Realeff – Relevance in complete dentures

Dr. Reeta Jain
Department of prosthodontics and crown and bridge including implant logy
Eklavya Dental College and Hospital, Kotputli, Jaipur (Rajasthan), India

Dr Sonal Pamecha
Department of prosthodontics and crown and bridge including implant logy
Darshan dental college and hospital, Udaipur (Rajasthan), India

Dr Gyan Chand Jain
Senior lecturer, Eklavya Dental College and Hospital, Kotputli, Jaipur (Rajasthan), India

Abstract - Complete dentures rest on basal seat area which is primarily oral mucosa and residual alveolar ridge .The oral mucosa on which complete dentures are fabricated is displacable and compressible. This factor was described by Hanau as 'resiliency and like effect', Realeff Effect. Realeff plays an important role In all the steps of compete denture fabrication as in primary impression , border moulding , final impression , jaw relation , try –in procedure and remount and follow up.

Adequate measures taken during fabrication, can utilize this effect for construction of well fitted dentures .Hence this review study has been done in which the details of all the clinical procedures like use of adequate impression materials, techniques, jaw relation procedures, selective grinding , relining and rebasing which are important for utilization of realeff effect in dentures are mentioned in detail , thereby helping the operator to fabricate dentures with long term function and efficiency .

Key Words: Resiliency, fibrous, hyperplasia, remounting.

I. INTRODUCTION

The mucosa is considered as a structure because its tissue components have individual and collective characteristics that are distinctive and ingeniously composed. The mucosal cells by their form and arrangement provide a mechanism of defense and have a capacity of reproduction and adaptability within the range of normality.[1] Four essential conditions for successful denture service supplied by the patients: (1)The ridge form, which is recorded by the impression technique (2)The ridge relation, which is recorded by registering the denture space (3)The condylar guidances, recorded by eccentric interocclusal records (4)The "realeff" (resiliency and like effect), which involves the quality of the saliva, unequal resilient areas, etc. [2]The mucosa on which dentures are fabricated is displaceable and compressible. This characteristic feature of mucosa is due to its resilient nature which Hanau has described as "Realeff" or resiliency like effect.

Mechanical or pathological reasons cause fibrous changes in residual ridge, making it resilient it is more commonly seen in mandibular resorbed ridges and maxillary anterior ridges. This uneven consistency and resilient nature of soft tissues is a contributing factor in complete denture construction i.e. making of impression, jaw relation and occlusion in jaw movements.

II. ORAL MUCOSA –CONSIDERATIONS

Thomas coined the term "Gerodontology": study of the oral tissues of the aging patient[1].A normal oral mucosa at the alveolar-areolar junction may be divided into (a) the epithelium proper, which includes the stratum corneum, stratum granulosum, stratum spinosum, and stratum germinativum, and (b) the subjacent lamina propria, made up primarily of collagen fibers. Below the lamina propria may be found the submucosa with the fatty tissues, glands, muscle fibers, and blood vessels. [3]

Cellular atrophy, degeneration, increased cell pigmentation and fatty infiltration occur within the tissues of the aging human. Therefore, there is a shrinkage and condensation of both the cellular and intercellular components with the aging tissues. [1] However in a study by Dietrich Turck, the epithelium showed a well-defined keratinous layer which was slightly thicker in edentulous denture-bearing regions compared with normal tooth-bearing regions. The connective tissue generally showed a slight increase of cellular and fiber elements when the denture was

physiologically adapted. Mucosa under ill-fitting denture is characterized by lack of keratinization, acanthosis, and thickening of the epithelium, higher mitotic activity and a very irregular shape of the basement membrane. The connective tissue showed all the characteristic signs of chronic inflammation. [4]

Oral mucosa is Viscoelastic in nature and demonstrates time dependent properties on loading. Orban divides the oral mucosa into three different types. The type related to problems of the denture-supporting tissues is termed **Masticatory mucosa** which is firm and offers resistance to deformation under applied load and is comprised of the gingiva and the hard palate. During function or mastication these tissues are subjected to strong forces of pressure and friction. [1] **Lining mucosa** which is highly distensible and easily deformed under applied load. [5]

