

## CASE REPORT

### An Innovative Novel Approach for Clinical Management of Severely Resorbed Mandibular Alveolar Ridges: A Case Report

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#### ABSTRACT:

The management of highly resorbed ridge has always posed a challenge to the prosthodontist for years. The conventional complete denture fabrication in such cases may further compound the poor denture bearing ability of the tissues and lead to decreased retention, stability and support which may result in psychological problems and social isolation. Modifications in the treatment procedures should be considered to fulfil the patient's functional and esthetic desires. This article presents a technique for management of the severely resorbed alveolar ridge using an orthodontic wire for making special tray, admixed and all green impression techniques, recording neutral zone, wax stops for recording centric relation and arranging artificial teeth in neutral zone to gain maximum retention, stability and support.

**Keywords:** Case report, resorbed ridge, impression techniques, admixed, rim stops

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#### INTRODUCTION

Residual ridge is a complex biophysical process following extraction of teeth. Highly resorbed residual mandibular ridge is commonly observed in older patients, along with thin, atrophic mucosa and lower threshold of pain, with diminished resiliency of tissues and muscle tonicity accompanied by poor adaptive capacity<sup>[1- 7]</sup>. Long-term edentulism and use of ill-fitting dentures usually result in severe resorption of the mandibular alveolar ridge contributes to difficulty in achieving retention, stability, and support and discomfort of the conventional acrylic resin denture.<sup>[4]</sup> Long-term edentulism and use of ill-fitting dentures usually result in severe resorption of the mandible. Mandibular dentures often present greater difficulty in achieving retention, stability, and support than do maxillary dentures, primarily due to the increased number of anatomic limitations. The key to successful denture therapy lies in precise execution of the treatment plan formulated by evaluation of a complete comprehensive history and through examination. Such a treatment is based on Devan's principles of preservation of what already exists than the mere replacement of what is missing.<sup>[1]</sup> Amount

of bone resorption can be evaluated using the "Atwood's classification" which is described as under (according increasing time duration since extraction):<sup>[5]</sup>

- a. Pre extraction
- b. Immediate post extraction
- c. High well rounded
- d. Low well rounded
- e. Knife edge
- f. Depressed

This article presents a technique for management of the severely resorbed alveolar ridge using an orthodontic wire for making special tray, admixed and all green impression technique, recording neutral zone, wax stops for recording centric relation and arranging artificial teeth in neutral zone to gain maximum retention, stability and support which is important for older patients with atrophied mandibular residual ridges.<sup>[6]</sup>

#### CASE REPORT

A 65 years old male reported to the Department of Prosthodontics and crown and bridge, H.P Government Dental College and Hospital, Shimla with a chief

complaint of missing upper and lower teeth and wants to get replaced by artificial teeth. The patient was apparently in good health and did not report any significant medical history. On intraoral examination, a highly resorbed mandibular ridge was observed. (Figure.1)



(Figure. 1a: Extraoral view of Complete Denture Patient)



(Figure 1b: Intraoral view of Complete Denture Patient)

### Technique

1. Preliminary impression of mandibular ridge was made with irreversible hydrocolloid impression material (Imprint, DPI, Mumbai) and preliminary mandibular cast was made using dental plaster (Dentico, Neelkanth, India). (Figure.2)

2. A 21 gauge orthodontic wire (S.S smith) was adapted on crest of the mandibular ridge on the preliminary mandibular cast in the form of special tray. An wire was used to make a loop with the help of universal plier, which extended from one retromolar pad to other

covering the crest of the ridge and same wire is used to fabricate the handle.



Figure.2: Preliminary impression with irreversible hydrocolloid

3. The special tray was evaluated for fit and extend in the patient's mouth and modification are made according to ridge contour. (Figure.3)



Figure 3: 21 gauge orthodontic wire adapted on crest of the mandibular ridge)

4. Primary impression for mandible is made using admixed impression technique -( Type I low fusing Impression compound (DPI Pinnacle, The Bombay Burmah Trading) and type I low fusing green tracing stick compound (DPI Pinnacle Tracing Sticks, Mumbai) in the ratio of 3: 7 parts by weight were placed in a bowl of water at 60°C and kneaded to a homogenous mass that provides a working time of about 90 seconds.). (Figure 4)



