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Prosthodontics

MANAGEMENT OF RESORBED RIDGE USING NEUTROCENTRIC CONCEPT- A CASE REPORT

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ABSTRACT Residual ridge resorption is an inevitable and natural physiologic process. Extensive bone loss shows many problems in prosthetic dentistry rehabilitation. Modern dentistry aims to restore an edentulous patient to normal contour, function, comfort, esthetics, and speech regardless of the atrophy. This case report describes the management of resorbed mandibular ridge using neutrocentric occlusion and neutral zone concept to obtain adequate stability for complete denture success.

KEYWORDS : Residual ridge resorption, Rehabilitation, Neutrocentric concept, Neutral zone)

INTRODUCTION

India has a largely geriatric population of 77 million, comprising 7.7% of its total population. One of the major handicaps in the elderly is the loss of teeth, affecting their mastication, dietary intake, and nutritional status.[1] Edentulism can essentially influence general and oral health and at the same time affect the overall quality of life. Many morphological and anatomical changes are exhibited in edentulous arches & may cause residual ridge resorption.[2] Alveolar bone loss (ABL) and remodeling directly affect the function of removable prostheses, which relies greatly on the quantity and architecture of the jawbones.[3] Golds stated that the resorbed mandibular ridge presents difficulty in making a suitable prosthesis because of decreased support and the encroachment of surrounding mobile tissues onto the denture border, thereby reducing the stability and retention of the denture.[4] In cases of severe resorption of the mandibular ridge, the goal of the clinician should be to achieve good stability and optimum support from the denture bearing area.[5]

Many techniques have been developed to deal with the problem of the compromised ridge.[4] Non-surgical procedure includes mucostatic principles, admixed, functional, all green, and cocktail techniques in impression making, flange technique for stabilization[4], altering the posterior tooth morphology and occlusal scheme.[6] Surgical procedures include vestibuloplasty, alveolar bone augmentation, implant-retained prosthesis.[4] Though implants as an option are more likely to meet the clinical requirements up to large extent, they are more invasive and require surgical procedures and less economical to the patients. To overcome these limitations, removable (complete denture) prosthesis can be considered as an alternative procedure .[6] To improve the retention and stability, modification in occlusal designs and the position of the mandibular occlusal units can be an approaching solution to the problem.[7]

In 1954, DeVan formalized guidelines for using flat teeth in his "neutrocentric concepts," The term "neutrocentric" is suggested to denote a concept embodying two key objectives: (1) neutralization of inclines and (2) centralization of occlusal forces.[8,9] This concept was carried out by limiting the mesiodistal extent of the occlusal table to avoid setting the teeth over the lower molar slope inherent in the posterior portion of the residual ridge.[7]

On the other hand, the soft tissues that form the internal and external boundaries of the denture space exert forces which also greatly influence the stability of the dentures. Tooth position and flange contour play an important role in denture stability. So another concept to increase the stability of complete denture; the neutral-zone approach is to locate the zone of equilibrium in the edentulous mouth where the teeth should be positioned so that the forces exerted by muscles will tend to stabilize the denture rather than unseat it.[10]

Case report

A 65-year-old male patient reported to the Department of Prosthodontics and crown and bridge, SCB dental college & Hospital, Cuttack with the chief complaint of replacing his upper and lower missing teeth(Figure-1,2). The patient was completely edentulous over 2-3 years and reported difficulty in chewing and speech without any systemic disease. On examination, the patient had moderately resorbed mandibular ridge corresponding to Atwood's order V ridge resorption.[11]

Fig-1

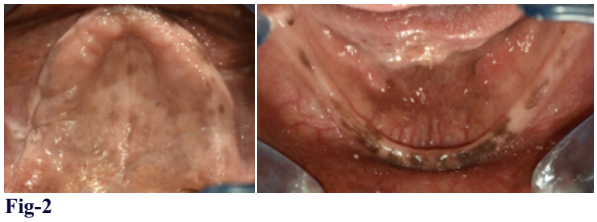

Fig-2

On the first appointment, maxillary and mandibular arch primary impressions were made using McCord and Tyson's admixed technique(Figure-3). Impression compound (Y-DENTS, MDM CORPORATION, 3116, Kucha pandit, Delhi) and green tracing stick compound (DPI Pinnacle The Bombay Burmah Trading Ltd., Mumbai) in the ratio of 3:7 parts by weight was placed in a bowl of hot water and kneaded to a homogeneous mass .12,13 Primary impression was immediately poured with dental stone (BNSTONE Type III dental stone, BN chemicals,87, Lalit Gupta st, Kolkata, Figure-4).

