

Loss of retention in complete and removable partial dentures and its management

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ABSTRACT

Complete dentures and removable partial dentures appear to be very simple and easy prosthetic solution for completely edentulous patients but can be extremely challenging when it comes to a favorable adaptation to the tissues and acceptability by patient. The treatment of a complete denture patient begins after the insertion of the prosthesis and many post insertion problems are faced by many complete denture patients. The patient must be recalled periodically after the delivery of the denture to eliminate any post insertion problems, for the success of a denture. A scrutiny based on a thorough knowledge of normal and abnormal tissue response as well as of the fundamentals of complete denture prosthesis is essential in treating the problems connected with complete denture use.

Index Terms: Complete denture, Denture Stomatitis, Management, Post insertion problems, Removable partial dentures.

INTRODUCTION

With advancements made in medical science, the life expectancy of human beings is steadily increasing. Along with the increased average life span of our population, the number of geriatric patients requiring dentures for replacement of missing teeth is also increasing. Although a revolution had taken place in the field of Implantology, removable dentures still play an important role among majority of the patients in our country and thus is an indispensable treatment option. Fabrication of complete dentures is dependent on technical, biological, and psychological interplay between the clinician and the patient. Paramount to the patient is factors as aesthetics, comfort, and masticatory ability. The overall success of complete denture therapy depends on patient's comfort and acceptance of the dentures.¹

The wearing of a new prosthesis may be associated with some complaints especially shortly after the insertion of the denture. The complaints may be lack of retention and stability, pain or discomfort, accumulation of food under the denture, altered speech, difficulty in chewing, unsatisfactory appearance, and wrenching. Several studies had been conducted on patients' complaints after delivery of complete dentures; however, there was no agreement on the most common complaint. Pain or discomfort was reported by some researchers as the most common complaint among new denture wearers while others stated that lack of retention and stability were the most frequent complaints.²

LOSS OF RETENTION

Patients who have worn dentures successfully for a long time often return for further service because of looseness.³ The alveolar residual ridge is the major bony support for the denture base to resist torquing and horizontal forces. Based on statistical calculations Jozefowicz concluded that wearing dentures enhances the atrophy of the residual ridges. In the presence of excessive and/or rapid loss of these ridges it is not always easy to determine the cause. The dentures may be the source, but they should not be classified as failures until extensive diagnostic procedures have been completed.^{4,5}

Unacceptable complete denture retention and stability are substantial risk factors for impaired Oral health quality of life in complete edentulism. For complete denture wearers, happiness was strongly associated with perceived general health, but

weakly-to-moderately associated with oral health. However, oral health may indirectly impact happiness through general health. Thus, maintaining optimal denture retention and stability in denture wearers is essential for good oral health and well-being with the goal of enhancing happiness.⁶

These difficulties may have been caused by³

(1) an incorrect or unbalanced occlusion that existed at the time the dentures were inserted or, more likely, (2) changes in the structures supporting the dentures that are now associated with a disharmonious occlusion. It is essential that the cause or causes of the reported difficulties be determined before any attempt is made to correct them.

CAUSES OF LOOSE DENTURES

The cause of loose dentures can be broadly classified into:

Decreased retentive forces⁷

- Lack of seal because of border under extension in depth and width, resorption of residual ridge and inelasticity of cheek.
- Air beneath the impression surface
- Xerostomia
- Neuromuscular control problems

Increased displacing force

- Overextension of denture borders in depth and width
- Poor fit – tissue recoil is caused because of poor/inappropriate impression
- Occlusal problems

MANAGEMENT

1. Due to problems arising from Decreased Retention Forces⁸

- Lack of peripheral seal

Cause-Border under-extension in Depth. Border under extension in width. Often a particular problem in distobuccal aspects of upper periphery which may be displaced by buccinator on mouth opening. Posterior border of upper denture

Treatment-Add softened tracing compound to relevant border, mould digitally and by functional movements by patient. Replace compound with acrylic resin. As a temporary measure a chair side reline material may be used.

- **Inelasticity of cheek tissues**

Cause-Consequence of ageing process; scleroderma, submucous fibrosis

Treatment-Mould denture borders incrementally using softened tracing compound as functional movements are performed - aim to slightly under-extend depth and width of denture periphery.

- **Air beneath impression surface** - Denture may rock under finger pressure. May see gap between periphery of flange and ridge.

Cause-Deficient impression. Damaged cast. Warped denture. Overadjustment of impression surface. Residual ridge resorption.

