

# Management of Flabby and Atrophied Ridges Using Liquid-Supported Denture & Neutral Zone Technique: A Case Report

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**Abstract:** Flabby ridges commonly occur in edentulous patients where inadequate retention and stability of a complete denture are often encountered. A liquid supported denture due to its flexible tissue surface allows better distribution of stresses and hence provides an alternate treatment modality in such cases. A liquid-supported denture was planned for maxillary arch with neutral zone concept for fabrication of contour of the polished surfaces of mandibular denture. This case report presents the use of a liquid supported denture in a patient with completely edentulous maxillary arch with flabby tissue in anterior region opposing neutral zone concept for atrophied edentulous mandibular ridge.

**Keywords:** Flabby ridges, edentulous patients, Denture & Neutral Zone technique.

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## I. INTRODUCTION

'Fibrous' or 'flabby' ridge is a superficial area of mobile soft tissue (composed of hyperplastic mucosal tissue and loosely arranged fibrous connective tissue with dense collagenised connective tissue) affecting the maxillary or mandibular alveolar ridges. It can be developed when hyperplastic soft tissue replaces the alveolar bone and is a common finding, particularly in long term denture wearers<sup>1</sup>. Such ridges are reported to be caused due to trauma from denture bases. In the edentulous patient, it is found more commonly in the anterior region.

The success of the prosthesis may be adversely affected by incorrect tooth placement and arbitrary shaping of the polished surfaces. This is particularly true for patients with reduced mandibular residual ridges, yielding flat or concave foundations due to severe bone resorption<sup>2</sup>.

Prosthetic rehabilitation in these patients can be challenging. Major problems encountered in these patients are loss of stability and inadequate retention of the dentures. These problems occur because of the easily distorted flabby tissue during impression making. Treatment options for these patients include surgery, implant retained prosthesis or conventional prosthodontics without surgical intervention. Treatment modality has to be chosen depending on patient's state of health and need, extent of flabby tissue, financial capacity and skill of the dentist. In most situations, surgical intervention or use of implants is not possible and conservative management is the treatment of choice.

In 1961, Chase introduced the use of elastic impression material to relieve traumatised tissue<sup>3</sup>. But this can be only a temporary provision. An ideal denture should be able to withstand masticatory forces and have flexible tissue surface to reduce stress concentration and trauma on the underlying tissues. A liquid supported denture can hence be a solution for this problem<sup>4</sup> and Neutral zone technique for lower atrophic ridges will help to construct denture in muscle harmony, so that it does not get displaced during the actions of the muscles surrounding as the actions of swallowing, mastication, speech and so on<sup>5</sup>.

## II. CASE REPORT

A 52 year old male patient reported to the Department of Prosthodontics Crown, Bridge and Implantology ,A.M.E`'s dental college and hospital for replacement of missing teeth. The patient had a history of wearing a maxillary complete denture for 5 years. His chief complaint was the poor fit of the denture and he felt it loose while eating. On examination atrophic residual ridges in mandibular and flabby tissue in maxillary anterior region was found.(Fig.1a,1b)

A preliminary impression of the maxillary and mandibular arches were made with impression compound (DPI, Pinnacle) and impressions were poured with dental plaster and the primary casts were retrieved. It was followed by Border molding with low fusing compound (Green Stick Compound KERR) and final impression using window technique<sup>6</sup> (Fig.2) using light bodied addition silicon impression material . Impression was poured and master cast was obtained. Denture base and occlusal rims were fabricated on master cast. Tentative jaw relation was recorded and transferred on to the articulator. For the mandibular arch a new record base was fabricated incorporating stainless steel wire spurs in the posterior region keeping anterior rim to provide aesthetic support (Fig.3). Neutral zone was recorded by functional method, which included swallowing, sucking of the lips, pronouncing the vowels, which helped in recording the neutral zone space using low-fusing compound(Fig.3a) .

### Laboratory procedure for liquid supported denture

#### Stage 1

1 mm and 0.5 mm thick, soft, flexible polyethylene sheet was adapted over the master cast with the help of a vacuum heat-pressed machine and cut in same size and shape which was 2mm short of the borders .Now the 1 mm thick sheet was heat cured with a heat-cure denture base resin (DPI) to facilitate sealing.(Fig.4) The denture was then finished, polished and inserted into the patient's mouth to check for retention, stability,support and border extension.(Fig.5) The patient was asked to use the denture for 25days till he got adjusted to the new dentures.