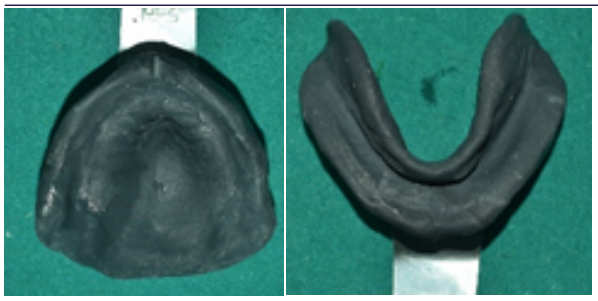

Fig-3

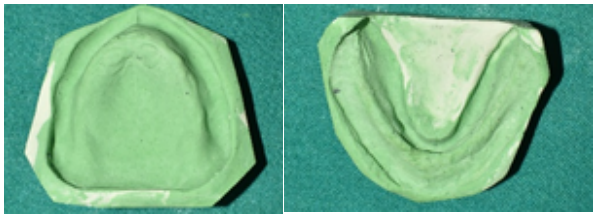

Fig -4

A Mandibular custom tray was fabricated with partial spacer design and Maxillary custom tray was fabricated using a full spacer design using auto-polymerizing resin(DPI-RR cold cure Acrylic repair material, The Bombay Bumrah Pvt. Ltd., Mumbai)(Figure-5,6).

Fig -5

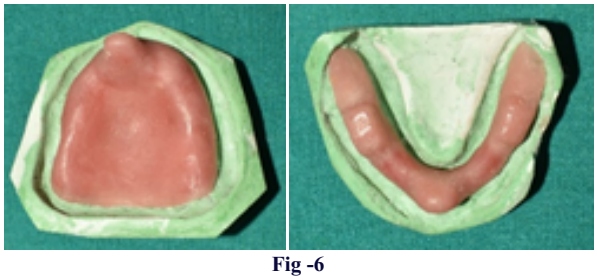

Fig -6

On the second appointment border molding was done with low fusing impression compound (DPI Pinnacle The Bombay Burmah Trading Ltd., Mumbai), and the final impression was made with zinc oxide eugenol paste (DPI impression paste The Bombay Burmah Trading Ltd., Mumbai) for the maxillary arch(Figure-7). Mandibular arch border molding was done in all-green method in which green stick compound (DPI Pinnacle The Bombay Burmah Trading Ltd., Mumbai) was kneaded to a homogenous mass. It was loaded on the special tray and border movements were performed.[13] (Figure-8) Tray adhesive (Tray-Fix universal Tray Adhesive, DENTO ONE INC., made in USA) was applied over the green stick compound and the final impression was made with light body impression material (Speedex light body surface activated, Coltene)(Figure-9). Secondary impressions were poured in dental stone (BNSTONE Type III dental stone, B N chemicals, 87, Lalit Gupta st, Kolkata)(Figure-10).

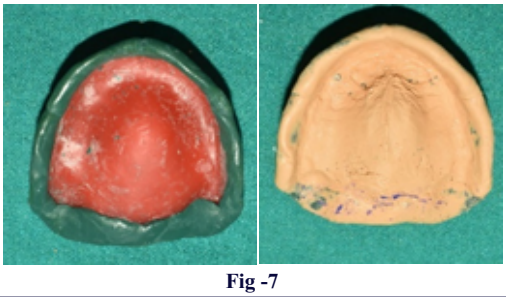

Fig -7

Fig -8

Fig -9

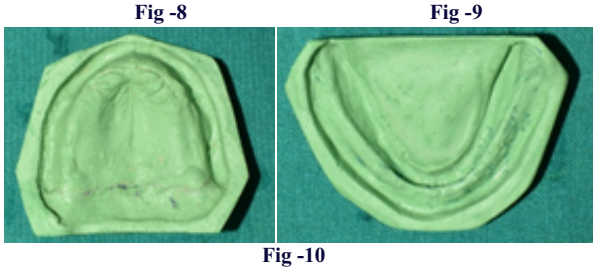

Fig -10

Temporary denture bases were fabricated using auto-polymerizing resin (DPI-RR cold cure Acrylic repair material, The Bombay Burmah Trading Ltd., Mumbai) and occlusion rims were made (Figure-11). On the third appointment orientation, vertical and tentative horizontal jaw relation procedures were done(Figure-12,13). Casts were articulated to a Hanau wide vue articulator in centric relation.

Fig -11

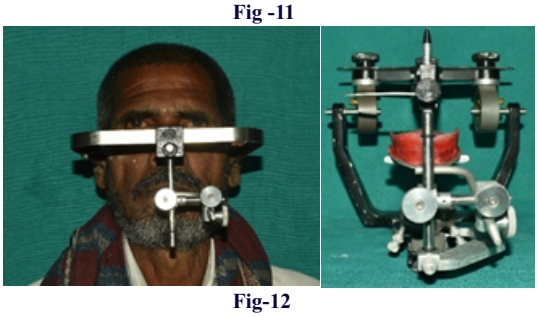

Fig-12

Fig-13 Fig-14

A mandibular temporary denture base with a vertical stop was made up of auto-polymerizing acrylic resin (DPI-RR cold cure Acrylic repair material, The Bombay Burmah Trading Ltd., Mumbai) for support & occlusal rim fabricated with green stick compound (DPI Pinnacle The Bombay Burmah Trading Ltd., Mumbai)(Figure-14).

