Prosthetic Rehabilitation of Completely Edentulous Mandibular Knife Edge Ridge: A Case Report

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ABSTRACT

Patients with conventional complete dentures may encounter various challenges, such as pain and soreness, particularly in the mandibular ridge during function. These issues may be related to a knife-edge ridge, severely atrophic ridge, and thin atrophic ridge mucosa. In such cases, a conventional complete denture with a rigid denture base further aggravates the condition. Hence, a resilient liner can be incorporated into the denture to avoid this. This clinical report presents the management of a patient with knife-edge mandibular ridge, flabby tissue, and undercuts. The patient had been previously rehabilitated with multiple dentures and had stopped wearing them due to pain. In this case, prosthetic rehabilitation was performed using a removable complete denture made with a heat-curing one-component silicone permanent soft relining material (Molloplast B, Detax, Germany). The incorporation of the resilient liner into the denture serves as a shock absorber by dissipating the kinetic energy generated from the impact of masticatory forces, thereby reducing trauma to the underlying mucosa.

Key words: Flabby tissue; Heat-cured silicone liner; Knife edge ridge; Molloplast B; Undercuts.

INTRODUCTION

Patients with severely resorbed ridges and knife-edge ridges complain of loss of retention and discomfort when using conventional removable complete dentures.[1-3] This also continuously causes trauma to the mucosa covering the undercuts during insertion and removal of the prostheses, thereby reducing the patient compliance. [4]

Conflict of Interest: None

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Incorporation of soft tissue liner in the complete denture improves retention as well as reduces the traumatic impact on the residual ridges by distributing the masticatory load. The resilient layer acts as a "shock- absorber." It is compressed in function and absorbs some of the kinetic energy applied so that less impact force is received. Part of the kinetic energy is dissipated in the deformation of the resilient layer.[3]

The current case report describes a method to manage the knife edge ridge along with the presence of flabby tissue and undercuts using a permanent heat-cured silicone soft tissue liner.

METHOD

Clinical Report

A 65-year-old female reported to the Prosthodontics Unit, Department of Dental

Surgery, Bir Hospital, NAMS, with the chief complaint of inability to wear dentures for a longer duration due to the soreness on the mandibular ridge. The patient had a previous history of use of multiple dentures, which did not continue for long due to discomfort. An intraoral examination revealed completely edentulous arches with a high, well-rounded maxillary residual ridge and knife-edged mandibular ridge. The mandibular ridge was associated with flabby tissue on the left posterior ridge and bilateral undercuts on both the buccal/labial as well as lingual aspect (Fig 1). The patient had no history of any systemic diseases. The treatment plan was informed to the patient, and she agreed to the fabrication of a new set of complete dentures with a silicone-based heat cure soft tissue liner on mandibular arch.

Clinical Steps: Maxillary and mandibular primary impressions were made using irreversible hydrocolloid (Zetalgin Chromatic Alginate, Zhermack). The custom tray was fabricated using autopolymerizing resin (Self Cure Denture Base Acrylic Resin, PYRAX) on the primary cast (Neelkanth Plaster of Paris). Border molding was done using green stick compound (DPI Pinnacle Tracing Green Sticks). A secondary impression was made with zinc oxide impression paste (DPI Impression Paste) on the maxillary arch. Whereas for the mandibular arch, due to the presence of undercuts and flabby tissue, elastomeric impression material (Elite HD+ light body, Zhermack) was used. Tray adhesive (Universal Tray Adhesive, Zhermack) was used for the mandibular tray. All the procedures for border molding were repeated once again during the secondary impression. After the master casts were obtained, clinical steps of jaw relations and try-in (Fig 2) were carried out conventionally.

Laboratory Steps: After try-in, the flasking (Deval Flask Clamp) and dewaxing of the completed trial dentures were done. Modeling wax (Samit Modelling Wax) of about 1.5 mm thick was adapted on the casts as a spacer for the permanent soft liner (Fig 3). The separating media (Cold Mould Seal Separating Medium, PYRAX) was then applied on the mold, except the teeth. Heat cure-based acrylic resin (Heat Cure Denture Base Acrylic Resin, PYRAX) was packed in dough consistency, and trial closure was done using a polyethylene sheet (Fig 4).