Ideally, soft tissue should be bound to underlying cortical bone, containing a resilient layer of sub mucosa and should be covered by keratinized mucosa. This resilient submucosa permits moderate compressibility and its fatty and glandular structure acts as a "hydraulic cushion" similar to palm of hand and sole of foot as described by Orban.[6] When the impact of masticatory forces fall on this cushioning submucosa it has a dual effect which reduces the impact force by: (a) changing kinetic energy into elastic energy and by reverting to kinetic energy depending upon load (b) dampens the vibrations which result from impacts by converting mechanical energy into heat. This cushioning action has mechanical reaction when a body of defined mass and velocity, exerts an impact. [7]

Some parts of masticatory mucosa are without a distinct submucous layer, yet dense connective tissue of lamina propria firmly binds the mucosa of underlying periosteum. This connective tissue layer serves as a protective base for mucosa. [8] Thus a *good* healthy mucosa with a distinct submucosa layer serves to support the relationship between the intaglio of denture base and the underlying tissue surface under varying degrees of denture loads and function.

III. FACTORS AFFECTING REALEFF

A) *Consistency of mucosa*

(a) Flabby ridge i.e., mobile or extremely resilient alveolar ridge. Seen most commonly in anterior part of maxilla with remaining anterior teeth in mandible and is due to excessive load on residual ridge, unstable occlusal conditions and prolonged denture wearing thus providing poor support for denture.

(b) Hyperplasia of tissue: Generally caused by chronic ill-fitting and overextended denture borders. Another form of denture induced hyperplasia is leaf fibroma found beneath upper denture.

B) *Excess bone loss during extractions*- localized response to traumatic extraction where large amount of bone is lost.

C*) Person's general health*- influencing form and size of supporting bone and associated mucosa.

D) *Elderly tissues* take longer time for recovery from moderate mechanical force as compared to younger individuals.

E) *Smaller forces produce distinct compression* -light loads for long duration have more effect than heavy loads for short duration .More deformity is seen in thicker tissues.

F) *Para functional habits* produce light loads for longer duration as physiological practices produce heavier loads for longer duration. [5]

G) *Single complete dentures*- mobile alveolar soft tissue found in anterior part of maxilla as a result of wearing upper complete denture as opposed to lower anterior teeth. This results in resorption of ridge and prominence of anterior nasal spine leading to denture instability and pain.

IV. REALEFF EFFECT APPLICATIONS

A) Preparing the mouth for prosthesis: Give sufficient time for tissue recovery (24 hrs for young patient and several days for geatric patients). The treatment should include leaving the prosthesis out of the mouth for a minimum of 24 hours before impressions are made and a longer time may be required were prosthetic appliance has been used.[9] Massage hyper plastic tissue with ball of finger[10]. Surgical procedures are considered where fibrous degeneration has occurred but often considered as last resort [10]. Small areas of denture hyperplasia can be excised under local anesthesia, this is done by excising the tissue and deepening the sulcus at the same time, scar formed can be grafted by split skin or oral mucosa. Leaf fibroma removed with scalpel or diathermy. Bone augmentation is advised in resorbed ridges. Soft relining material allows –"uniform distribution of stress at the mucosa/lining interface". [11]Greenstick compound forming lingual extension prior to relining, improves resistance to lateral movement. Thixotropic material viscous (*visco-gel*) gives functional reline impression. Tissue Conditioners should be changed every 3 days for series of 3 relining. [12] Para functional habits produce light loads for long duration, whereas

grinding and clenching procedures produce heavy loads for short duration. These patients should be recognized and treatment plan done accordingly.

B) Impression technique and application

Those regions, which possess a thin or less keratinized submucosa, should be relieved or recorded without displacement. Impression techniques attempt to provide mild displacement of more resilient tissues which are capable of providing denture support and resisting resorption. [8] Use astringents before making impressions this reflexly stimulates palatal glandular activity and dilates the ducts causing turgidity within the adjacent tissues. Intrinsic pressure created induces a smooth surface of the mucous membrane for making of an impression. [13] Preferably complete border refining in more than one appointment and make impression next day. Mucostatic impression technique is used with ZnO eugenol impression paste for making impressions. Low viscosity impression material is used. Anterior window preparation in special trays for flabby ridges**.** Snap on technique is for making impression. Escape holes are made in maxillary arch for refined impressions.

