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CASE REPORT

ESTABLISHING ZONE OF EQUILIBRIUM FOR STABLE MANDIBULAR COMPLETE DENTURES: A CASE REPORT

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ABSTRACT

Complete denture stability and retention depends upon its coordination with the surrounding muscles and oral structures. Improper position of teeth will make the denture unstable during talking, swallowing and mastication. Thus the denture teeth should be placed in' neutral zone' where the displacing forces of tongue, lips, cheeks and modulus are balanced. This is a case report in which neutral zone impression technique was used to solve the problem of denture instability especially in patients who cannot afford implant retained dentures.

KEYWORDS: resorption, stability, retention, neutral zone, mandibular denture.

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INTRODUCTION:

The retention and stability of mandibular complete dentures is challenging due to residual alveolar resorption and proximity to the limiting structures. As the area of the impression surface decreases in ridge resorption, denture retention and stability becomes more dependent on correct positioning of the teeth and the contours of the external or polished surface of the dentures. Therefore the tooth position and the contouring of the denture surfaces should be so that the horizontally directed forces applied by the peridenture muscles should act to seat the denture in well balanced muscular space known as neutral zone.[1] Sir Wilfred Fish of England described neutral zone concept in 1931. The neutral zone is defined as the potential space between the lips and cheeks on one side and the tongue on other; that area where forces between the tongue and cheeks or lips are equal (GPT 9)[1]. Positioning of teeth in this zone is essential for enhancing the stability and retention of mandibular dentures in patients who cannot afford for implant retained dentures.

This case report describes the neutral zone technique for fabrication of complete dentures for a patient with severely resorbed residual alveolar ridges.

CASE REPORT:

A 70-year old female patient reported to the Department of Prosthodontics, with the chief complaint of difficulty in mastication due to missing teeth. There was no relevant medical history. Intra-oral examination revealed completely edentulous upper and severely resorbed lower arch. (Fig1).
The different treatment options for prosthetic rehabilitation were -1) Conventional complete dentures; 2) Complete dentures with neutral zone technique (3) Implant retained prosthesis.

Fig 1: Edentulous upper and lower arch

Due to financial reasons, it was planned to provide the patient with complete dentures fabricated by neutral zone technique.

Maxillary and mandibular primary impressions were made with impression compound (Y-Dents Impression Composition, MDM CORPORATION) (Fig 2).

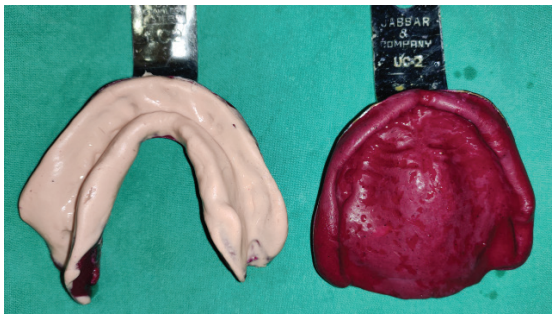

Fig 2: Primary impressions

Border moulding was done with low fusing compound (DPI Pinnacle Tracing Sticks). The lower special tray with the softened low fusing compound in a 65˚C water bath was placed in the patient's mouth; this tray was very carefully adjusted in the mouth to be sure that it was not overextended and remained stable during opening, swallowing, and speaking. The patient was then asked to talk, swallow, do tongue movements etc. After 5– 10 min, the set impression was removed from the mouth and examined. 1 mm of compound was scrapped from the tray. Upper and lower master impressions were made using light viscosity addition silicone (Zhermack elite HD+ addition silicone) (Fig 3).

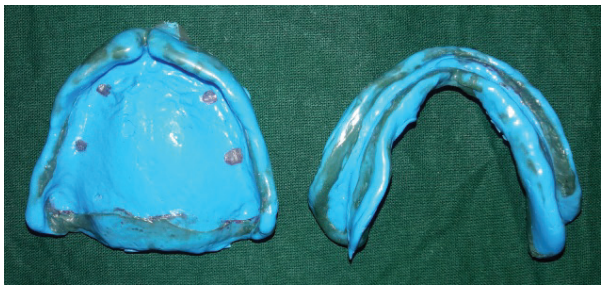

Fig 3: Master impressions

Wax rims were fabricated and jaw relationship was recorded which was then mounted on an articulator. The diagnostic articulation helped to assess the available inter arch space. Mandibular occlusal rim was completely removed and wire loops were attached over the record base in accordance with recorded vertical height. Maxillary occlusion

rim and modified mandibular record base with wire loops were evaluated intra-orally for their fit & ensured that loops do not interfere with muscle movement during function [Fig 4]. Maxillary rim was left in mouth in order to provide enough support to the facial musculature during making neutral zone impression.

