

## Anatomic and functional approach for residual resorbed ridge management using soft liners- A Clinical Report.

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**Abstract:** The objective of prosthodontics to restore normal function, aesthetics and speech becomes challenging in a complete denture service. This becomes furthermore complicated when there are resorbed ridges especially the mandibular residual alveolar ridge due to decreased denture bearing area, supporting tissues and unfavourable muscle attachments. This paper describes in detail the prosthetic management of extremely resorbed mandibular ridge by making a definitive impression using tissue conditioner as given by Winkler followed by Monophase elastomeric impression material so as to accurately record the maximum denture bearing area within physiological limits using closed mouth impression method. The tissue surface of denture base is lined with heat cure silicone soft liner material to act as a cushion that aid in wider distribution of stress onto basal seat thereby preventing further resorption.

**Key words:** Resorbed ridge; Tissue conditioner; Heat cure Silicone soft liner; closed mouth impression

### I. Introduction

Support for the Mandibular denture is provided by the bone and soft tissue overlying it. The early stage of resorption of residual ridge is initiated by the loss of tooth and periodontal membrane. If the resorption process continues results in disappearance of basal bone and shortening of ridge in oral cavity<sup>[1]</sup>. The average available denture bearing area<sup>[2]</sup> for an edentulous mandible is 14cm<sup>2</sup> whereas for maxilla is 24cm<sup>2</sup>. Hence the mandibular ridge is less capable of receiving occlusal forces than maxilla which becomes essential to record all the available supporting tissues especially the buccal shelf area to enhance the stability and support.

A closed mouth secondary impression with tissue conditioner<sup>[3]</sup> is being utilised since it acts as a functional impression material that records basal seat tissue and border tissues in physiologic position. Tissue conditioner act as dynamic material that functionally distributes the movement on surface of basal tissue on elderly patient.<sup>[4]</sup> Soft denture liner have been used in dentistry for more than a century with earliest soft liners being natural rubbers. Soft liners are defined as a soft resilient material bonded to fitting surface of denture to reduce trauma to supporting tissue.<sup>[5]</sup>

Heat cure silicone soft liner added onto the tissue surface of denture serve as a resilient material and aids in wider distribution of forces. This clinical paper throws an insight onto the management of such resorbed mandibular ridge using these two methods –closed mouth impression using tissue conditioner and denture being lined with soft liner to enhance the longevity of the prosthesis.

### II. Case Report

A female patient aged 58 years with a chief complaint of unstable lower denture with a period of edentulousness for 8 years. Extraoral examination revealed no abnormality. Intraoral examination revealed partially edentulous maxillary arch with 11,21,22,23 and 24 remaining and Mandibular completely edentulous arch that had been resorbed to a greater degree (Figure 1). Preliminary diagnostic impression was taken with irreversible hydrocolloid (Zelgan, Dentsply India, Pvt Ltd) a mucostatic impression to avoid overextension and cast being poured in type II plaster. The preliminary cast were analysed and its prosthetic management is described in detail.



**Figure 1: Intra oral preoperative view**



**Figure 2: Tissue conditioner being applied on mandibular occlusal rim**

Maxillary dual impression was planned and a custom tray for distal free end saddle region was made. The borders of it are moulded with low fusing tracing compound (DPI tracing sticks, DPI India) and impression made with Zinc oxide Eugenol Impression paste (DPI impression paste, Mumbai, India). The custom tray with zinc oxide eugenol impression paste is retained in its position, the dentulous region being recorded with irreversible hydrocolloid impression material (Zelgan, Dentsply India, Pvt Ltd). Master cast poured for dual impression in type III stone (Kalabhai, Kalstone, India). Closed mouth impression is taken for the resorbed mandibular ridge using tissue conditioner as impression material as given by Winkler<sup>[2]</sup>. Vertical jaw relation being taken with adequate freeway space and onto the tissue surface of mandibular occlusal rim tissue conditioner (GC Fuji, GC corporation, India) has been applied, (Figure 2) placed in the patient's mouth and left for 10 minutes to obtain the functional impression. The patient was instructed to perform functional movements such as swallowing, deglutition etc. Then monophasic elastomeric impression (Aquasil LV, Dentsply, India) placed to delineate the tissue borders (Figure 3). This functionally border moulded secondary impression helped in accurate recording of the buccal shelf area. Beading and boxing done mandibular master cast obtained by pouring in type III stone (Kalabhai, Kalstone, Mumbai, India) (Figure 4). Jaw relation followed by articulation and wax trial done as usual.