(Figure.4: Making of primary impression for mandible using admixed impression technique)

5. Admixed impression material is loaded around the special tray made of wire and impression is made with all border and functional movements. Material can be heat moulded in case of deficiency of borders and primary cast is made using dental plaster (Dentico, Neelkanth, India). Maxillary primary impression is made using impression compound (DPI Pinnacle, The Bombay Burmah Trading) on stock tray. (Figure.5)



(Figure.5: Primary mandibular and maxillary impression with admixed technique and impression compound respectively)

6. Extend of borders are marked in patients mouth with indelible pencil which is replicated on the cast. Impression is poured with dental plaster (Dentico, Neelkanth, India) (Figure.6)

7. Custom tray without spacer is fabricated using self cure acrylic resin (DPI, The Bombay Burmah Trading) on mandibular primary casts. Border extensions of the trays were adjusted to be at least 2 mm short of the vestibules on the preliminary cast and evaluated for fit of custom tray in patients' mouth. (Figure.7)

8. Mandibular secondary impression was made using all green technique. After checking the custom tray extension in the mouth, it was border molded using low fusing impression compound, Green stick compound (DPI Pinnacle Tracing Sticks, Mumbai). Following border molding, incremental loading of softened low fusing impression compound on the anterior, middle and posterior third of the impression surface of custom tray was done.



Figure.6: Maxillary and mandibular cast with border marked with indelible pencil



(Figure.7: Custom tray without spacer fabricated using self-cure acrylic resin)

It was then seated onto the denture bearing area, labial and buccal borders were molded and the patients were asked to perform various tongue movements to mold the lingual flange. Tray was held by placing two fingers on the tray in the buccal shelf area and the thumb supporting the chin without exerting pressure on any part of tray. (Figure 8a)



Figure 8a: Mandibular secondary impression made using all green technique)





(Figure.8b: Wash impression with ZOE paste(DPI))

9. Wash impression was made using Zinc Oxide Eugenol paste (DPI). Maxillary secondary impression is made with green stick with conventional border moulding and wash impression is made with Zinc Oxide Eugenol.(DPI). (Figure.8b)

10. Impression was washed and disinfected. Final impression is poured with Die Stone type IV and master cast is made. Base plate was fabricated with self cure acrylic resin (DPI, The Bombay Burmah Trading). Maxillary and Mandibular occlusal rims are fabricated.

( Figure.9)



(Figure.9 :Mandibular and maxillary master cast poured with Die stone (Type IV ))

11. On maxillary baseplate 3 wax spherical stops of 4mm diameter and 2mm thickness was fabricated at midline. Anterior most at centre of incisive papilla, middle one at centre of hard palate and posterior most just anterior to PPS area to guide the patient to close the jaw in centric relation. Patient was guided to first touch the anterior most stop with the tongue, then the middle and then the posterior most stop so that patient gives the same centric relation each time. (Figure.10)



(Figure.10: 3 wax stops of 4mm diameter and 2 mm thickness marked at midline of maxillary base plate)



12. Maxillo-mandibular jaw relation were recorded and mounted on semi adjustable articulator. (Figure.11)



(Figure-11: Recording maxillo-mandibular jaw relation)

13. Mandibular wax occlusal rim is cut in posterior region (from first premolar to first molar region) and impression compound was placed in this region and neutral zone was recorded. During this procedure patient was asked to make movements like puckering lips, swallowing, talking, sucking, drinking water and by producing exaggerated 'EEE' and 'OOO' sounds to record neutral zone. (Figure.12)



(Figure.12- Recording Neutral Zone)

14. Excess material if any will be displaced and should be removed. In case of insufficient material, additions can be made using extra material and the process is repeated.  
15. Plaster indices were constructed. The indices are rearranged and wax flowed into the space to make an occlusal rim to conform to the patient's neutral zone.  
16. Teeth were arranged according to these rims and try in was performed in the patient's mouth. Trial denture was placed on the casts and evaluated with the help of plaster indices to confirm the position of the teeth is within the neutral zone. (Figure.13)



(Figure.13: Trial of Complete Denture with teeth arranged in neutral zone)