Treatment- Reline

- **Xerostomia**

Cause-Medication by many commonly prescribed drugs, irradiation of head and neck region, salivary gland disease

Treatment-Design dentures to maximise retention and minimise displacing forces. Prescribe artificial saliva where appropriate

- **Neuromuscular control**

Cause-Poor neuromuscular control may be due to advanced age or illness but denture factors which might lead to loss of retention maybe basic shape of denture incorrect, lower molars too lingual; occlusal plane too high: upper molars buccal to ridge and buccal flange not wide enough to accommodate this; lingual flange of lower convex.

Treatment-Correct design faults such as removal of lingual cusps of posterior teeth. Flatten polished lingual surface of lower from occlusal surface to periphery, fill sulci to optimal width. May require remake to optimal design.

2. Due to problems arising From Increased Displacing Forces⁸

• Linear erythema at depth of vestibule; lower denture jumps up on opening the mouth, frequent ulceration in vestibular area; upper denture falls on opening the mouth

Cause-Over-extended denture borders in length Extended lingual flanges causes lower denture to lift on tongue movement. Extended distobuccal flange of upper denture cause it to fall on opening or cheek soreness occurs. Thick upper and lower labial flanges may produce displacement during muscle activity **Treatment**-Use disclosing material to identify the overextensions and reduce them judiciously. Always polish the borders again after reduction is complete. Check borders of record rims and trial dentures at the appropriate stages.

• Lips and cheek appear puffed out. In lower, the buccal flange may be palpated lateral to external oblique ridge

Cause-Overextension in width Error at jaw relation or try-in stage. Wax-up errors

Treatment-Reduce width of the flanges. Remake the dentures if error is gross.

• Denture rocks on supporting tissues. Dentures seats but lift up on releasing digital pressure

Cause-Poor fit to supporting tissue Impression making errors, especially in retro mylohyoid area **Treatment**-Reline the denture if no other problem; otherwise, remake

PROBLEMS WITH MAXILLARY DENTURE

Dislodgment during functions⁴ is a result of

- Overrecorded buccal vestibule
- Overextension in the hamular notch area,
- Inadequate notches for frenum attachments,
- Excessively thick denture base over the distobuccal alveolar tubercle area leaving insufficient space for the forward and medial movement of the anterior border of the coronoid process,
- Placing the maxillary anterior teeth too far in an anterior direction,
- Placing the maxillary posterior teeth too far in a buccal direction,
- Placing the posterior palatal seal too far in a superior direction causing over displacement of soft palate tissues, or Lack of occlusal harmony.

When the teeth do not make harmonious contact, the seal between the tissues and the denture base is often broken. The result is loss of stability and retention. Dislodgment when the jaws are at rest is a result of^{4,9}

Underfilled buccal vestibule, inadequate border seal, excessive saliva, or xerostomia. When the maxillary denture slowly loses retention, the consistency of the saliva, excessive saliva, or the lack of saliva is usually involved. When the drop or loosening of the denture is sudden, the cause is usually mechanical. As an example, when the wearer smokes or whistles, the contraction at the modiolus dislodges the denture if the denture flange is not contoured properly.

PROBLEMS WITH MANDIBULAR DENTURE

In the mandible, resorption of residual ridge poses many challenges in fabrication of a complete denture. Immediately after extraction of teeth, there is enough residual ridge height to provide a wider denture bearing area, which when captured well with an accurate impression, will provide the denture with sufficient retention, stability and support thus making it acceptable to many patients. As the resorption becomes more severe due to the time lapsed from the extraction date, denture fabrication becomes more complicated; mainly because of reduction in the height of the ridge that does not allow sufficient denture bearing area to provide the desired retention and support. In cases of severe resorption of the mandible, the goal of the clinician should be to achieve good stability and optimum support from the denture bearing area. Achieving very good retention in such cases may not always be possible. The material in the article should only be applied to cases with very weak foundations, as the methods may alter when the foundations are strong.^{4,10}

Dislodgment during function can be due to^{4,10}

- Overextension in the masseter groove area,
- Extending in a lateral direction beyond the external oblique line,
- overextension of the lingual flanges,
- placing the occlusal plane too high, causing dislodgment when the tongue tries to handle the bolus of food,

- under extension of the lingual flanges causing the border to become the playground for the tongue,
- improper contour of the polished surface,
- overextension in the retromolar pad area, causing contact between the denture base that covers the alveolar tubercle and the denture base that covers the retromolar pad when the mandible is protruded. This contact dislodges the mandibular denture in the anterior section.

Various Modifications in the Design of the Denture in Resorbed Ridges to increase retention and stability⁷

Lingual flange design (sublingual crescent extension): It involves a lingual wing (horizontal extension of the lingual flange) placed in a biologically acceptable fashion by increasing the area of the denture, which enhances retention and stability.

