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International Journal of Oral Health Dentistry

Journal homepage: [www.ijohd.org](http://www.ijohd.org)

## Case Report

# Orthodontic wires: newer approach for impression making and neutral zone in severely resorbed mandibular ridge: A case report

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## ARTICLE INFO

### Article history:

Received 14-09-2023

Accepted 18-10-2023

Available online 16-01-2024

### Keywords:

Resorbed mandibular ridge

Impression technique

Orthodontic wire

Condensation Silicone

Neutral zone

## ABSTRACT

The management of the resorbed mandibular ridge is a difficult task. Rehabilitating a patient who is completely edentulous is a common dental procedure, but it can sometimes be challenging and difficult. Making an impression with the available stock trays, even after modification, is difficult in extremely resorbed ridges.

Many materials have been used to record and transfer the neutral zone in complete dentures. So here we present a new technique of making an impression with properly adapted wire for recording the impression along with recording the neutral zone with a heavy body addition silicone impression material that rests on the wire loops projecting upward on the denture base to achieve maximum retention and stability and also for the preservation of residual alveolar ridge.

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## 1. Introduction

Residual bone resorption is a complex biophysical process and often occurs after tooth extraction. Ridgeline atrophy is most noticeable during the first year after tooth loss, then the rate of resorption is slower but more gradual.<sup>1,2</sup> The severe atrophic ridges are more common in the remaining ridges of the mandible than of the maxilla. This is because the mandible resorbs at a faster rate than the maxilla. Achieving maximum stability and retention may be especially important for older patients with atrophied mandibular residual ridges.<sup>3</sup> Although conventional dentures have been an effective treatment option for some patients, they are unsuccessful for others because of poor stability, compromised retention, inadequate facial support, poor esthetics, inefficient tongue function/posture, poor mastication or speech, gagging

and general discomfort, or the patient's inability to adapt. All these factors have been classically related to physiologically inadequate contours or denture base volume and functionally inappropriate positioning of denture teeth.<sup>4</sup> The impression technique plays a key role. A good idea holds the key to a successful treatment. No matter how well the prosthesis is constructed, it will not function as intended if it does not make an accurate impression. The impression determines the retention and comfort of dentures made for patients with unfavorable residual ridges.<sup>5</sup>

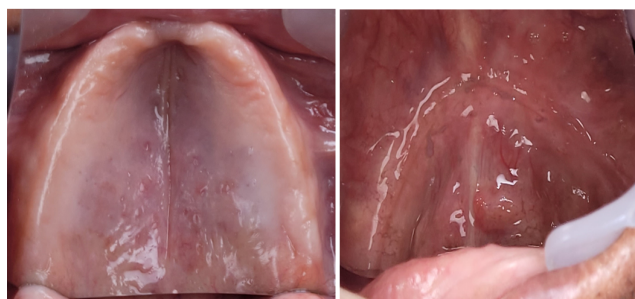
In addition, the importance of the neutral zone in the formation of the whole tooth is the balance of muscle strength from this area, which helps the clinician to place the tooth in an area where minimal destabilizing forces will act on the denture. It is also referred to as the dead space or zone of minimal conflict.<sup>6</sup> This procedure is used for patients with atrophic ridges.

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## 2. Case Report

A 64-year-old male patient reported to the Department of Prosthodontics and Crown & Bridge, G.D.C.H. Aurangabad with a chief complaint of loosening of lower denture. The patient was medically fit. The patient was apparently healthy and reported no systemic disease. The patient wore a prosthesis but was not satisfied with the prosthesis due to poor stability. On the intraoral review, a resorbed mandibular ridge was found. There is firm mucosa on palpation. (Figure 1)



**Figure 1:** Upper and lower edentulous arch

Mandibular impressions were taken from the patient's previous prosthesis with irreversible hydrocolloid material (Vignette Chromatic, Dentsply, India). (Figure 2) The primary mandibular cast was in dental plaster. A 19-gauge wire (S.S Smith) round in shape is used for the mandibular ridge in the form of a special tray. A ring is made by using an orthodontic wire with the help of universal pliers connected from one retromolar pad to another retromolar pad covering the crest of the ridge. The handle is made of the same wire. (Figure 3) As the patient is having firm residual ridge orthodontic wire gets properly adapted on ridge. Special tray have been examined in the patient's mouth. The final impression is made of Putty Consistency Heavy Body Condensation silicone impression material by mixing equal parts base and catalyst. (Figure 4) The material is placed on a wire to provide the impression. Defects are corrected by adding putty where it is missing. After the border molding is completed, the putty is cut away with a flame-shaped carbide cutter to make room for the final impression material. The final impression was made using light body condensation silicone impression material. (Figure 5)