#### Stage 2:

The maxillary denture was now ready to be converted into a liquid-supported denture. A polyethylene sheet of 1mm thickness is taken out from denture(Fig.6) and polyethylene sheet of 0.5mm thickness was then secured into position with light cure flowable composite resin.(Fig.7) This sheet was a permanent one of 0.5mm thickness as compared to the temporary one which was of 1mm thickness. This difference in space was occupied by liquid in the final prosthesis. Two inlets were made in the denture distal to the molar region on polished surface of denture. A viscous liquid, i.e, glycerin was filled through the inlets(Fig.8)and one inlet was sealed with cold cured acrylic resin. The occlusal vertical dimension was adjusted by fitting the denture in the patient's mouth. The denture was now ready to be used by the patient(Fig.9). In this particular patient, it was technically challenging to convert the mandibular denture into a liquid-supported one, due to severely atrophied mandibular ridge. So the mandibular denture was acrylised in the conventional method.

For this patient, a periodic recall check up was scheduled at a regular interval of 3,6,9 & 12 months to check for any rupture of polyethylene sheet and seal. In case of liquid leak, the denture was refilled and repair. The patient is happy with the prosthesis because of great comfort due to the smooth flexible surfaces.

### Laboratory procedure for neutral zone denture

After neutral zone was recorded by functional method using low-fusing compound(Fig.3a), Plaster was used to form an index around the neutral zone(Fig.3b). The pink base plate wax was slowly melted and poured into the index to duplicate the low fusing compound .Teeth arrangement was done and it was rechecked using the plaster index . The wax trial dentures were tried intraorally to check the appearance and occlusion.<sup>2</sup>

## III. DISCUSSION

The principle of this design was that tissue surface of liquid supported denture is flexible and continuously adapts itself to the mucosa. However, it is also rigid enough to support the teeth during use. Thus, the denture base is covered with a close-fitting flexible sheet to keep a thin film of liquid in its place. This design will act as a soft liner for the denture and thus has an advantage over the existing denture designs. When no forces are applied, the sheet remains in the resting position, acting as a soft liner and when the dentures are in use, vertically directed loads are distributed in all directions by

the liquid resulting in optimal stress distribution. This helps in long-term preservation of bone and soft tissues. Apart from the combined benefits of tissue conditioners and soft liners, load from biting forces and even bruxism, will be distributed over a larger surface<sup>7</sup> (Chase, 1961). For a liquid cushion, glycerine was used which is clear, colorless, odourless with a good pharmaceutical placation. The aim of the neutral zone technique is to construct a denture in muscle balance. In the highly atrophic mandible, muscular control over the denture is the main retentive and stabilizing factor during function.

#### IV. CONCLUSION

Fibrous and atrophied ridges pose a prosthodontic challenge for the achievement of stable and retentive dental prostheses. Surgical removal of the fibrous tissue and implant retained prostheses may not be possible to be used in all cases. Considering conventional prosthodontics, the use of liquid supported denture can further improve the patient's acceptance due to more uniform distribution of forces and due to the improved comfort level and also this technique in combination with neutral zone allows continued adaptation of the denture to the mucosa in the resting & functional states.

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#### LEGENDS

Fig.1a.Maxillary edentulous ridge with flabby tissue

Fig.1b.Mandibular atrophic edentulous ridge

Fig.2. Window technique to record flabby tissue

Fig.3. Record base incorporating stainless steel wire spurs.

Fig.3a.Neutral zone recordation using low-fusing compound.

Fig.3b. Plaster index around the neutral zone records.

Fig.4. sheet 2mm short from margins incorporate during flasking procedure.