Posterior lingual extension: The posterior part of the alveolingual sulcus (the retromylohyoid fossa) divides into two parts: anteroinferior and posterosuperior. The lingual flange of the mandibular denture should be turned into the anteroinferior part to produce maximum stability for the denture since no muscle lies directly underneath.

Residual Ridge Factor Height and width: Denture stability is directly proportional to the height and width of the ridge. Resorbed ridges have poor stability.

Ridge shape and size: Denture stability is increased in square, parallel-sided broad ridges than the small narrow tapered ridges. The former provides greater resistance to the functional horizontal dislodging forces. **Interarch space:** The appropriate vertical dimension enhances denture stability. If there is excessive interridge distance, the stability decreases because of increased leverage. In case of excessive resorption, the interridge space increases, putting the occlusal surface of teeth farther from the supporting area, which results in biomechanical disadvantage for the denture due to increased leverage.

Ridge parallelism: Parallelism of the edentulous ridges favors seating of the denture bases during tooth contact because of favorable directions of forces, thus increasing the stability. Deviation from the parallelism of the ridges adversely affects stability.

Ridge relation: Denture stability is a problem in severe prognathic and retrognathic ridge relations.

Ridge quality: Denture stability becomes decreased by the presence of hypermobile or flabby tissue on the ridge surface. Ridge resorption can result in a prominent and sharp mylohyoid ridge, limiting the denture extension below the mylohyoid area, potentially affecting denture stability. Mylohyoid ridge reductions can aid in the success of mandibular denture by permitting the increased surface area coverage by the denture.

In highly resorbed ridges with shallow sulcus depth, adequate stability is not achievable through non-surgical procedures. Pre-prosthetic surgery measures, including sulcus deepening and/or ridge augmentation procedures, are to be adopted to ensure the stability of the mandibular denture.¹¹

THE RELINING PROCEDURE

Both biological supporting tissues and materials utilized in complete denture manufacture are subject to time-dependent alterations. While the denture teeth may chip, discolor, or get abraded, the denture base material may deteriorate or discolor. While these material alterations can be corrected, irreversible alterations in the tissues that support the prosthesis can only be partially made up for.⁸

The foundation that supports a denture change adversely because of varying degrees and rates of residual ridge resorption (RRR). These changes may be insidious or rapid, but they are progressive and inevitable, and they usually are accompanied by one or more of the clinical changes such as⁹

- Loss of retention and stability
- Loss of vertical dimension of occlusion
- Loss of support for facial tissues
- Horizontal shift of dentures: incorrect occlusal relationship
- Reorientation of occlusal plane

Relines are easy, precise, and reasonably priced to complete. The teeth cannot be moved around as easily as they can when a new denture is constructed, and rebasing a complete denture entails all the issues associated with creating new dentures. Consequently, a rebase prescription may be seen as an inferior clinical alternative to the more expensive and time-consuming decision to construct new dentures. As a result, a clinician may occasionally decide to reconstruct a prosthesis instead of rebasing it and instead decide to reline one.

Socioeconomic realities and common-sense dictate that these techniques must be provided frequently, and clinical experience certainly justifies their use.³

If the clinician chooses to go forward with existing denture modifications of basal seat and possibly occlusion, some preliminary steps are undertaken before the actual reline procedure.

These steps aim at the following objectives: (1) re-establishing the height, orientation, and aesthetics of the occlusal plane by manipulation of the mandibular denture (usually, though not necessarily, done first) and

(2) relating the maxillary to the mandibular denture while the correct occlusal and aesthetic position of the maxillary denture is being established.^{3,12}

The clinical relining or rebasing can be achieved by

- (1) the static impression technique,
- (2) the functional impression technique, or (3) the chairside technique.

MANAGEMENT OF LOOSE DENTURES BY CHEMICAL RETENTION

With the loss of teeth, there is a decrease in vertical dimension as the mouth is allowed to over close when there are no teeth present to block further upward movement of mandible towards maxilla. Due to this, the dentures can become loose over time with changes in the bone and supporting gum tissue.^{9,12}

Even the most accomplished practitioners find difficulty in satisfying the patient's expectations for stability and retention of the denture and it is often considered appropriate to prescribe a denture adhesive for these patients. Denture adhesives may also give psychological confidence for the patient as it supplements retention and stability especially during occasions of public interaction.¹⁴ However, denture adhesives should not be used as a method to improve retention in an improperly fabricated ill-fitting denture, and under any circumstances excessive amounts of denture adhesive should be indicated.¹³ Standardized guidelines are needed for the application, use and removal of denture adhesives.¹⁵

COMPOSITION OF DENTURE ADHESIVES

The main ingredients of denture adhesives are classified into three groups.^{13,16,17}

Group 1 (Adhesive agents)- Tragacanth, gelatin, methyl-cellulose, acacia, hydroxyl methyl cellulose, Karaya gum, sodium carboxyl-methyl cellulose, pectin, and synthetic polymers like acrylamides, acetic, polyvinyl and polyethylene oxide.

