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# Management of a Severely Resorbed Mandibular Ridge Using Neutral ZoneImpression Technique: A Case Report

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**ABSTRACT**:
Severely resorbed ridges are difficult to manage and the success rate of a denture which is fabricated using conventional method is very low. Neutral zone impression technique is a more useful technique which is employed in case of severely resorbed ridges. this technique utilizes a zone where all the forces were neutralized. Thus increase the retention and stability of the denture. This article employs this neutral zone impression technique for complete denture fabrication in a severely resorbed mandibular ridge.

**Keywords**: Severely resorbed, Neutral zone, Ridge resorption, Stability

## I. INTRODUCTION:

Resorption of mandibular ridges common in edentulous patient those who are in the state of edentulousness for a longer period or those who uses the denture for a long period of time. Residual ridge resorption (RRR) is a chronic, progressive, irreversible, and disabling disease, probably of multifactorial origin[1]. RRR is an inevitable and natural physiologic process. It is amultifactorial and biomechanical disease that leads to loss of sulcular depth, vertical dimension loss, and decreased lower facial height[3,4,5]. Due to this the denture becomes passive due to complex neuromuscular control and causes difficulties in impression-making, mastication, and swallowing, which in turn leads to loss of retention and stability in complete denture. Bone resorption is most evident in the first year after extraction and later it slowly reduced[7]. Residual ridge resorption is one of the main cause of denture instability as well as reduced retention of the denture. Hence, residual ridge resorption becomes a challenging scenario for a prosthodontist while fabricating a denture. So a prosthodontist must analyze the ridge pattern of the patient during history taking and appropriate treatment planning should be doneduring that time.

Atwood postulated the main four factors that causes the ridge resorption includes: anatomic, prosthetic, metabolic and functional factors[5]. The type as well as shape of the bone has greater effect on bone resorption. Well-formed broad ridges show less resorption[5]. The remodeling of bone is influenced by the force that applied on it. These are mainly due to the habits factor like parafunctions habit such bruxism[10] and misuse of prosthesis. Metabolic factors influence the bone resorption rate, which include Age, race, present of systematic illnesses such as osteoporosis, nutritional status especially calcium and vitamin D[5] and the amount of time the patient has been edentulous[10].

The prosthodontics management of patient with severe residual ridge resorption can be either with or without surgical intervention. Prosthesis without surgical intervention include a number of modified impression techniques for resorbed mandibular ridge have been suggested by various authors such as admixed[13], functional[18], all green[19], and cocktail technique[20]. The other technique for increases retentive and stability of complete denture is neutral zone technique[21]. Soft liners are also used in resorbed cases because of the cushioning effect[22]. Also alveolar ridges can be preserved by introducing broad area of coverage under denture base[23] and also decrease in number of tooth, buccolingual width of tooth as well as modifying the tooth form[24].

Resorbed ridges can be also managed by prosthesis with surgical intervention. Prosthesis with surgical intervention include implant supported overdenture, bone grafting and distraction osteogenesis in which new bone generation following a corticotomy or an osteotomy and gradual distraction[25].

The neutral zone concept plays a significant role in overcoming these challenges. Neutral zone is the potential space between lips and cheeks on one side and tongue on other side, that area where forces between tongue and lips and cheeks are equal[1]. The neutral zone technique is an alternative approach for the construction of lower complete dentures.[2] The neutral zone technique is

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highly suitable for fabricating a denture in a patient withpoorly resorbed ridges.[2] This article presents a case report on fabricating a mandibular completedenture in a severely resorbed ridges by employing the neutral zone impression technique.

## II. CASE REPORT

A 70 years old male patient reported to the OPD of St. Gregorios Dental College, Chelad with the chief complaint of missing upper and lower tooth. On history taking patient had given history of using complete artificial teeth set on the upper and lower arch for 15 years. Patient had broken his dentures 6 years back. And after that patient was edentulous for this past six years. Patient wants a new complete denture set.

Intra oral examination revealed completely edentulous maxillary and mandibular arch, extremely strong mentalis and buccinator muscle which on activation led to narrowing of labialand buccal sulcus. The mandibular ridge was in order V, muscle attachments were higher and close to the residual ridge (Figure-1). Due to severely resorbed ridge it was decided to fabricate the mandibular denture employing the neutral zone concept.