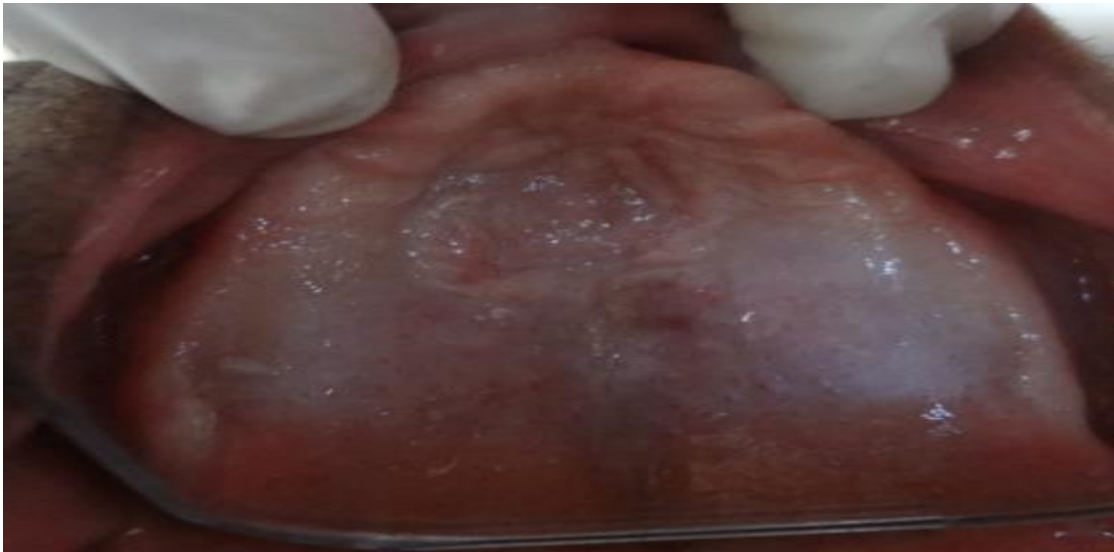
Fig.5.sheet incorporated on tissue surface of denture.

Fig.6. removal of 1mm thick sheet after 25days.

Fig.7. adaptation of 0.5 mm thick sheet with flow able composite by curing unit

Fig.8. Injection of glycerine in prosthesis by inlet holes.

