

Case Study

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Neutral zone Concept for Severely Resorbed Ridges - A Clinical Report

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ARTICLE INFO:	ABSTRACT
Article history: Received: 10 March, 2017 Received in revised form: 21 March, 2017 Accepted: 10 April, 2017 Available online: 30 April, 2017	Prosthetic rehabilitation of a patient with severely resorbed ridge is the most challenging therapy a prosthodontist can undertake. In order to have a favourable prognosis for the denture therapy, impression technique selected should be based on the present state of the basal tissue support. This article presents the application of neutral zone concept being incorporated in to impression making in an effort to achieve successful complete denture
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Complete denture prosthesis	

1. Introduction

The basic objectives of Complete Denture Prosthodontics are the restoration of function, facial appearance and the maintenance of patient's health[1]. Loss of teeth leads to multi factorial changes occurring in the mouth like alveolar ridge resorbtion, expansion of the tongue, and laxity of muscles of face[2].

The success of any prosthesis depends on the proper position of the artificial teeth within the neutral zone. Neutral zone is a potential area where forces generated in an outward direction from the tongue are being neutralized or balanced by the inward forces generated by lips and cheeks during functional activities[3]. Failure to recognize the importance of tooth position, flange form and contour often results in dentures which are unstable and unsatisfactory[4].

In patients with compromised support and poor denture adaptability, this technique is considered as a valuable tool in the prosthodontic armoury especially where dental implants are contraindicated or unfeasible[5].

This present article describes a novel method to gain maximum retention, stability and masticatory efficiency in cases of severely resorbed ridges with neutral zone technique by simple usage of materials available by the chair side with every dental clinician.

Clinical Case Report

A 78 year old female patient reported to the Department of Prosthodontics, Crown and Bridge at Bangalore Institute of Dental Sciences and Hospital, Bangalore with a chief complaint of difficulty in mastication, loosening of upper and lower dentures and poor esthetics for the past 12 years. She also complained of denture moving during swallowing and speaking. On clinical examination, patient had no gross facial asymmetry. The TMJ, muscles of mastication and facial expression were asymptomatic. No gross abnormalities were detected in the overall soft tissue of the lips, cheeks, tongue and oral mucosa (figure 1).

On intraoral examination it revealed resorbed maxillary ridge (figure 2), and flat (atrophic) mandibular ridge (figure 3) Atwood order V. There was no hypermobile tissue on palpation.

The objective of the treatment was to rehabilitate the patient with complete denture therapy by locating the neutral zone and accordingly arrange the denture teeth and contour the complete denture polished surfaces in order to achieve the maximum prosthesis stability, comfort and function.

Treatment procedure

- The primary impressions of maxillary and mandibular denture bearing area were made with irreversible hydrocolloid impression material (figure 4). Soon after making primary impression, the impression was poured in plaster of paris and primary casts were prepared (figure 5). The custom trays were fabricated with self cure resin over the primary casts keeping the borders 2mm short of the sulcus (figure 6).
- 2. The borders of the trays were molded with green stick impression compound and the secondary impressions were made with zinc oxide eugenol impression material (figure 7). The master casts (figure 8) were poured in dental stone.
- 3. The record bases were fabricated, assessed and modified for stability, extension and comfort. Wax rims were made

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over the record bases for recording the maxillamandibular jaw relations and mounted in a mean value articulator (figure 9).

- 4. The wax rims were cut at three places at first molar and central incisor regions (figure 10) and replaced with autopolymerizing resin. These resin pillars will now act as vertical occlusal stops. Now the remaining wax is removed and is attached with retentive loops made of thin orthodontic wire (figure 11).
- 5. The record bases are trimmed and checked in the patient's mouth and ensured that loops and vertical pillars do not interfere with muscle movements during function (figure 12). Mixture of 3 parts of impression compound and 7 parts of green stick compound in kneaded in a hot water bath and placed over the retentive loops and the neutral zone recorded. During this procedure the patient was asked to make the movements like puckering lips, swallowing, sucking, pouting, grinning and by producing exaggerated sounds like OOO and EEE to record the neutral zone. Excess material if any will be displaced and should be removed. In case of insufficient material, additions can be easily made using extra material and the process is repeated.
- 6. Now the maxillary rim was adjusted at the same vertical height with mandibular rim maintaining the vertical stop determined by the maxillo-mandibular relationship with

wax occlusal rims. Both the compound rims were then replaced on the articulator to evaluate the vertical relation again.