Then the patient was called for the jaw relation, in which the wire technique has been used for the neutral zone. Two occlusal finger-rests were built up with green impression compound modeling plastic (Impression compound) on the wire loops at the premolar regions of both sides. (Figure 6). The stops were molded in the patient's mouth to the same and previously determined occlusal vertical dimension. The tray adhesive was applied to the temporary prosthesis base, and the NZ impression was made by applying polyvinyl



**Figure 2:** Primary impression using old denture



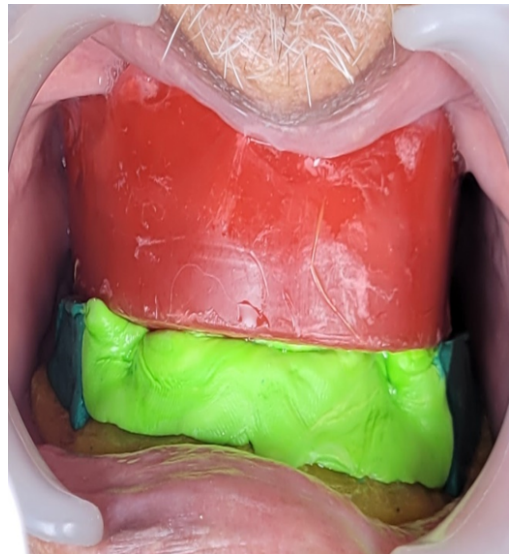
**Figure 3:** Spacial tray using wire

Siloxanes to dental prostheses in acrylic resin and finger rests, contouring it to an approximate rim. (Figure 7) Patients were asked to sit upright with the maxillary occlusal rim in place intraorally and perform the following tasks for 2 min. swallow slowly, drink often, speak loudly, say sounds, count from 60 to 70, smile, laugh, and lift lips. In doing so, high pressure is applied to the heavy body addition silicone impression material, which is gently molded into a state of neutral balance and becomes centrally inert in relation to all of the complex forces acting upon it. (Figure 8)

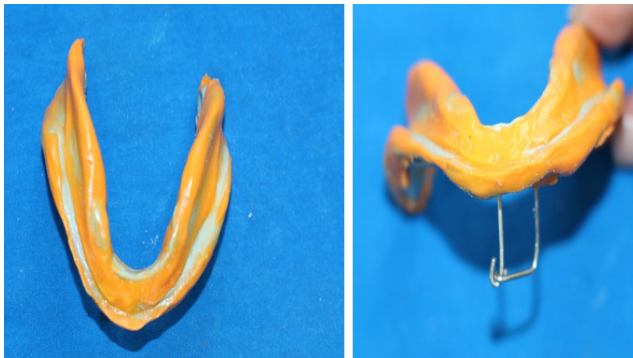
The denture base with the documented neutral zone is placed on a master cast and a putty consistency of the heavy-body condensation silicone impression material is mixed with an elastic impression material and applied to



**Figure 4:** Spacial tray using wire placed intra-orally



**Figure 7:** JR using neutral zone



**Figure 5:** Final impression using light body condensation silicone impression material



**Figure 8:** Neutral zone recorded



**Figure 6:** Occlusal stop using wire loops

the surfaces labial, buccal, and lingual of the base of the prosthesis. (Figure 8). The putty index is then removed and maintained as a record that can be transmitted to the sequential surface of the final denture during the subsequent stage of denture manufacturing. The polyvinyl siloxane material was then replaced with wax using an index as a guide for the wax to replicate the NZ record. After this arrangement of the teeth, the position of the teeth was verified by placing the index around the wax try-in. Once the waxed dental prostheses were ready, they were verified in the patient's mouth for aesthetics, phonetics, and occlusion. (Figure 10) After the try-in was satisfied, the effects of external groups and internal groups of muscles were recorded using light body condensation silicone.(Figure 11)