C) Jaw Relations, relating the patient to the articulator and applications:

Centric relation is complicated further because of varying soft tissue density .This resiliency like effect is present in both mucosa and tissues of Temporomandibular joint ;hence undue pressure in securing relation must be avoided .Numerous methods of registering centric relation have been described in the literature. They can be classified as (1) static, (2) graphic, (3) physiologic or functional, and (4) cephalometric. Two of the most popular methods of registering centric relation are the intra-oral Gothic arch (needle-point) tracing, and the wax recording procedure. Both of these methods have been criticized for their inaccuracies. Hanau pointed out the “resilient and like effect,” Realeff, of the supporting tissues as the chief source of error in registering maxillomandibular relationships.

In order to minimize the influence of this factor, Hanau and Wright advocated that the registration of centric relation be made under minimum pressure or, when possible, with zero pressure. [14] While recording centric relation – use of check bites, they exert more pressure on soft tissues. When compared to tracers , tracers will be able to provide a definite advantage to “realeff” in providing a smooth glide from the first contact to maximum intercuspation.[15]Trapozzano has stated that intra-oral central bearing point devices may only provide equalization of pressure if two conditions are present: (1) if normal ridge relations exist and the central point of bearing can be placed in the center of the maxillary and mandibular foundational bases; and (2) if mucosal resiliency is extremely slight.[16] This ‘Realeff’ can produce new discrepancies, that when corrected for,(via spot grinding) will provide a disharmonious occlusion and cause further masticatory dysfunction. Yurkstas also found that the position and inclination of the central bearing point and the relative tilt of the tracing plate affect the duplicability of the intra-oral tracing.[14]Therefore, great care must be taken in patient selection and procedural execution in order to use the Coble Balancer effectively.[16]Centric registration is made with same soft tissue placement as during impression making using soft Plaster of Paris , ZnO Eugenol paste or softened wax this is concern for equalization of pressure when recording the bite.[17]

D) Try in and applications– Use of Hanau articulators, Hanau stated that less realeff the more the instrument would simulate mandibular movements. [18] Centric relation is verified. Ideal teeth arrangement is done where centric relation is proportional to centric occlusion. The blocking out of undercut regions may result in a poor fit of the base and an uneven distribution of pressure when recording maxillomandibular relations. This contributes to an uneven setting of the base upon the resilient mucoperiosteal support, with resulting inaccuracies in the occlusion of the finished dentures. Small distortions are transferred to the articulator which cannot possibly be detected during the try-in of the arranged teeth. This is because of the “realeff’ phenomenon that masks the inaccuracies and produces a likeness of correct relations.

E) Denture Insertion and Applications

Clinical remounting eliminates difference in resiliency of tissue and the impression casts. After maximum intercuspation or posterior tooth contact is developed in the articulator in centric relation the same dentures in patient’s mouth, results in change in maxillomandibular relation leading to the distal inclines of the mandibular posterior cusp having a tendency to find premature contact with the mesial inclines of the maxillary cusps. This happens because the mucosa under the maxillary denture is displaced in a superior direction and the mucosa under the mandibular denture is displaced in an inferior direction. Managed by selective grinding done with unstrained mounting with a passive material and no displacement of the mucosa followed by a strained jaw relation with jaws in terminal relation with a compressive impression material. This results in an area of freedom of occlusion with the jaws in terminal relation. [21]

In a study by Langer the bases of processed dentures become distorted as a result of curing and when placed in the mouth, do not contact the mucosal tissues in the same manner as the trial bases during the recording procedures. On

the other hand, processed final bases used for records and setting teeth adjust, after the dentures have been placed in the mouth, to the same resiliency they registered during clinical procedures, although they too are affected by some dimensional changes. The validity of maxillomandibular records made with trial and processed acrylic resin bases. [19]