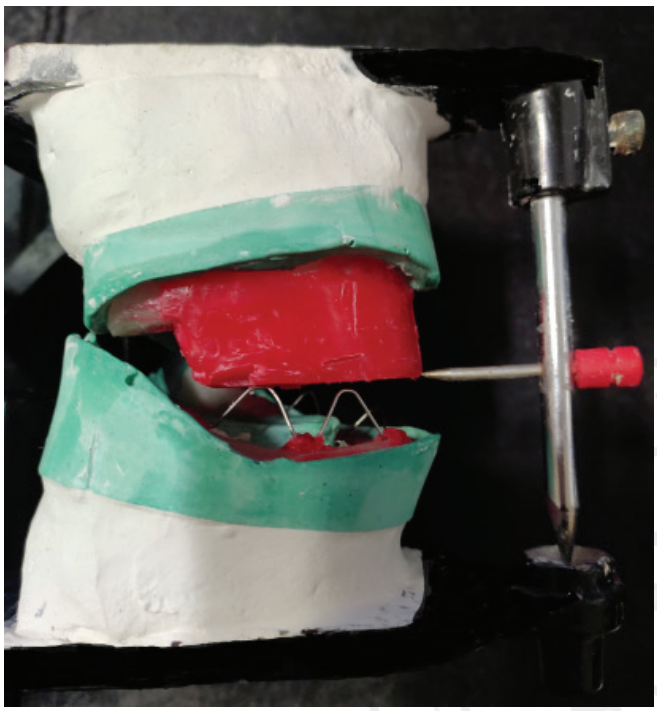

Fig 4: Modified mandibular denture base

NEUTRAL ZONE IMPRESSION:

The patient was made comfortable in an upright position with the head unsupported. Maxillary wax rim was inserted in the mouth and reassessed for support & occlusal plane. Low fusing compound was softened in a 65˚ C water bath and kneaded into a roll which was formed according to the crest and adapted it to retentive loop at established vertical dimension. The attached roll of compound was reheated in the water bath and was carried into the patient's mouth. With the record base firmly seated, the patient was asked to perform a series of actions like swallowing, speaking, sucking, pursing lips, pronouncing vowels sipping water and slightly protruding the tongue several times which simulated physiological functioning. These actions molded the material by muscle activity. After 10 minutes, the set impression was removed from the mouth.

The neutral zone impression so obtained was placed on the master model, locating grooves were cut on the master cast and was covered with a silicone putty index around the impression on both the labial and lingual sides (Fig 5).

Fig 5: Silicone index

The position of the teeth was checked by placing the index together around the wax try in (Fig 6). The waxed up dentures were placed in the mouth and patient was asked to repeat all the movements previously mentioned.

Fig 6: Waxed up denture

The denture was stable after all the movements. Aesthetics, phonetics and occlusion were assessed. The dentures were then processed as a conventional denture. Finishing and polishing of denture was done carefully so that the contour of the polished surfaces remained unaltered. On insertion of denture, minor occlusal discrepancies were corrected.

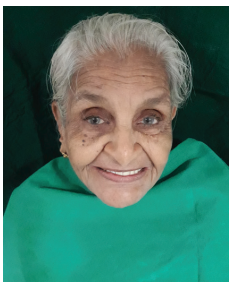

Fig 7: Post-insertion photograph

Post-insertion instructions were given to the patient (Fig 7). Periodic review was carried out for 1 year.

DISCUSSION:

Edentulousness can greatly affect the psychology of the patient. According to Devan, 'Perpetual preservation of what remains is more important than the meticulous replacement of what is missing'[2]. So preserving the remaining healthy teeth and providing overdentures can enhance their retention, thereby reducing the amount of ridge resorption[3]. If none of the teeth could be saved, then the complete extraction followed by the conventional complete dentures or implant supported dentures are the only options.

The coordination of complete dentures with neuromuscular function is the foundation of successful, stable dentures. The soft tissues that form the internal and external boundaries of the denture space exert forces which greatly influence the stability of the dentures.[3] The main aim of the neutral-zone approach (Fig 8) is to locate that area in the edentulous mouth where the teeth should be positioned so that the inward forces exerted by mentalis, buccinator muscles and outward forces by the muscles of tongue will tend to stabilize the denture rather than unseat it.

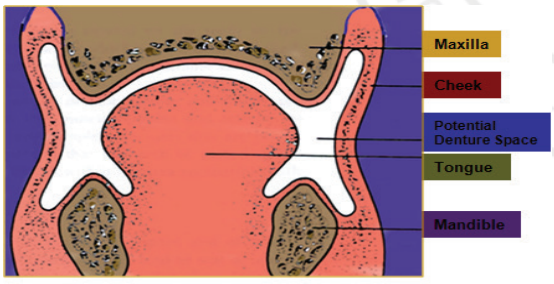

Fig 8: Neutral zone

Complete dentures fabricated by conventional techniques result in denture borders that may not facilitate denture stability against the existing oral and perioral muscle forces. This will result in ill fitting prosthesis which might be uncomfortable for the patient for function. [4]

Many materials have been suggested for shaping the neutral zone: modeling plastic impression compound, soft wax, a polymer of Dimethyl siloxane filled with calcium silicate, silicone, and tissue conditioners and resilient lining materials. [5]

CONCLUSION:

Neutral zone technique in complete dentures is rarely used because of the complexity and extra clinical steps involved in the procedure.[6] Teeth should be arranged as dictated by the musculature, and this will vary for different patients. So, neutral zone must be evaluated as an important factor during the fabrication of complete dentures. Therefore this technique is one of the best alternative techniques in cases of highly resorbed mandibular residual ridge where implant supported dentures are not possible or affordable by such patients.

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Nil

CONFLICT OF INTEREST:

There is no conflict of interest

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