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Case Report

Stability is success: Rehabilitation of an atrophic mandibular ridge employing neutral zone technique - A case report

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ABSTRACT

Mandibular ridge resorption is a biomechanical and a complex disease that brings about chronic, progressive, cumulative and irreversible changes in bone structure resulting in severe impairment in fit and function of prosthesis. Some common hormonal, neurological, metabolic disorders can affect the adaptability of denture which can be diagnosed by a trained prosthodontist with proper history taking and clinical examination. If a denture stays inside or outside of the neutral zone, it will be unstable during functional & physiological activities such as talking, swallowing and mastication. Neutral zone technique is a long being used for the management of severely resorbed mandibular ridge. Various materials can used in recording neutral zone which have their own advantages and disadvantages. This technique serves as an alternative approach for the construction of mandibular complete denture. This technique is most effective for denture where there is a highly atrophic ridge, neuromuscular incoordination and history of denture instability. This clinical report describes in detail the fabrication of a complete denture in a patient with poorly formed mandibular ridge using neutral zone technique with addition of cast metal in mandibular denture for extra stability.

1. Introduction

Neutral zone is defined as the potential space between the lips and cheeks on one side and the tongue on other side where the forces between the tongue and cheeks or lip are equal.[1] It is also known as dead space or stable zone or zone of minimal conflict or zone of least interference.

Recording neutral zone is required for patients where there is highly atrophic ridge.[1] Various materials (impression compound, tissue conditioner, waxes, impression plaster) have been advocated to record neutral zone which have their own advantages and disadvantages. [4] The unstable mandibular complete denture is a fundamental yet challenging scenario for a prosthodontist.[2]

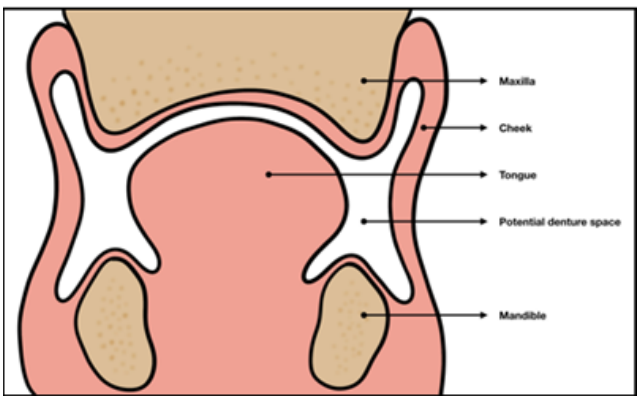

Fig. 1: Neutral zone (cross section)

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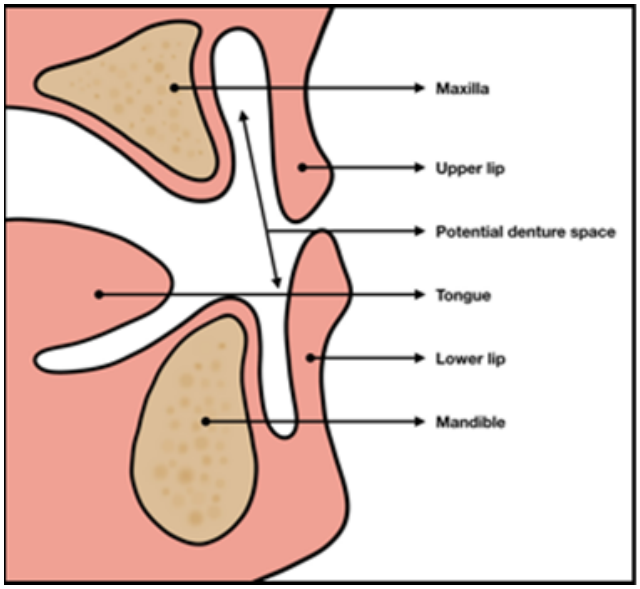

Fig. 2: Neutral zone (sagittal section)