**Figure 9:** Putty index



**Figure 10:** Try in for aesthetics, phonetics, and occlusion

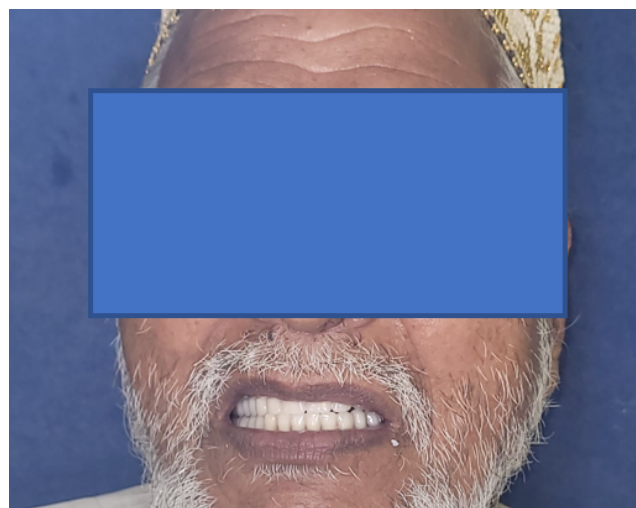


**Figure 11:** Muscle effects recorded using light body addition silicone

After trying, the denture is manufactured in the heat cure acrylic resin. Finished and polished dentures are placed in the patient's mouth. The patient was recalled after 24 hours for examination. Post-denture instructions were given to the patient. After 3 months of recall, the patient was very happy and satisfied.(Figures 12 and 13)



**Figure 12:** Final denture



**Figure 13:** Happy patient

### 3. Discussion

In the atrophic mandible, the muscle attachment is located near the crest of the ridge where the muscle dislocating effect is greatest. Customized trays made with this technique have the advantage of avoiding the effect of muscle dislocation within the limits of the poorly extended prosthesis. The condensation silicone used in border molding is easy to handle and can be re-molded. Many

casts can be poured with the same product. Changing the concept of resorbed mandibular ridges has been proposed by many authors such as the mixed technique,<sup>7</sup> functional,<sup>8</sup> all green,<sup>9</sup> and the cocktail technique. A modified impression appears to be a useful option for the management of a disabled mandibular ridge. Tan et al. advocated the use of a functional impression using fluid wax.<sup>10</sup>

Fish and other researchers have emphasized the concept of the neutral zone which is the zone of balance in which the external forces exerted by the tongue counterbalance the internal forces of the lips and cheeks in the complete construction of the prosthesis. Fish pointed out that of the three surfaces of the prosthesis, the polished surface is bounded by the tongue and the cheeks. They are involved in normal physical actions such as speech, mastication, swallow.<sup>6,11</sup> Hence, the fabrication of the denture must be in harmony with these functions. Mandibular ridge resorption occurs buccally in the tongue, leaving more room for the tongue to move, resulting in the enlargement of the tongue over the years. On the other hand, the jaw and lip muscles lose tone with aging. This results in a displacement of the central region towards the vestibular and labial side. Accurate information about this area and the preparation of the teeth in this area are very important for the stability of the denture.

The purpose of this study was to use a customized wire stock tray system that may be helpful for making an impression on patients with the highly resorbed mandibular ridge. The tray was easy to fabricate and could be easily molded according to the shape and size of the residual ridge<sup>3</sup> also, in this case report, the steps of recording the influence of the neutral zone in both maxillary & mandibular complete dentures are described using the addition of silicone material which was not used yet. The advantage of this material is easy to manipulate when compared with tissue conditioner. Also, this material is dimensionally stable, so less chance of distortion.

The limitation of the study is less working time when compared with tissue conditioner. Also, the material is expensive. So In this case report orthodontic wire was used successfully for both the final impression and neutral zone recording.

#### 4. Conclusion

This article provides a novel approach in the management of a completely edentulous patient with the mandibular resorbed ridge. The article described here a technique for recording impressions of the highly resorbed mandibular ridge using an orthodontic wire and elastomeric impression materials, to gain maximum retention and stability. Also, the neutral zone uses a polyvinyl siloxane along with wire loops acting as a support. Both of these novel techniques help for the preservation of residual alveolar ridge. Denture stability and will provide more comfort to the patient.

#### 5. Human Ethics

Consent was obtained by participants in this study.

#### 6. Source of Funding

None.

#### 7. Conflict of Interest

None.

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**Cite this article:** Ade N, Khalikar S, Mahale K, Rajguru V, Mahajan S, Tandale U. Orthodontic wires: newer approach for impression making and neutral zone in severely resorbed mandibular ridge: A case report. *Int J Oral Health Dent* 2023;9(4):298–302.