A COMPARATIVE STUDY OF SELECTIVE PRESSURE IMPRESSION TECHNIQUE AND NEUTRAL ZONE APPROACH IN ATROPHIC MANDIBULAR RIDGES

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ABSTRACT

Mandibular denture instability is a common problem in patients with atrophic mandibular ridges. Various methods had been employed by the profession to overcome this problem. In this study selective pressure impression technique and neutral zone have been compared. Certain factors are better achieved by one technique and others by second method. But statistically neutral zone concept yielded relatively better outcome.

Key words: *Atrophic mandibular ridges, selective pressure impression technique, neutral zone approach*

INTRODUCTION

Successful complete denture therapy begins with a careful assessment of patient's physical condition and determining a treatment plan that will deliver optimum results. Maxillary dentures have a better record of clinical success due to larger denture bearing area; regular parabolic form and less acquired muscular influence.[1,2]

Favourable mandibular ridges and denture bearing area significantly contribute towards the success of proposed complete denture. Ridge resorption is a chronic, progressive, irreversible and cumulative localized bone loss[3]. Most resorption occurs in alveolar process whereas the basal portion remains intact'. This leads to qualitative and quantitative reduction in denture bearing area; loss of sulcus depth and available ridge height; decrease in load bearing capacity of denture bearing area and reduced denture stability[9,8,7]. Conventional dentures may not provide desired results in these cases.

Provision of implant retained prostheses may serve the purpose. But every patient is not suitable for implants[8]. To get the successful results in such cases other factors may have to be exploited. These may include improved impression techniques; proper location and arrangement of artificial teeth and appropriate form of polished surfaces.

Success of the complete denture depends largely upon the relation of the dentures to anatomic structures that support and limit them, familiarity with the location and character of these structures is essentials. Selective pressure impression (SPIT) technique is based on the premise that the stress bearing capability of the denture bearing area must be taken into account while recording the impression[1o].

All the oral functions involve the synergistic actions of lips, cheeks, tongue and floor of the mouth. Failure to recognize the cardinal importance of tooth position and flange form and contours may result in unstable and unsatisfactory dentures. Neutral zone (NZ) is the area where the forces from the cheeks and lips are counter balanced by the forces exerted by tongue[11,12,13.] It is also referred to as dead space, the stable zone and the zone of minimal conflict[14]. Many unstable lower dentures are caused by the external surface not being properly formed and teeth not positioned in within the neutral zone[13,14].

The objective of this study was to conduct a comparative evaluation of selective pressure impression technique and neutral zone approach in atrophic edentulous mandibular ridges.

MATERIALS & METHODS

This study was carried out on edentulous patients with atrophic mandibular ridges. 24 patients (Atwood

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order V & VI)[3] were selected. These patients were placed in to two groups. Patients with odd numbers were placed in group — I and even number patients were put in group — II.

Group — I patients were provided denture with selective pressure impression technique—border molded special tray as described in Boucher's Prosthodontic Treatment of Edentulous Patients[15]. In group — **II** neutral zone concept described by Beresin and Schiessern was employed.

All other steps of complete denture construction were kept same in both groups to keep the variables constant.

The technical quality of the mandibular dentures was evaluated by assessing the following factors:

TABLE —1

Factors	**Grades**
RETENTION Does the denture dislodge with vertical pulling on central incisors after these are dried with gauze?[16,17]	I. No II. Yes but difficult III. Easily
STABILITY Is there movement induced by index & middle finger pressure on the first molar teeth? (First , a direct pressure is applied equally on both sides; then a direct pressure is applied on each side individually; lastly, a rotational force is applied)[16-18]	I. Within tissue displacement II. More than tissue displacement III. Sliding
BORDER EXTENSION Number of satisfied check points:[16] Half of right retromolar pad is covered Half of left retromolar pad is covered Right mylohyoid line is contoured to anatomic formLeft mylohyoid line is contoured to anatomic formAnterior lingual flange is pertinentWhole of labial/buccal flange is anatomically contoured	**I. All** II. Up to 5 points III. Less than 5 points
FIT OF DENTURE Is there pain induced by index and middle finger pressure applied equally on both sides of first molar teeth?[16]	I. No II. Sligh t **DI**
TONGUE SPACE Does the tongue cover the mandibular artificial teeth?[16,19]	I. No — lateral borders at the level of occlusal plane, round dorsum II. No- lateral borders curled up with contraction on dorsum III. Yes
POSTERIOR TEETH POSITION Relation between mandibular alveolar crest & first molars by viewing from the back of denture is: [16] Posterior teeth with central fissures on centre of the ridge, grade — I. Central fissures not on the centre but within the bucco-lingual limits of retromolar pad, grade — **II.** Grade — **III,** when central fissures were out of bucco-lingual limits of retro molar pad.	I. Central fissures of molars on both sides on centre of the ridge II. Central fissures of molars on either side on centre of the ridge III. Central fissures of molars on both side not on centre of the ridge
ANTERIOR TEETH POSITION Do the height & inclination of anterior teeth and contour of the lip harmonize with patient's face?[16,13]	I. Yes II. Changed for esthetics — denture remain seated III. No — denture tend to dislodge

