

A CASE REPORT

Re Envisioning the management of a Mandibular Resorbed Ridge with Neutral Zone Technique Using Low Fusing Compound - A Case Report

Divyabharathi Selvam^a, Shanmuganathan N^b

ABSTRACT

The management of a mandibular resorbed ridge presents unique challenges, particularly in achieving denture stability and patient comfort. The neutral zone technique using low fusing compound offers a valuable alternative, particularly for patients with highly atrophied mandibular residual ridges. This case report outlines the use of neutral zone technique using low fusing compound provides a reliable method for managing mandibular resorbed ridges, enhancing denture stability and patient satisfaction. By adhering to the principles of this technique, clinicians can create dentures that harmonize with the patient's neuromuscular system, leading to improved functional and aesthetic outcomes.

Key words: Compromised Ridge, Neutral zone, Prosthetic management

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INTRODUCTION

The fabrication of complete dentures is a complex process that requires meticulous attention to detail to ensure functional and aesthetic success. Beyond the mechanical construction of these prostheses, they must harmonize with the oral cavity's neuromuscular functions, encompassing activities such as speech, mastication, swallowing, smiling, and laughing. These functions involve the coordinated actions of the tongue, lips, cheeks, and floor of the mouth, which are highly individualistic and complex.¹

A critical aspect of achieving stable and satisfactory dentures lies in the correct positioning of teeth and the appropriate contouring of the denture flanges. Missteps in these areas can lead to instability and patient dissatisfaction, even when the dentures are skillfully designed and expertly constructed.

The coordination of complete dentures with the neuromuscular function is thus foundational to their success. This involves creating dentures that align with the natural forces exerted by the tongue, lips, and cheeks, especially in the potential denture space left by the loss of natural teeth.²

The neutral zone is defined as the potential space within the oral cavity where the forces exerted by the tongue on one side and the lips and cheeks on the other are in equilibrium.³ Proper tooth placement and careful shaping of the polished surfaces are crucial to maintaining this balance. This is particularly vital for patients with reduced mandibular residual ridges, where severe bone resorption can result in flat or concave foundations, posing a challenge to denture stability. The instability of the lower complete denture remains a significant issue within the profession.⁴

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Various materials and techniques have been proposed for shaping the neutral zone. These include modeling plastic impression compounds, soft waxes, silicone polymers filled with calcium silicate, tissue conditioners, and resilient lining materials (Schiesser, 1964). Techniques often involve functional movements such as sucking, grinning, whistling, and pursing the lips to identify and mold the neutral zone accurately. One prominent technique is the swallowing method using modeling plastic impression compound, which employs swallowing as the principal modeling function to locate the neutral zone.⁵

Case Report

In this case report, we describe the management of a mandibular resorbed ridge utilizing the neutral zone technique with low fusing compound. A 62-year-old female patient presented with a completely edentulous and severely resorbed mandibular ridge (Figure 1).



Figure 1: Severely resorbed mandibular ridge

Primary Impressions and Model Fabrication

Primary impressions (Figure 2) of both the maxillary and mandibular jaws were made using alginate. The primary cast and special tray were fabricated. Border moulding was done using green stick impression compound followed by secondary impression (Figure 3) were made. The models were then poured to fabricate trial denture base accordingly.



Figure 2: Primary impression of maxillary and mandibular ridge using alginate

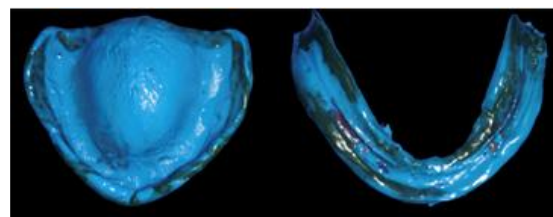


Figure 3: Secondary impression of maxillary and mandibular ridge using light body of addition silicone

Fabrication of Occlusal Rim and Trial Denture Base

A maxillary occlusal rim was fabricated, and a mandibular trial denture base was created with acrylic stops to aid in retention of the low fusing compound (Figure 4). The lower trial denture base, softened in a 65°C water bath, was placed in the patient's mouth. Care was taken to ensure it was not overextended and remained stable during opening, swallowing, and speaking, alongside the maxillary occlusal rim. The patient was asked to perform activities such as talking, swallowing, and drinking water (Figure 5). After 5–10 minutes, the set impression was removed and examined.

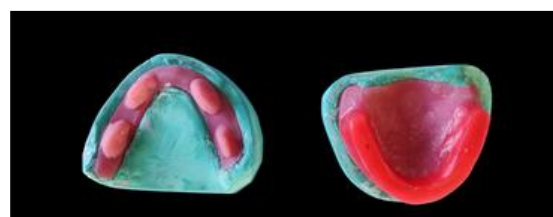


Figure 4: Maxillary denture base with occlusal rims and mandibular denture base with acrylic stops