17. Denture was flaked, processed, trimmed and polished using conventional method and denture insertion was done with minor adjustments. (Figure.14)



Figure.14: Complete Denture Insertion

18. Patient was recalled for a follow up at intervals of 24 hours, 1 week and 1 month. Denture was very stable and retentive and patient was quite happy with the complete denture prosthesis. (Figure.15)

## DISCUSSION

The success of every complete denture relies on the fulfilment of the three basic properties of retention, stability, and support. Mandibular dentures usually present more difficulties in achieving these three properties, basically because of the larger number of anatomic limitations that requires added attention.<sup>10</sup> Surgical management requires patient cooperation and may not be feasible at all times. Alternatively, prosthetic management of such severely resorbed ridges involves special impression techniques mainly to achieve these properties.



Figure.15: Satisfied patient after denture insertion

In this article, customized wire stock tray system used is helpful for making impression for patients with highly resorbed mandibular ridge. The muscle attachments located near the crest of the ridge have greater dislocating effect of the muscles. For these reasons, the range of muscle action, as well as spaces into which the denture can be extended without dislocation, must be accurately recorded in the impression. Customized tray that is fabricated in this technique has the advantage of avoidance of dislocating effect of the muscles on improperly extended denture borders, ease of fabrication of tray and easy mouldability according to the shape and size of the residual ridge<sup>16</sup>. In this technique, the primary impression was recorded using admixed technique (as recommended by McCord and Tyson) on customized wire stock tray having an advantage of lower compressibility and better flow characteristics.<sup>2</sup>, recording the functional position of the muscles in a single step, less chair side time and economical as compared to tissue conditioner or reline material<sup>11</sup>. Drawbacks of this technique include discomfort due to heat used during functional molding of impression compound, the brittleness of the material during scraping, manipulation of impression material on custom stock tray is difficult.

All green impression technique used for making secondary impression has the following advantages: (1) they can be easily controlled to gain maximum coverage hence, maximum stability (2) can be corrected readily (3) can be used to accurately determine the extent of the mucobuccal reflections; and (4) the intimate contact of custom tray helps in distributing maximum forces toward the load-bearing areas, specifically, the buccal shelf and the slopes of residual ridges in the mandible<sup>10</sup> (5) the viscosity of the low fusing impression compound removes any soft tissue folds and smoothens them over the mandibular bone, thus reducing the potential for discomfort arising from the "atrophic sandwich" of the mucosa between the denture and the bone<sup>115</sup>. Various surveys<sup>112</sup> show that modelling impression compound and zinc oxide eugenol impression paste are the most popular materials used for complete denture impression because of their fast setting, capability of reproducing fine details, easy handling and having no significant dimensional changes subsequent to hardening. However, it has certain limitations such as its short manipulation time and the fact that it hardens quickly in

the mouth and does not remain in a plastic stage till the functional movements of the vestibular and alveololingual sulcular tissues are completed.

Three wax stops fabricated on midline of maxillary occlusal rim helps to guide the patient to close in centric relation so that patient doesn't change his/her centric relation. Thus, it decreases chair side time and eases the cumbersome procedure of recording centric relation. This technique is very helpful specially in patients with poor neuromuscular coordination.

When all of the natural teeth have been lost, there exists within the oral cavity a void which is the potential denture space. The neutral zone is the potential space between the lips and cheeks on one side and the tongue on the other, that area or position where the forces between the tongue and cheeks or lips are equal.<sup>[2]</sup>

Incorrect tooth placement and arbitrary shaping of the polished surfaces may have an adverse effect on the success of the prosthesis. This is particularly true for patients with reduced mandibular residual ridges, yielding flat or concave foundations due to severe bone resorption. In this technique neutral zone is recorded by cutting mandibular occlusal rim from premolar to first molar region and placing impression compound in this area with all functional movements. Philosophy is based upon the concept that for each individual patient, there exists within the denture space a specific area where the function of the musculature will not unseat the denture and where forces generated by the tongue are neutralized by the forces generated by the lips and cheeks. The neutral-zone approach registers the neutral zone to determine the proper placement of teeth after resorption has taken place. Positioning artificial teeth in the neutral zone achieves two objectives. First, the teeth will not interfere with the normal muscle function, and second, the forces exerted by the musculature against the dentures are more favourable for stability and retention.<sup>17</sup>

Whatever method is used for making impression, it should be based on the basic principles<sup>[13]</sup> of maximum tissue area coverage and intimate contact so as to achieve the objectives of retention, support, stability, esthetics, and preservation of ridge (supporting structures).