Group 2 (Anti-microbial agents) Sodium tetraborate, ethanol, hexachlorophene, and sodium borate.

Group 3 (Other agents) Plasticizing agents, flavoring agents like oil of peppermint, oil of wintergreen, and wetting agents, etc.

MODE OF SUPPLY¹⁷

The usage of denture adhesives dates back to late 18th century. Initially, denture adhesives were formulated by mixing vegetables. The mixed vegetables form a substratum which sticks both to the tissues and to the prosthesis.

In today's world, denture adhesives are available as

- Paste
- Powder
- Cream
- Strips
- Wafers

Requirements of an Ideal Denture Adhesive¹⁵

1. Available as gels, creams, and powders.

2. Biocompatible, nontoxic and non-irritant.
3. It should have a neutral odor and taste.
4. Easy application and removal from the tissue surface of the denture.
5. Discourage microbial growth.
6. Adhesiveness should be retained for 12-16 hours.
7. Increase the comfort, retention and stability of the denture.

Mode of Application¹⁵

Any residual adhesive should be removed from the tissue bearing surface of the denture.

1. Food debris on the tissue surfaces of the denture is wiped clean.
2. Wet dentures before application of adhesive.
3. Small amounts of adhesive are applied to the tissue-bearing surface of the denture.
 - In the maxillary denture - anterior alveolar ridge, the center of the hard palate and posterior palatal seal region.
 - In the mandibular denture – adhesive must be applied along the entire sulcus.
4. Denture should be seated and held in place firmly by hand pressure for 5-10 s.
 - Gauze is used to remove excess adhesive.
 - Patient is advised to close into centric occlusion several times to spread the adhesive as a thin even layer.

Contraindications^{13,14}

1. Allergies to denture adhesives or any of its components.
2. Gross inadequacies in retention and function.
3. Excessive bone resorption and soft tissue shrinkage leading to loss of vertical dimension.
4. Adhesives should not be used to retain fractured dentures or dentures with lost flanges.
5. Patients with inability to maintain proper hygiene of the denture should avoid the use of denture adhesive.

With proper use denture adhesives are beneficial to the patient in increasing retention and stability, enhanced comfort, improved function, and in providing psychological satisfaction. They should not be used as an aid to compensate for denture deficiencies even though adhesives enhance denture performance. Patients should not use denture adhesives inadvertently without proper guidance and instructions from the dentists

LACK OF RETENTION AND STABILITY IN REMOVABLE PARTIAL DENTURES

Retention or stability loss of an RPD may originate from the following situations:¹⁸

1. Broken clasps or loss of the precision attachments
2. Decrease in the function of the clasps or precision attachments
3. Overextended or underextended denture bases
4. Deflective occlusal contacts

There may be times when a removable partial denture has to be expanded or repaired. However, with careful diagnosis, thoughtful treatment planning, appropriate oral preparations, and the implementation of an efficient removable partial denture design with correct fabrication of all component parts, the frequency of this occurrence should be kept to a minimum. Then, rather than defective design or manufacture, any need for repairs or additions will derive from unanticipated issues that occur in the abutment or other teeth in the arch, breaking or deformation of the denture by accident, or careless handling by the patient.

It is crucial that the patient is trained in proper insertion and removal of the prosthesis so that undue strain is not exerted on clasp arms, on other portions of the denture, or on contacting abutment teeth. Additionally, the patient should be informed that any deformation may be irreversible and that the prosthesis needs to be treated carefully while it is not in use. It should be made clear that, aside from evident structural faults, there can be no assurance against breakage or distortion.^{12,18}

CONCLUSION

Complete dentures and removable partial dentures appear to be very simple and easy prosthetic solution for completely edentulous patients but can be extremely challenging when it comes to a favorable adaptation to the tissues and acceptability by patient. A dentist should utilize his skill to fabricate retentive and stable dentures for patient with the

maximum support offered. He needs to have thorough understanding of the associated, local, systemic factors and psychological factors which govern the retention of the removable prosthesis.

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