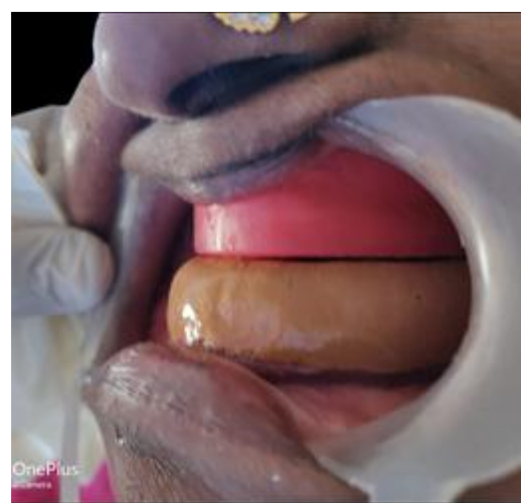


Figure 5: Patient performing functional techniques

Achieving Neutral Zone Balance

The internal and external muscle groups were engaged through their respective actions, exerting reciprocating pressures on the compound. This process gradually molded the compound into a state of neutral balance, making it centrally inert relative to the complex forces acting upon it. Once a tentative vertical dimension and centric relation were established, the neutral zone impression was placed on the master model. Location grooves were cut on the master cast, which was then covered with a stone index around the impression on both the labial and lingual sides (Figure 6).

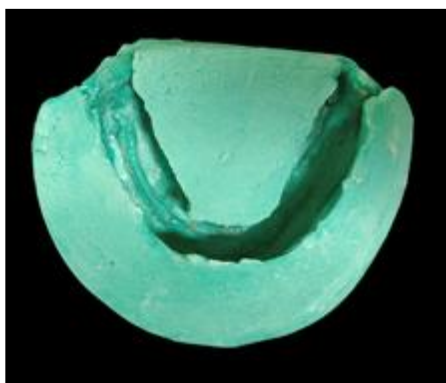


Figure 6: Stone Index

Preserving the Neutral Zone and Arranging Teeth

The compound occlusal rim was removed from the trial denture base, and the index was replaced to preserve the neutral zone space using a putty index. Teeth were arranged exactly following the stone index (Figure 7). The position of the teeth was verified by placing the index around the wax try-in. Once the waxed-up dentures were ready, they were checked in the patient's mouth for aesthetics, phonetics, and occlusion. Following a satisfactory try-in, the dentures were processed, finished, and inserted (Figures 8,9,10).



Figure 7: Teeth arrangement following Stone Index



Figure 8: Occlusal view of processed denture



Figure 9: Lateral and frontal view of processed denture



Figure 10: pre and post operative photographs

This technique effectively managed the challenges associated with a severely resorbed mandibular ridge, ensuring stability and patient satisfaction through the precise application of the neutral zone concept.

DISCUSSION

Fish^{6,7} noted that among the three surfaces of a denture, the polished surface, bounded by the tongue and cheeks, plays a crucial role in normal physiological functions such as speech, mastication, swallowing, smiling, and laughing. Therefore, the denture's fabrication must be in harmony with these functions.

While the neutral zone technique is a well-established method for managing compromised ridges, the novelty in this case lies in the meticulous adaptation of the technique to the patient's unique oral environment. The use of a low-fusing compound enabled precise capture of the neutral zone, accommodating the severely resorbed ridge to achieve optimal stability and retention. Additionally, the custom occlusal scheme, tailored to the patient's specific muscular dynamics, contributed to the prosthesis's success, making this

approach an ideal solution for the complex challenges posed by the compromised ridge.

The technique described in this case emphasizes the clinical value of recording the physiological dynamics of oral and perioral muscle function and using this information to develop complete denture contours and tooth positions. By arranging artificial teeth within the neutral zone, two critical objectives are achieved:

- 1. Non-Interference with Muscle Function:** Prosthetic teeth do not interfere with normal muscle activity.
- 2. Enhanced Stability and Retention:** Normal oral and perioral muscle activity applies forces that stabilize and retain the dentures, rather than causing displacement.

The selection of occlusion in neutral zone cases is pivotal to prosthetic success. In this case, lingualized occlusion was chosen, which literature supports for balancing function and esthetics, particularly in resorbed ridges. This occlusal scheme allows effective mastication while minimizing lateral forces that could destabilize the denture. Combined with the neutral zone technique, this approach ensures that the denture remains secure and functional, aligning with the patient's dynamic muscle activity.

In managing resorbed mandibular ridges, several techniques are available, each with its benefits and limitations. Conventional dentures often struggle with stability in cases of severe ridge resorption.^{8,9,10} While implant-retained overdentures offer enhanced retention, they require surgical intervention. The neutral zone technique, as demonstrated in this case, provides a non-surgical alternative that leverages natural muscular dynamics to stabilize the prosthesis.¹¹ The use of a low-fusing compound ensures that the denture adapts precisely to the neutral zone, reducing displacement risk and enhancing patient comfort.

From this technique, it is evident that two factors are critical for success:

- 1. Accurate Neutral Zone Impression:** The neutral zone impression must be recorded at the

occlusal vertical dimension determined in a previous visit using an occlusal rim.

- 2. Appropriate Material Selection:** The material should be slow-setting enough to allow the oral musculature to shape it to the appropriate contour and dimensions.

By adhering to these principles, the resulting dentures are more likely to function harmoniously with the patient's neuromuscular system, enhancing stability, comfort, and overall patient satisfaction.

CONCLUSION

Understanding and implementing the neutral zone technique is essential for clinicians aiming to provide complete dentures that offer both functionality and comfort, ultimately leading to higher patient satisfaction.

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