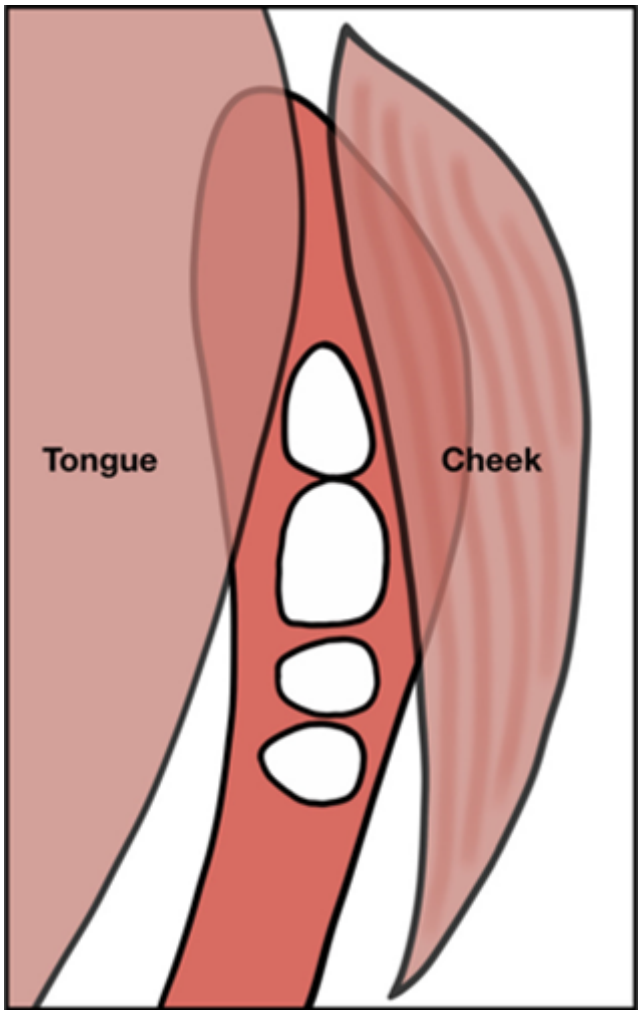

Fig. 3: Neutral zone (Top view)

Residual ridge resorption is a chronic progressive change in bone structure which results in severe impairment in function and fit of prosthesis.[2] It is a natural and inevitable physiologic process. The goal of this technique is to place the teeth such that the forces exerted by the tongue and the cheek muscles are nullified and the teeth remain in a safe, protected zone.[2] Looseness and discomfort are the most frequent complaint reported by patient and they are quite often difficult to manage by dentist.[3] In this technique, admix material i.e. impression compound and green stick compound was used to record the neutral zone in a patient with a neuromuscular disorder.[2] This technique reduces the chair side time and the number of appointments and visits.[2] Muscles involved in neutral zone are[4–8] (Figures 1, 2 and 4):

1. Dislocating muscles
2. Fixing muscles

1.1. Indications

1. Atrophic mandibular ridge
2. Patients with prominent & highly attached mentalis muscle, lateral spreading of tongue as a result of poor transition from dentate to edentulous state & severe resorption.
3. Patient with atypical shape or consistency of oral and perioral structure
4. Patient with scleroderma or patient who has undergone marginal or segmental mandibulectomy.[3]

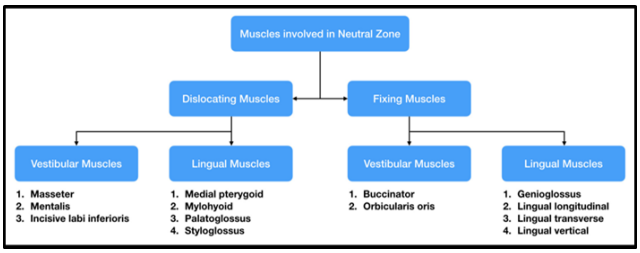

Fig. 4: Muscles involved in neutral zone

2. Case Report

A 67 year old female patient reported to the department of maxillofacial prosthodontics and implantology at Himachal Dental College, Sundernagar with a chief complaint of an unstable mandibular denture. The patient was explained about the situation & advised rehabilitation using of complete denture with neutral zone technique. Another treatment option of implant supported overdenture was explained to patient but she declined as it was an expensive modality. On clinical examination it was seen that the maxillary residual alveolar ridge was rounded and well formed where as the mandibular residual ridge showed high

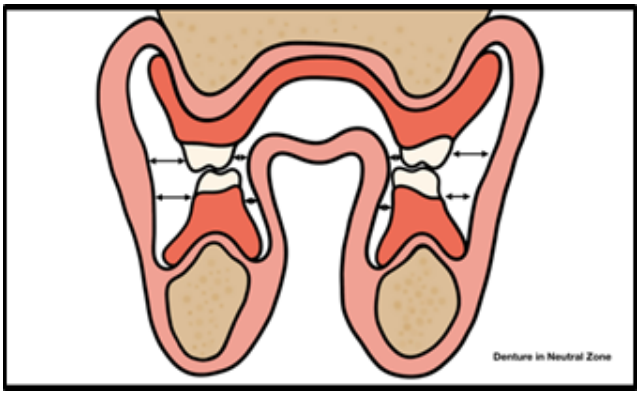

Fig. 5: Denture in neutral zone

degree of resorption (classified as Atwood's order V: low and well rounded).