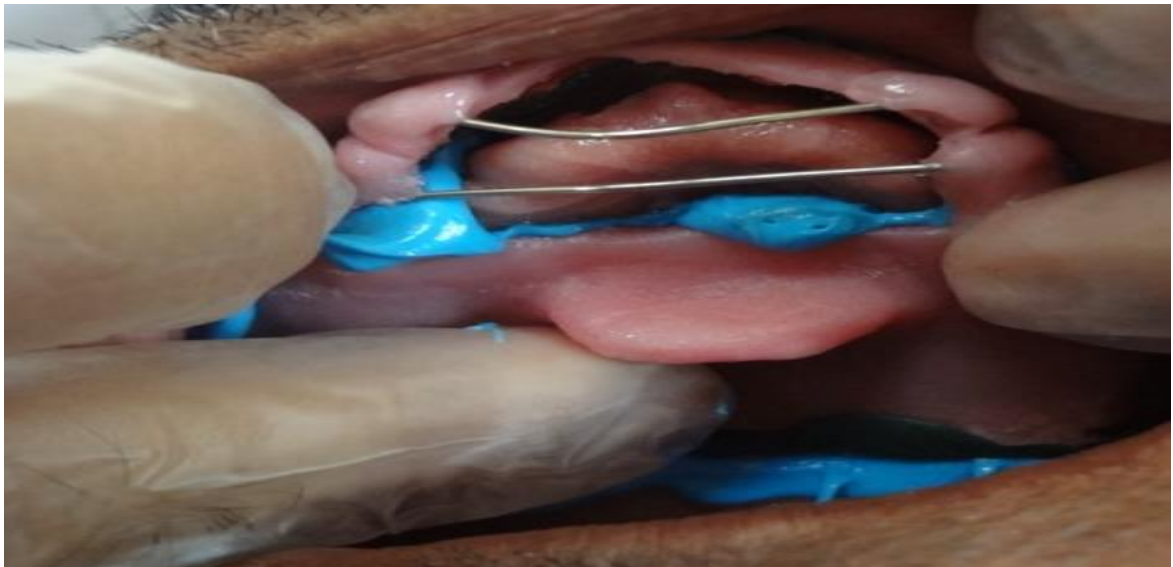
Fig.9. Patient with final prosthesis



**Fig.1a**



**Fig.1b**



**Fig.2**



Fig.3



Fig.3a

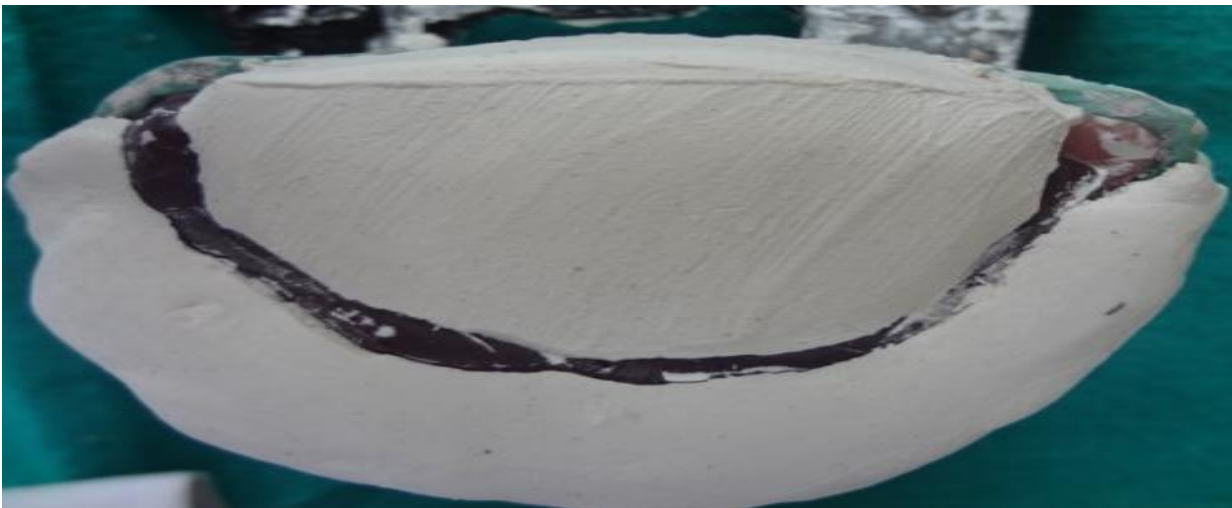
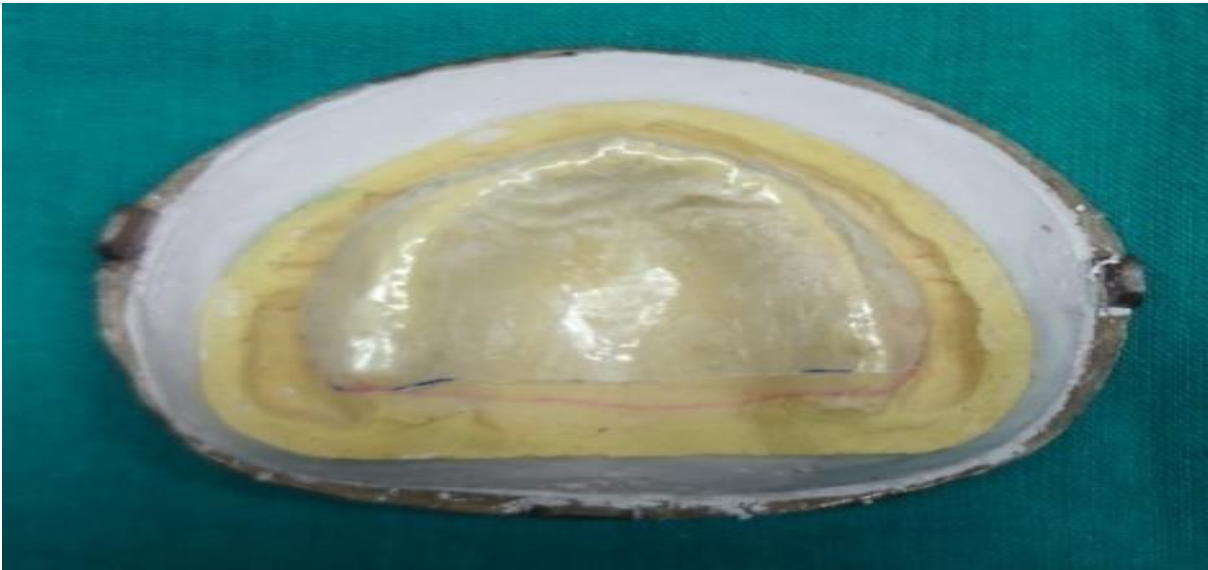