Figure-1- Severely resorbed mandibular ridge

**Preliminary and secondary impression**:

The preliminary impression was made in stock trays using a mucocompressive material, impression compound in the maxillary arch and using alginate (mucostatic) impression material on the mandibular arch (Figure-2). Border moulding was done using greenstick impression compound and secondary wash impression made using Zinc oxide eugenol impression paste. Master cast was obtained from the wash impression by pouring it with dentalstone (Figure-3). Using the master cast a second secondary impression was made. This helps to impress the borders and sulcus more accurately.

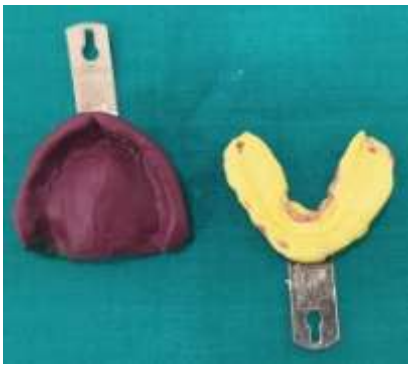

Figure-2- Preliminary Impressions Figure-3- Master cast

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**Jaw relation**:

The denture base was made on heat cure acrylic denture for the stability. Occlusal rims were adjusted on to the record base. Maxillary occlusal rims were adjusted according to the patient mouth and centric relation recorded. Vertical dimension at rest and vertical dimension at occlusion was measured and centric relation recorded (Figure4). Then it is transferred to a semi adjustable Hanau articulator(Figure-5)

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Figure-4- Centric relation

Figure-5- mounted in Hanau articulator

**Neutral zone impression**:

Patient was made set comfortable in an upright position with the head supported. Maxillary occlusal rim was inserted into patient's mouth and reassessed the occlusal plane. After that the mandibular occlusal rim was removed. The impression compound and green stick in ratio 3:7 (admix technique)[6] was softened in a 650◦C water bath. The softened compound was kneaded and roll was formed according to the crest and was adapted to retentive loop at the established vertical dimension. The attached compound was again reheated in hot water bath and carried to patient mouth for recording the neutral zone. Patient was asked to perform a series of actions like swallowing, speaking, sucking, pursuing lips, pronouncing vowel sounds, sipping slightly hot water and slightly protruding the tongue several times which simulated physiological functional of the muscles. These all actions help to mold the material according to muscular activity. After 10 minutes, the set impression was removed from the

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mouth.

The neutral zone so obtained was placed in a master cast and locating grooves were cut on the master cast. Master cast was covered with a silicone putty index around the impression on both the labial and lingual sides (Figure-6). After that the compound occlusal rim was removed and the index was replaced. This index would have preserved the space for neutral zone. Wax was poured on to the index space (Figure-7). Teeth arrangement were done based on the index (Figure-8).

Figure-6: silicone putty index

Figure-7: Wax added to the putty index to form new occlusal rim

Figure-8: Teeth arrangement based on the index

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**Denture Fabrication**:

According to the index teeth arrangement was done and try-in were done. The waxed up dentures were placed in the mouth and patient was asked to repeat all the movements previously done while recording the neutral zone. Asthetics, phonetics and occlusion were assessed. Afterthat in the conventional manner denture was fabricated and delivered to the patient (Figure-9). On review patient was highly satisfied with the denture stability.

Figure-9: Finished and polished final complete denture in the patient mouth

## III. DISCUSSION:

The ultimate aim of a prosthodontist is to restore the function, form and esthetic of the patient.Dentures are involved in normal physiologic movements such as mastication, smiling, speech, swallowing etc. in such condition denture will always contact the cheek and lips. So while fabricating a denture, it should be in harmony with the normal physiological movements of lips and cheeks. Fish et.al stated that out of the three denture surfaces, the polished surface is bounded by tongue, lips and cheeks[3]. So we should harmonies these all while fabricating a denture. otherwise it will compromise the denture stability, retention, insufficient facial and
tissue support, less tongue space and compromised phonetics[10].

Denture fabricated using neutralzone technique in a severely resorbed ridge ensures that the muscle forces aid in retention andstability of the denture rather than dislodging it. By utilizing neutral zone, it will neutralize theforce from the tongue as well as lips and cheeks and will not unseat the denture[2]. And teeth willnot interfere with normal muscle and the force generated bythe musculature against the denture area more favourable for stability and retention.

## IV. CONCLUSION:

Recording and utilizing the neutral zone for a severely resorbed ridge is a more effective, simple, non-invasive and economic procedure. It involves only one extra clinical step. This will improve the quality of denture. neutral zone technique increases the denture stability to a great extent. So, it is an advisable technique for fabricating denture in a severely resorbed ridge.

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