- 7. The impression compound rims were relined with zinc oxide eugenol impression paste (figure 13) and stone indices (figure 14) were constructed. The compound rim is then removed from the record bases (figure 15). The indices are rearranged and wax flowed into the space to make an occlusal rim (figure 16) to confirm to the patients neutral zone.
- 8. The teeth arrangement (figure 17) was carried on this occlusal rim and the trial denture was verified using the stone indices (figure 18) to confirm the position of the teeth is within the neutral zone. Try in was carried in the patients mouth. The trial denture was then relined along the flanges using light body impression material (figure 19) to achieve additional retention and stability.
- 9. Following this the dentures were flasked (figure 20), processed, trimmed and polished using conventional method and denture insertion was done.

The patient was satisfied with the new complete denture as it was retentive, stable and increased chewing efficiency. The patient was recalled after 24 hrs, 1 week, 1 month and 1 year for follow up and was evaluated for retention and stability.



Figure No.1: Extra oral view of patient





Figure No. 3: Resorbed mandibular ridge (Atwood class V)

Figure No.2: Resorbed maxillary ridge



Figure No.4: Extra oral view of patient



Figure No. 5: Primary cast



Figure No. 6: Custom tray fabricated on primary cast



Figure No. 7: Secondary impression made with Zinc oxide eugenol impression paste



Figure No. 8: Master cast retrieved from secondary impression



Figure No. 9: Tentative jaw relation mounted in a mean value articulator



Figure No. 10: Wax blocks cut at molar and central incisor region



Figure No. 11: Record base with resin pillar and retentive loop for recording neutral zone



Figure No. 12: Assessment of fit of record bases intra-orally



Figure No. 13: Relined compound rim with ZnoE impression paste



Figure No. 14: Stone indices formed around compound rim with neutral zone recording



Figure No. 15: Record base in stone indices





Figure No. 16: Wax rim formed in the stone indices

Figure No. 17: Teeth arrangement in mean value articulator



Figure No. 18: Trial denture verified in the stone indices



Figure No. 19: Relined trial denture in patients mouth



Figure No. 20: Flasking of trial denture



Figure No. 20: Flasking of trial denture



Figure 21: Complete denture

2. Discussion

The ultimate goal of any Prosthodontic treatment is to restore the form, function, and aesthetics of the patient[3].

Simple impression procedures have been followed to get the maximum retention and stability of the complete denture, especially on the mandibular ridges[6,7,9,10].

Providing stable mandibular dentures for patients with severely resorbed mandibular ridges is a challenge. One can overcome this problem if dentures are fabricated with their contours harmonizing neutral zone. A denture shaped by neutral zone technique will ensure that the muscular forces are working more effectively in harmony and gives advantage of stabilizing potential of oral and perioral musculature[3,8].

Denture fabricated over severely resorbed mandibular ridge by neutral zone impression technique will insure that the muscular forces aid in retention and stabilization of the denture rather than dislodging the denture during function. The dentures will also have other advantages such as reduced food lodgement, good esthetics due to facial support, proper positioning of the posterior teeth which allows sufficient tongue space. Clinicians must identify and record the neuromuscular dynamics of the oral tissues and this should be applied in the construction of the definitive prosthesis[11].

Clinicians must identify and record the neuromuscular dynamics of the oral tissues and this should be applied in the construction of the definitive prosthesis that will exist within the stabilizing boundary conditions of the neutral zone area[12].

Arranging artificial teeth within the neutral zone achieves two important objective: (1) prosthetic teeth do not interfere with normal muscle function; and (2) normal oral and perioral muscle activity imparts force against the complete dentures that serves to stabilize and retain the prosthesis rather than cause denture displacement. The neutral zone technique typically locates posterior denture teeth slightly facially, when compared to teeth arranged over the crest of the residual alveolar ridge[7].

The technique for recording neutral zone in the current case report is simple. In this case report, the entire procedure was aimed at using the materials that have compatible properties and are available easily by the chair side, therefore, impression compound, green stick compound and ZOE, light body were used as they are easy to manipulate unlike impression plaster which is messy and cumbersome to use and fractured fragments of plaster can be swallowed by the patient while performing functional movements.

3. Conclusion

This article provides a novel approach in the management of completely edentulous patient with resorbed ridges. The neutral zone technique for denture fabrication has an advantage that it stabilizes the denture with the surrounding tissues, instead of being dislodged by them. Retention and stability are improved especially in the severely atrophic ridges. The technique described is simple and utilizes the routine materials used for denture fabrication, at the same time minimizes the errors in achieving the treatment goals.