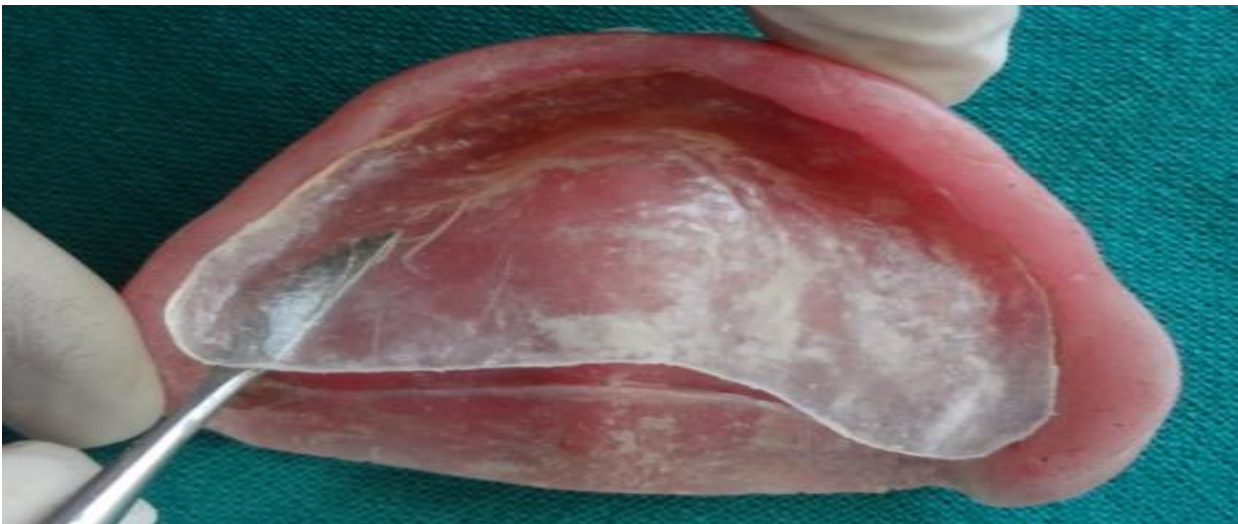
Fig.3b



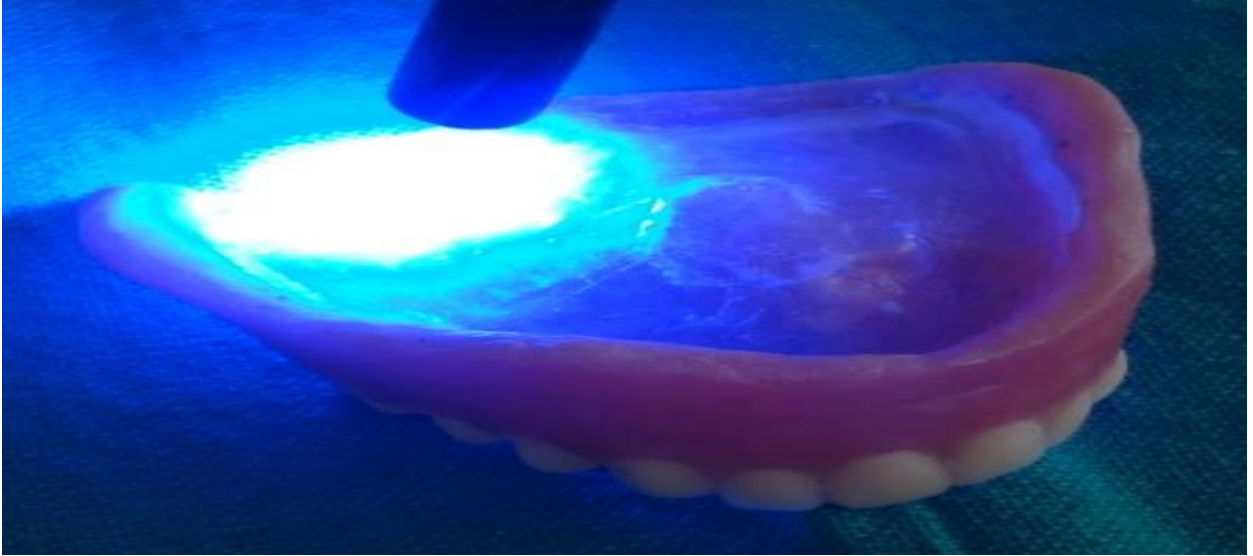
**Fig.4**



**Fig.5**



**Fig.6**



**Fig.7**



**Fig.8**



**Fig.9**