**Figure 3: Closed mouth impression with tissue conditioner and monophasic elastomeric impression material**



**Figure 4: Master cast with buccal shelf area**



**Figure 5: Cellulose paper adapted on the crest of ridge**



**Figure 6: Primo adhesive being applied on packed heat cure resin dough**



**Figure 7: Molloplast B being packed into place**



**Figure 8: Intaglio surface of finished denture with soft liner**

During the processing of the denture heat cure silicone soft liner (Molloplast B) has been employed so that the hard denture base will support the teeth and tissue surface with soft resilient liner is provided for the highly resorbed ridge to produce a “cushioning effect “ on the underlying tissues. The waxed up denture was flaked and dewaxing done. After dewaxing the cellulose paper was adapted onto the crest of the region of the cast providing a 2mm relief on all the aspects (Figure 5). Heat cure acrylic resin (DPI heat cure, DPI India Pvt Ltd) was mixed and packed in dough stage with a cellophane sheet and placed for bench curing overnight. The cellophane sheet and cellulose paper were removed.

The silicone adhesive (Primo, Molloplast B), a volatile solvent is applied onto the tissue surface of packed acrylic resin dough (Figure 6). The heat cure silicone soft liner (Molloplast B) which is available as dough is then placed (Figure 7). They are kept for bench curing for half an hour and then cured in usual manner. Trimming and polishing done. The excess heat cure silicone soft liner (Molloplast B) is removed with special stones available for them and smoothed with varnish containing self curing silicone liquid which is then coated with adhesive. Finished and polished denture with intaglio surface showing heat cure silicone soft liner (Figure 8). Denture inserted in patient's mouth (Figure 9).



**Figure 9: Post treatment**

Post insertion instructions with special care for soft liner that has to be maintained with soft brush and nonabrasive dentifrice is given. The patient was reviewed at regular intervals with reinforcement on home care regimens was carried out. The patient was satisfied with function, aesthetics and harmony.

### **III. Discussion**

The complete dentures are mechanical devices operating in biological environment. Hence a basic understanding of anatomy and physiology of oral tissues are essential for nonliving dentures and living supporting tissues to be harmonious and coexist for reasonable length of time. This basic understanding helps in form of denture border that is harmonious with limiting structures and selective placement of forces by denture bases on supporting tissue and fulfil basic requirements of function, aesthetics and comfort.

Soft liners are used when patient cannot tolerate hard denture base due to thin and non resilient oral mucosa and severe bone resorption<sup>[6]</sup>. Soft liners provide comfort for patient and reduce residual ridge resorption by decreasing impact force in load bearing areas in the supporting structures during function<sup>[7]</sup>. Silicone Soft liners basically consist of polydimethylsiloxane polymer that hardens by crosslinking with application of heat with added advantage of long term elasticity and ease with its manipulation<sup>[6,8]</sup>. These materials able to compensate for reduced thickness of mucosal tissue and decrease the stress directed to basal seat area<sup>[9]</sup>.

Though bonding of heat cure silicone soft liner with heat cure acrylic resin is weak and this bond failure leads to bacterial growth and foul smell but can be adequately prevented by good maintenance. The resiliency is not due to the presence of the plasticisers but due to the inherent nature of the siloxane polymers. Hence they do not lose their resiliency due to the leaching of plasticisers as seen in acrylic based soft liners. Thus they serve as an ideal denture base in highly resorbed ridge.

### **IV. Conclusion:**

The soft liner prevents friction between base and mucosa and pain by increasing denture base retention and stability and decrease its movements. This helps in the successful use of denture during function and increase its masticatory efficacy<sup>[10]</sup>. Silicone based soft liners showed better compatibility with cleansing solutions and maintained their resiliency better for a long term usage<sup>[11]</sup>. Implant supported dentures is a gold standard in these situations but the cost and surgical risk precludes its usage where alternative methods to minimise resorption is undertaken for a better care of the geriatric patients.

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