## CONCLUSION

Prosthetic rehabilitation of a patient with compromised residual ridge in a conventional manner is a difficult task. Modification in treatment procedure should be considered to fulfil the patient's functional and esthetic demands. This article provides a novel approach in the management of completely edentulous patient with mandibular resorbed ridge. The technique incorporates theoretical principles to impress such tissues and concurrently overcomes the practical difficulties commonly encountered during such procedures and its simplicity helps the prosthetics to utilize this technique in routine basis for denture fabrication.

## REFERENCES

1. Devaki VN, Manonmani P, Balu K, Aravind RJ. Clinical management of highly resorbed mandibular ridge without fibrous tissue. *J Pharm Bioall Sci* 2012;4:149-52.
2. Sofou AM, Diakoyianni-Mordohai I, Pissiotis AL, et al: Fabrication of a custom-made impression tray for making Preliminary impressions of edentulous mandibles. *Quintessence Int* 1998;29:513-516
3. Mccord JF, Tyson KW (1997) A conservative prosthodontic Option for the treatment of edentulous patients with atrophic (flat) Mandibular ridges. *Br Dent J* 182:469-472
4. Atwood DA, Coy WA. Clinical, cephalometric, and densitometric Study of reduction of residual ridges. *J Prosthet Dent* 197 1;26:280-95.
5. Jain M. Impression techniques for the resorbed mandibular arch: A guide to increased stability. *J Sci Soc* 2015;42:88-91
6. Firtell DN, Koumjian JH: A mandibular complete denture Impressions with fluid wax or polysulfide rubber: a comparative Study. *J Prosthet Dent* 1992;67:801-804
7. Praveen G., Saurabh Gupta, Swatantra Agarwal, Samarth Kumar Agarwal-Cocktail Impression Technique: A New Approach To Atwood's Order VI Mandibular Ridge Deformity. *J Indian Prosthodont Soc* (Jan-Mar 2011) 11(1):32-35
8. Winkler S (2009) Essentials of Complete Denture Prosthodontics 2nd edn. AITBS, New Delhi, India.
9. Vinaya Bhat, Krishna Prasad D & Shipra Kant- Prosthodontic Management Of Resorbed Mandibular Ridge Using Neutral Zone Impression Technique : A Case Report. *Nitte University Journal of Health Science*. Vol. 5, No.2
10. Yadav, B., Jayna, M., Yadav, H., Suri, S., Phogat, S., & Madan, R. (2014). Comparison of Different Final Impression Techniques for Management of Resorbed Mandibular Ridge: A Case Report. *Case Reports in Dentistry*, 2014, 1-6.
11. J. F. McCord and K. W. Tyson, "A conservative prosthodontic option for the treatment of edentulous patients with atrophic (flat) mandibular ridges," *British Dental Journal*, vol. 182, no. 12, pp. 469-472, 1997
12. M. M. DeVan, "Basic principles in impression making," *The Journal of Prosthetic Dentistry*, vol. 2, no. 1, pp. 26-35, 1952
13. D. A. Atwood, "Reduction of residual ridges: a major oral disease entity," *The Journal of Prosthetic Dentistry*, vol. 26, no. 3, pp. 266-279, 1971.
14. Daniel S, Daniel AY, Kurian N. A modified physiologic impression technique for atrophic mandibular ridges. *CHRISMED J Health Res* 2017;4:204-8.
15. McCord JF, Grant AA. Impression making. *Br Dent J* 2000;188:484-92.
16. Tanvir H, Kumar N, Singh K, Kapoor V. An Innovative Wire Impression Technique of Highly Resorbed Mandibular Ridge. *J Dent Oral Biol*. 2017; 2(6): 1048.
17. Beresin, V. E., & Schiesser, F. J. (2006). The neutral zone in complete dentures. *The Journal of Prosthetic Dentistry*, 95(2), 93-100.