2.1. Technique

3. Discussion

The aim of a prosthodontist is to restore form, function and aesthetics. Many approaches to set teeth have been advocated and used in complete denture treatment.[3] However, there is substantial debate on which of these provide optimal position in the facio-lingual dimension and guarantee a favourable outcome in term of stability, facial support, chewing efficiency, aesthetics and patient comfort.[3] Providing stable mandibular dentures for patients with severely resorbed mandibular ridge is a challenge.[1] One can overcome this problem if the dentures are fabricated with their contours harmonising neutral zone.[1] The aim of neutral zone technique is to construct a denture in muscle balance.[1] Admix material was used for recording the neutral zone taking into consideration our patients history of neuromuscular incoordination.[2] It is a combination of impression compound and green stick compound in a ratio of 3:7.[2] The mixing of a low fusing compound with the impression compound results in a low viscosity material allowing for ease in manipulation of the oral musculature.[2] The admix material allowed better flow and an accurate impression. Neutral zone technique is a simplified technique to record the physiological dynamics of oral and perioral muscle functions.[9] So shaping a denture by neutral zone technique ensures that the muscular forces are working more effectively in harmony and gives advantage of stabilizing potential of oral and perioral musculature.[10–12] The principle of the neutral zone concept has remained the same since it has been first described by Beresin and Schiesser.[13] However this technique has been subjected to various modifications. Type of retention incorporated in the base plate, recording materials used and further refinement to the initial record are among the variations between clinicians.[14]

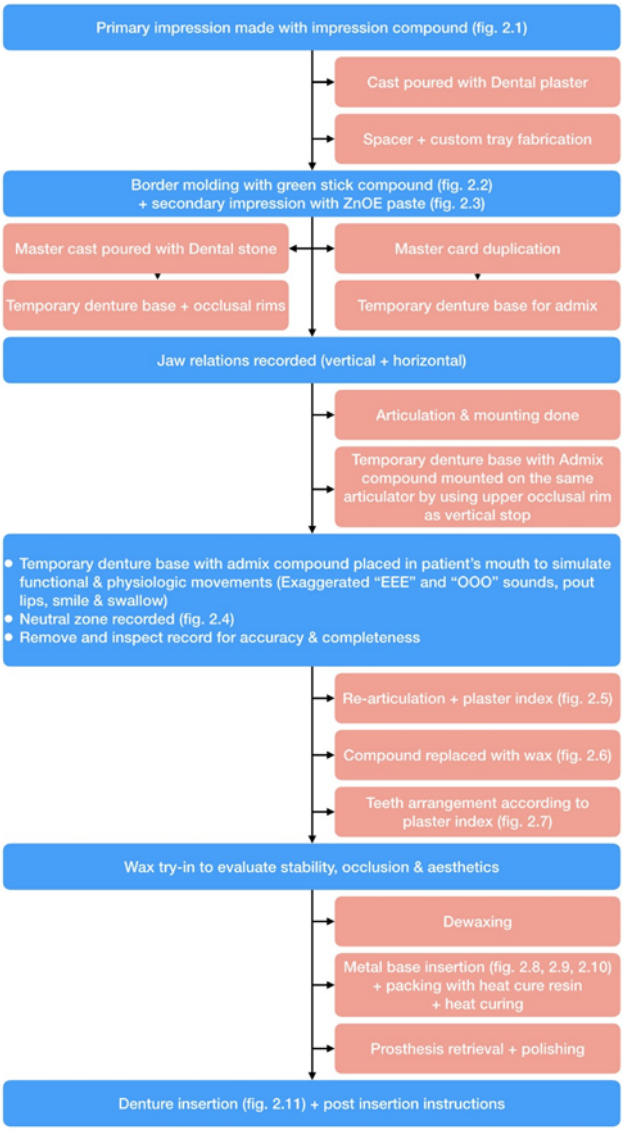

Fig. 6:

Fig. 7: Primary impression

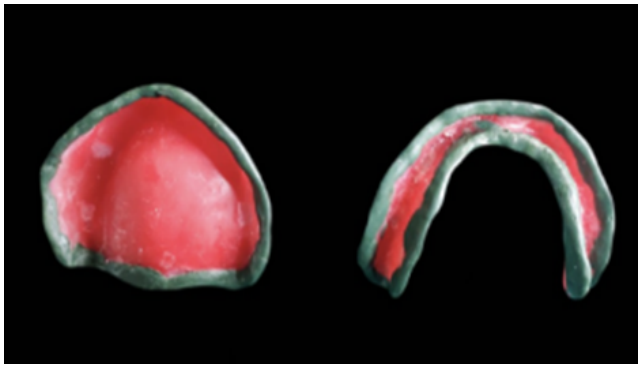

Fig. 8: Border molding

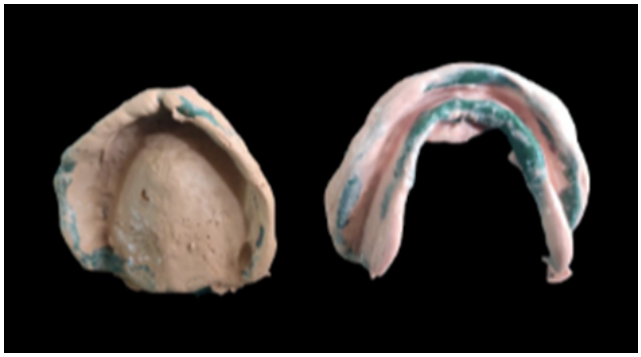

Fig. 9: Secondary impression

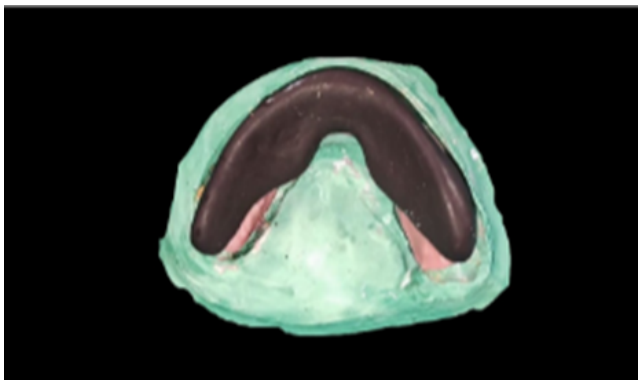

Fig. 10: Neutral zone recorded

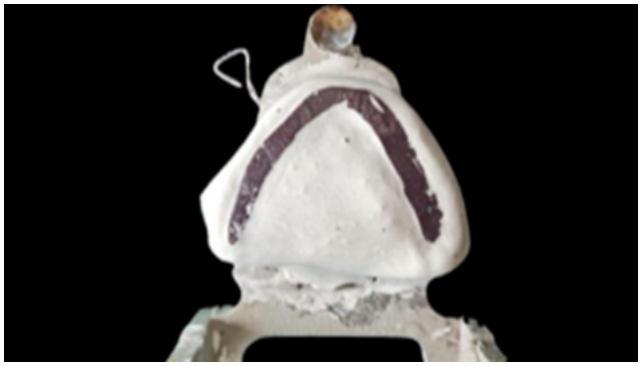

Fig. 11: Plaster index with admix compound

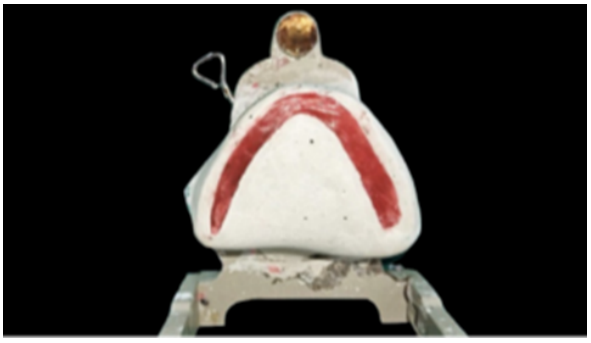

Fig. 12: Plaster index with modelling wax

Fig. 13: Teeth arrangement

Fig. 14: Metal reinforcement

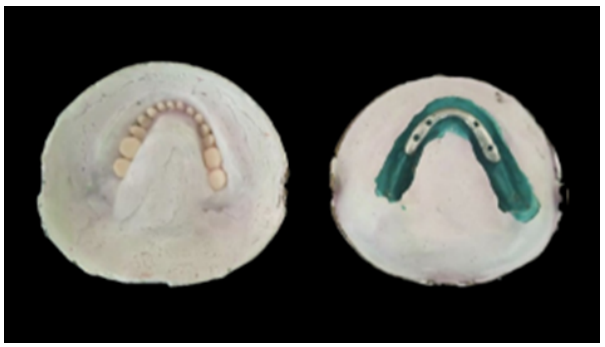

Fig. 15: Flask ready for packing

Fig. 16: Metal reinforcement secured

Fig. 17: Denture insertion

4. Conclusion

Neutral zone concept is considered as exceptionally important when considering treatment options for patients complaining from unstable mandibular CD predominantly if implant treatment is not feasible.[3] This is an alternative technique for the construction of a mandibular complete denture on highly atrophic ridges and quite useful in cases where dental implants are not possible. Although the technique is simple, but there are increased chair side time and laboratory costs.[4] Non compliance with neutral zone factors may lead to complete and partial denture failures.[4]

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Source of Funding

None.

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