach. (Recovery Program)

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.

Soft tissue massage: 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.

Modification of the denture by flange and occlusal adjustment: Diagnose and remove any pressure areas or sore spots using pressure-indicating paste (PIP). Correction of occlusal disharmonies by clinical remounting and restoring (VDO) the occlusal vertical dimension.

Tissue conditioning: Relining the old prosthesis with soft tissue conditioners before fabricating new dentures. 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.

Prosthetic Approach

If the condition persists after conservative management then the prosthetic approach may be employed:

• Impression techniques.

• Centric occluding record.

• Occlusal form and posterior teeth arrangement

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 mucostatic technique (nondisplacive), (Addison, 1944)

The mucocompressive technique (displacive), (Applebaum & Rivette, 1985)

The selective pressure impression technique — where some denture-bearing tissues are displaced and others are not (McCord & Grant, 2000).

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.

**B. One-part impression technique (Selective Perforation tray) (Lamb, 1993)**

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.

**C. Controlled lateral pressure technique**

This technique was recommended by several authors for use with a fibrous (unemployed) posterior mandibular ridge (McCord & Grant, 2000). 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 wont 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.

**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 (Osborne, 1964). 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.

In 1985, Devlin described an accurate modification of this approach (Devlin, 1985), in which a locating rod is positioned in the centre 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 pre-planned even thickness of impression material.

**E. Selective composition flaming (Lamb, 1993)**

A 3–4 mm spaced rigid special tray is prepared and wont 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.

**F. Two part impression technique: Mucostatic and mucodisplacive combination**

This popular technique is first described by Osborne in 1964 for use in the mandible (Osborne, 1964), which ensures pressure exerted by the tray does not cause distortion of the mobile tissues.

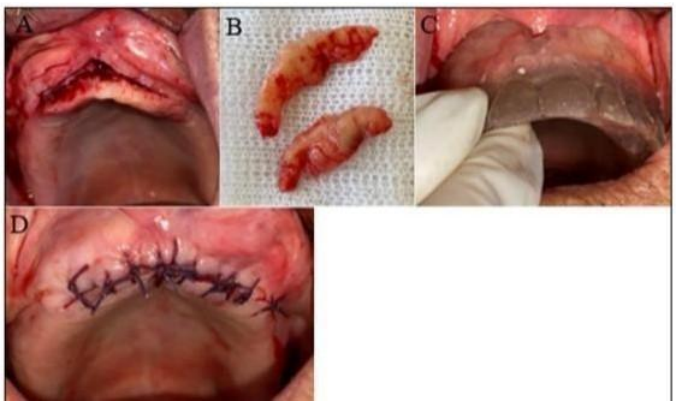


Figure 8: Surgical procedure. A: excision using conventional scalpel surgery, B: removed mucosa, C: surgery control using Surgical guide, D: suture

## 1.11 Treatment Planning Considerations

Treatment planning for implant-supported prostheses involves a multi-step process that ensures the best outcomes for the patient. First, a thorough assessment of the patient's medical history, oral anatomy, and bone structure is essential. This includes imaging such as CBCT (Cone Beam Computed Tomography) to evaluate the bone density and volume, as well as the patient's overall health to ensure they are suitable candidates for implants. After evaluating these factors, the dentist can plan the placement of the implants and design the prosthesis. In some cases, bone grafting or sinus lifts may be required to provide enough bone support. The prosthesis itself must be carefully designed to ensure it integrates seamlessly with the patient's oral structures. The treatment plan should also address the functional needs of the patient, ensuring that the implants are placed in a way that facilitates proper chewing, speaking, and overall oral function.(Sudharson et al., 2021)

# Chapter Two // Conclusion

Flabby ridges represent a significant challenge in complete denture construction due to the displacement of mobile mucosa under functional and impression pressures, leading to compromised retention, stability, and patient comfort. Early identification through careful clinical examination is essential to prevent inaccurate impressions and unstable prostheses. Although surgical removal of flabby tissue may be performed in selected cases, it can reduce the cushioning effect of soft tissue and may increase the thickness of the denture base, potentially predisposing the mucosa to trauma. Therefore, non-surgical prosthodontic management remains a key approach, particularly through impression techniques that minimize tissue distortion and provide a more accurate denture foundation. Methods such as the window technique, mucostatic or two-stage impressions, and controlled-pressure approaches can significantly enhance denture fit and function.

In patients with severely resorbed ridges or persistent instability, implant-supported prostheses may provide superior outcomes, but they require comprehensive assessment and appropriate case selection. Ultimately, the most effective management of flabby ridges is achieved through individualized treatment planning that considers systemic health, ridge anatomy, financial limitations, and patient expectations, while prioritizing conservative and tissue-preserving strategies to optimize long-term denture success.

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Thank You