F) Follow up and application -to avoid hyperplasia of tissue reduce overextended flanges or remove of entire denture flange. The patient is encouraged to massage the hyper plastic tissue with ball of the finger Surgery is last resort [10].The degree of keratinization of oral mucosa is inversely proportional to the amount of time dentures are worn. There is a higher degree of keratinization for men than women and it is not related with age. It is greater in smokers than in non-smokers and keratinization is increased if dentures are removed from mouth at night. [20]

V. SUMMARY AND CONCLUSION

In complete denture patients, understanding basic nature of supporting tissues is essential, as it dictates further steps like impression making, jaw relations etc. which depends on nature of supporting tissues and denture irritability can be traumatic to supporting tissues.

By "realeff" at various stages of complete denture construction we can achieve better stable denture, as we know irritability can be further traumatic to supporting tissues, violating our motto of golden words by **Muller de Van's dictum – *"it is more important to preserve what already exists than to meticulously replace what is missing."***

REFERENCES

[1] Van Scotter, Boucher. The nature of supporting tissues for completed denture. *J Prosthet Dent* 1965; 15; 2:285-94
[2] Robert R.Gillis. A Relining Technique for Mandibular Dentures. *J Prosthet Dent* 1960; 10; 3:405-10
[3] Ennio L.Uccellani. Evaluating the Mucous Membranes of the Dentulous Mouth. *J Prosthet Dent* 1965;15;2:295-303
[4] Dietrich Turuck. A Histologic comparison of the edentulous denture and non-denture bearing tissues. *J Prosthet Dent* 1965;15;3:419-34
[5] Kydd, Daly. The biologic and mechanical effects of stress on oral mucosa. *J Prosthet Dent* 1982; 47
[6] Oral mucous membrane. In. GS Kumar(ed).*Orban's Oral Histology and Embryology*, 12th edition.Elsevier, 2006; 229.
[7] Wlodzimierz Jozefowicz. Cushioning properties of the soft tissues forming the basal seat of dentures. *J Prosthet Dent* 1972; 27; 5
[8] Jacobson, Krol. A contemporary review of factors involved in complete dentures Part III: Support. *J Prosthet Dent* 1983; 49; 3
[9] Ralph H.Boos. Preliminary Treatment of Prosthetic Patients. *J Prosthet Dent* 1965; 15; 6:1002-9
[10] McCord, Grant. Pre-definitive treatment: rehabilitation prostheses. *Br Dent J* 2000; 188; 8
[11] Garcia, Jones. Soft liners. *D Clin N Am* 2004; 48:709-20
[12] Lytle. Complete denture construction based on a study of deformation of the underlying soft tissue. *J Prosthet Dent* 1959; 9:539
[13] Butcher, Mitchell. Effect of dentures and astringents on palatal mucosa. *J Prosthet Dent* 1968; 20; 1:3-7
[14] Yurkstas, Kapoor. Factors influencing Centric Relation Records in Edentulous Mouths. *J Prosthet Dent* 1964; 11; 14:1054-65
[15] Nair, Sudhakar, Podwal. Equalization of pressure when recording the bite. *J Indian Prosthodont soc* 2005; 5; 1 266-32
[16] Tavelin, Psillakis. Adjustment of complete denture occlusion with the coble balancer: a case report. *Columbia Dental Review* [Internet] 2006-2007; 11:17[about 1p] Available from: http://dental.columbia.edu/pubs/cdr2007.pdf
[17] Myers. Centric relation records –historical review. *J Prosthet Dent* 1982; 47:141-5
[18] Weinberg. Arcon principle in the mechanism of adjustable articulation. *J Prosthet Dent* 1963; 13:263-68
[19] A. Langer. The validity of maxillomandibular records made with trail and processed acrylic resin bases. *J Prosthet Dent* 1961; 45; 3
[20] N. J. Markov. Cytologic study of keratinization under complete dentures. *J Prosthet Dent* 1968; 20; 1:8-13
[21] Realeff, Review of complete denture. *Lovely M.Jaypee publications*; 132-33