Trial closure was done for 10–15 min at 50 kp under the hydraulic press to allow the acrylic resin to gain adequate stiffness to avoid deformation by the permanent soft-liner material during pressing. Then, the flask was removed from the clamp and opened carefully (Fig 5). The polyethylene sheet was removed first, following which excess acrylic resin and spacer were removed. The required amount of heat-curing one-component silicone, permanent soft relining material (Molloplast B, Detax, Germany) (Fig 6) was then dispensed with a clean spatula from the jar and packed onto the space created previously over the prepressed acrylic in the flask (Fig 7).

The flask was closed and pressed at 50 kp and bench-cured for 45 minutes. The whole assembly was placed in cold water and heated slowly to 100°C. The polymerization was done in boiling water at 100°C for approximately two hours. The flask was then allowed to bench cool slowly to room temperature. After opening the flask, the prosthesis was retrieved, finished, and polished (Fig 8). The finishing of acrylic was done with acrylic carbide burs and sandpaper in a mandrel. The intaglio surface and the border of the mandibular denture with soft tissue liner were smooth and, hence, did not require finishing; however, the excess was cut with scissors. Polishing was done with wet pumice on a rag wheel attached to the dental lathe. Final polishing of the complete denture was carried out using tripoli applied to a dry muslin buffing wheel. After occlusal adjustments, the

prosthesis was delivered to the patient (Fig 9). Following 24 hours, post-insertion adjustments were made, and the patient was asked to report in case of any discomfort. After subsequent follow-ups (1 week, 2 weeks,1 month, and 3 months), the patient was quite satisfied with the prosthesis.