After softening the occlusal rim with greenstick compound (DPI Pinnacle The Bombay Burmah Trading Ltd., Mumbai) was placed in the patient's mouth. For recording the neutral zone, the movements were used swallowing, sucking & puckering of the lips and protrusion, and side to side movement of the tongue (Figure-15).[14] Putty index of the recorded neutral zone was made. According to the putty index, the greenstick compound was replaced with modelling wax (ROLEX Modelling wax no 2, ASHOO SONS, WP-547, Wazirpur, Delhi)(Figure-16).[10] Cuspless teeth were arranged with the help of putty index guide (Figure-17).

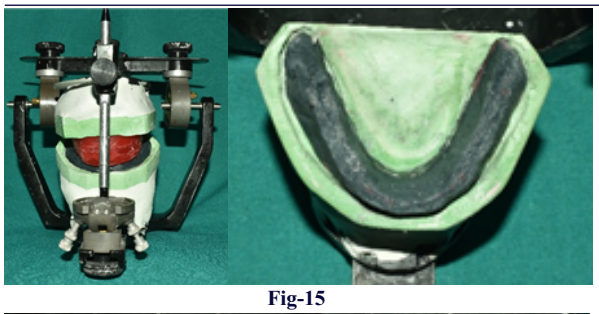

Fig-15

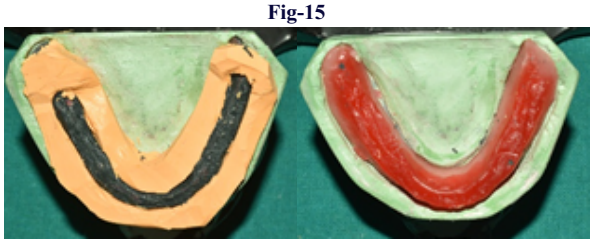

Fig-16

Fig-17

On the fourth appointment trial denture insertion was done(Figure-18). Esthetics, phonetics, and occlusion were verified. Excessive wax was removed from the buccal and lingual surface of the denture & replaced with tissue conditioner (Visco-gel, Temporary Soft Denture Liner, Dentsply Caulk, USA) to record the polished surface (Figure-19).

The patient was asked to repeat the same movements used for recording the neutral zone.10 The denture was processed using heat-activated acrylic resin (Coltocure H, Heat cure acrylic resin, Coltene Whaledent Pvt. Ltd.). Selective grinding was done and the denture was inserted on the fifth appointment (Figure-20).

Fig-18

Fig-19

Fig-20

DISCUSSION

Various factors contribute to the overall performance of complete denture prosthesis. Achieving stability in a resorbed mandibular ridge is a challenge due to decrease in the available surface area. The treatment modalities with modifications were introduced in order to achieve stability of the dentures in resorbed ridges.

McCord and Tyson's admixed technique was used for making the maxillary & mandibular arch impressions. A viscous admix of the impression compound and tracing compound removes any soft tissue folds and smoothens them over the mandibular bone. This reduces the potential discomfort arising from the atrophic sandwich that is the creased mucosa lying between the denture base and mandibular bone.[15] All green technique was used for border molding of the mandibular arch to improve the denture stability.[5] The use of these techniques has the following advantages: to gain maximum coverage, to correct readily, to accurately determine the extent of the mucobuccal reflections. These are also used to direct pressure towards the load-bearing areas like the buccal shelf area and the slopes of residual ridges. Arranging artificial teeth within the neutral zone achieves two important objectives: (1) prosthetic teeth do not interfere with normal muscle function, and (2) normal oral and perioral muscle activity imparts a force against the complete dentures that serves to stabilize and retain the prostheses rather than cause denture displacement.[16]

Neutrocentric concept of occlusion was used to enhance the stability of the denture. M.M. De Van proposed five factors of this concept; position, proportion, pitch, form, and number.[9] In this case, the position was established using neutral zone technique. The proportion factor was incorporated by the selection of teeth with reduced buccolingual width, Pitch by establishing the occlusal plane parallel to the foundation i.e. neutralization of the compensating curves during teeth setting. Anatomical teeth having cuspal inclination creates lateral forces towards the flat ridge & cause more resorption. So zero-degree teeth form with no cuspal inclination were arranged to allow the patient to clench and grind in and around maximum intercuspation during both functional and non-functional activities and also to aid in denture stability.[17,18] Number was reduced by elimination of the second molar to centralize the forces in the second premolar and 1st molar region. The stability of the lower denture was assessed by observing the presence or absence of movement of the denture during functional movements and wide opening of the mouth.

CONCLUSION

Treatment of atrophied ridges is a clinical challenge faced by dentists worldwide. Severely resorbed ridges present difficulty in the fabrication of an optimal prosthesis. Modifications in the treatment procedures should be considered to fulfill the patient's functional and esthetic desires.[19] All the factors should be considered to favour the stability of the denture base to avoid deflective and/or excessive forces transmitted to the underlying structures.[9] In the present case, the neutrocentric occlusal scheme & neutral zone concept provided good stability to the denture with improved function and esthetics of the patient. Further clinical trials must be conducted to validate the effect of this treatment modality.

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