References

- [1]. Lakshmana Rao. B., Sangur R., Sherigar P., Singhal P., Prosthodontic rehabilitation of mandibular resorbed ridge: a different approach, Annals and essence of dentistry 2010;2:3:29-31.
- [2]. Asnani P., Chandu GS., Mishra SK., Neutral zone technique in complete denture –case report, Journal of Applied Dental and Medical Sciences 2015; 1:1:15-18.
- [3]. Agarwal N., Srivastava R., Palekar U., Airen A., Neutral zone technique to enhance stability of severely resorbed mandibular ridge, NJDSR 2015, 3:1:49-52.
- [4]. Bhat V., Krishna Prasad D., Kant S., Prosthodontic management of resorbed mandibular ridge using neutral zone impression technique: A Case Report, Nitte University Journal of Health Science 2015;5:2:69-73.
- [5]. Kapoor K., Singh RG., Puri A., Sharma A., Mittal R., Singh M., Neutral zone technique for rehabilitation of resorbed mandibular ridge: A Clinical report, 5th anniversary Issue, heal talk, 2013;6:1:18-19.
- [6]. Agarwal S., Gangadhar P., Ahmed N., Bhardwaj A., A simplified approach for recording neutral zone, J. Indian Prosthodont Soc 2010;10:2:102-104.
- [7]. Haroon TM., Bharathi S., Nair C., Mandal N., Yadav G., Prosthodontic management of resorbed mandibular ridges: A simplified approach, Journal of Dental Sciences and oral Rehabilitation 2013;35-37.
- [8]. Saba N., Nath DK., Gupta P., Neutral zone technique for the management of unstable mandibular complete denture: A Case Report, Journal of Dental Sciences and oral Rehabilitation 2013:44-46.
- [9]. Rathee M., Goel M., Tamrakar AK., Prosthodontic management of severely resorbed mandibular ridge using modified impression technique: A Case Report, Indian journal of applied research 2013:3:8:74-75.
- [10]. Atluri AD., Barla SC., Tadi DP., Balusu S., Tadi SP., Neutral zone –A Clinical Case report, International Journal of Basic and Applied Medical Sciences 2014;4:1:303-306.
- [11]. Anand Kumar R., Prasad KB., Neutral zone impression technique for mandibular compromised ridges: A Case Report, Int. J. Dent. Med. Res. 2014;1:4:79-82.
- [12]. Garg R., Jain S., Kumar S., Choudhary S., The neutral zone technique in complete dentures for atrophic mandible: A Case Report, Journal of Updates in Dentistry 2015;4:2:37-39.
- [13]. Mustafa AZ., Effect of lingual ledge of neutral zone impression on the retention and stability of mandibular

complete dentures in elders with atrophied alveolar ridge, Tanta Dental Journal 2015; 12:111-118.

- [14]. Yeh YL., Pan YH., Chen YY., Neutral zone approach to denture fabrication for a severe mandibular ridge resorption patient: Systematic review and modern technique, Journal of dental sciences 2013;8: 432-438.
- [15]. Naik NR., Aesthetic management of a completely edentulous patient with the help of cheek plumper and neutral zone approach, J. Cont. Med. A Dent. 2015;3:2: 54-56.
- [16]. Rastogi I., Management of highly resorbed mandibular ridge, Int. J. of Dent. and Health Sciences 2014;1:4:512-522.
- [17]. Jain C., Goel R., Kumar P., Singh HP., Neutral zone approach for severely atrophic ridges; avenues beyond

implants and surgeries- A Case Report, IJCDS 2011;2:3:6-9.

- [18]. Beresin VE., Schiesser FJ., The neutral zone in complete dentures-classic article, The Journal of prosthetic dentistry 2006;95:2: 93-100.
- [19]. Chandra Shekar S., Management of a severely resorbed mandibular ridge with neutral zone technique, Contemporary clinical dentistry 2010;1:1:36-39.
- [20]. Rashid H., Vohra FA., Haidry TZ., Karmani GD., Stabilizing mandibular complete dentures using neutral zone impression technique, J. Pak. Dent. Assoc. 2013;22:2:154-159.
- [21]. Kukreja HS., Narula S., Sharma V., Khandelwal M., Lath V., Chhonkar DPS., Utilization of neutral zone technique for rehabilitation of maxillary and mandibular ridges: A Clinical report, J. Orofac. Res. 2012;2:1:64-68.

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