DISCUSSION

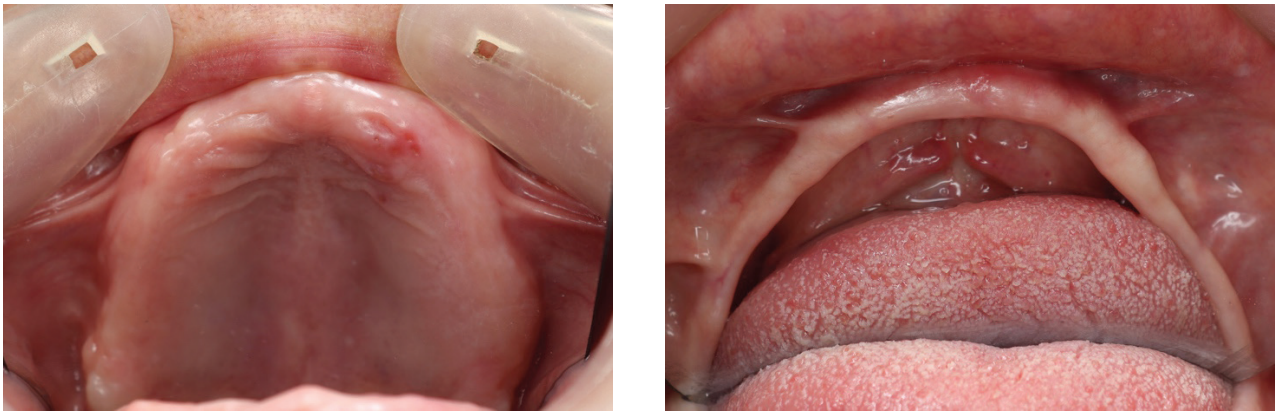

Figure 1: *Intraoral photograph of maxilla and mandible*

Figure 2: *Trial denture*

Figure 3: *Modeling wax spacer of 1.5mm for spacer*

Figure 4: *Polyethylene sheet over the mandibular master cast and a spacer*

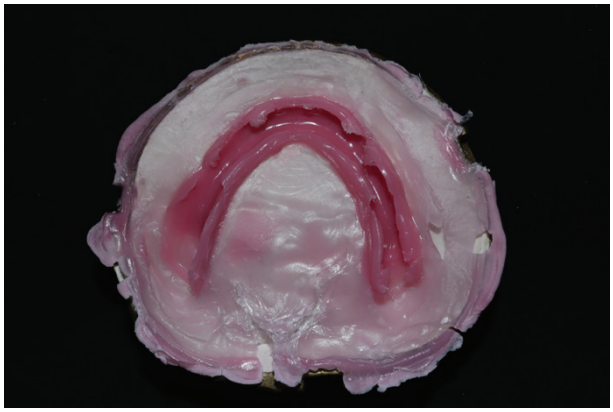

Figure 5: *After trial closure*

Figure 6: *Molloplast B*

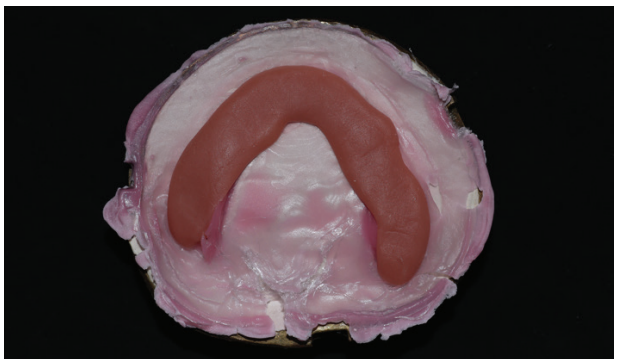

Figure 7: *Dispensed molloplast onto the prepressed acrylic*

Figure 8A, 8B: *Processed denture with silicone liner and definitive polished prostheses*

Figure 9A, *9B, 9C, 9D: Delivery of denture*

Residual ridge resorption is a chronic cumulative localized disease of bone remodeling which is aggravated by various local and systemic factors resulting in excessive resorption with compromised retention of the prosthesis and trauma to the underlying soft tissues.[2] A resilient soft tissue liner incorporated beneath a rigid denture base can improve retention, masticatory efficiency, and oral comfort for patients presenting with a reduced thickness or lessened resilience of the oral mucoperiosteum.[5-8] Lammie and Storer stated that the soft tissue liner were beneficial in complete lower denture with marked senile atrophy, bilaterally undercut residual ridges and obturators for acquired and congenital clefts of the palate.[4] A six year retrospective investigation done by Schmidt and Smith found that 93% of the edentulous patients felt more comfortable when the denture was lined with a soft liner compared to the conventional dentures.[6] The serviceability of Molloplast B-lined dentures was also determined by another retrospective investigation, which found that Molloplast B was not a transitory solution but can last for a period of time (6 years of service) comparable to that of conventional acrylic resin dentures.[7] However, soaking the denture in bleach-type dental cleansers resulted in excessive wrinkling and fading of soft liner and was ultimately unserviceable.[7]

In the present case, Molloplast B was used as a soft tissue liner in the mandibular complete denture. Molloplast B is a heat-curing one-component silicone, permanent soft relining material system activated by heat (boiling water for 2 hours). It consists of a polymer (polydimethylsiloxane), a cross-linking agent (acryloxy alkylsilane), and a catalyst (heat and benzoyl peroxide). An adhesive (Y-methacryloxy propyl trimethoxysilane), which is a silicone polymer, is supplied as a solvent to aid bonding to the existing denture base where relining is needed. The heat-cured silicone consisting of a siloxane with methacrylate at the chain ends polymerizes into the crosslinked denture base.[9] Soft tissue liner acts as a shock absorber by the uniform distribution of stress.[3,10] The resilient material is compressed in function, and part of the kinetic energy is dissipated by the deformation of the resilient layer.[3] Due to its resiliency, compliance is increased in cases of severe undercuts and bony prominences during insertion and removal of prostheses.[4] However, its resiliency depends on the thickness of the material, and the optimum thickness is approximately 3 mm.[7] Parker minimized the effect of traumatic impact over the edentulous ridge by sandwiching a resilient liner layer within the denture base.[3] Similarly, Plotnick discovered a 20% force reduction for a silicone soft liner layer that was 0.25 mm thick, which was further lowered to 60% for a silicone layer that was 4 mm thick.[11]

CONCLUSION

Fabrication of denture with the incorporation of heat cured permanent silicone soft liner is a unique approach to minimize the trauma to the compromised underlying denture-supporting tissues and to improve the retention of the denture by maintaining intimate contact with the tissues.

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