TABLE - 2

Factors	Selective Pressure Impression Technique n = 12			Neutral Zone Concept n = 12		
	Mean (X)	Standard Error (S.E.)	Standard Deviation	Mean (X)	Standard Error (S.E.)	Standard Deviation
Retention	2.33	+ 0.22	0.78	2.42	+ 0.19	0.67
Stability	2.58	+ 0.14	0.51	2.67	+ 0.14	0.49
Border Extension	2.58	+ 0.19	0.67	2.42	+ 0.22	0.78
Fit of Denture	2.58	+ 0.19	0.67	2.50	+ 0.19	0.67
Tongue Space	2.50	+ 0.19	0.67	2.67	+ 0.14	0.49
Position of Posterior Teeth	2.58	+ 0.14	0.51	2.42	+ 0.19	0.67
Anterior Teeth Arrangement	2.42	+ 0.19	0.67	2.75	+ 0.12	0.45
TOTAL	**2.51**	**+0.18**	**0.64**	**2.55**	**+0.17**	**0.60**

1. Retention 2. Stability

3. Border extensions 4. Fit of the denture

5. Tongue space 6. Position of posterior teeth

7. Anterior teeth arrangement

These factors were analyzed according to a 3 grade (I, II & III) criteria ranging from good average and poor respectively (Table - 1). Numerical values of 3, 2 & 1 were assigned respectively for comparisons and SPSS 10.0 for windows was used for statistical analysis. Student's T - test was applied for results.

RESULTS

Technical quality of the dentures for these evaluation factors was statistically analyzed both individually and as well as collectively. Results indicated that none of the two techniques has significance over the other. Certain factors e.g. border extensions, fit of the denture and position of posterior teeth were better achieved by selective pressure impression technique and others like retention, stability, tongue space and position of anterior teeth were found favorable in neutral zone concept (Table - 2). However on the basis of over all results neutral zone seemed to have slightdenture16'20lective pressure impression technique (Fig. - **I).**

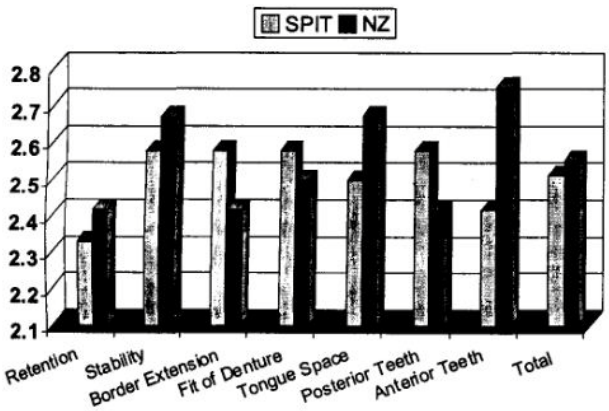

Fig 1.

DISCUSSION

The ultimate objective of prosthodontics is to restore form, function and esthetics. A patient with atrophic mandibular ridge is a frequent and difficult problem for majority of dentists. Several times a combined approach of preprosthetic surgical options, implants and careful prosthetic treatment yields successful results. However majority of patients are not suitable for these advance options due to various constraints[5].

About 16 different factors are considered to evaluate both upper and lower denture[16,2o]. Out of these, seven factors (retention; stability; border extension; fit of denture; tongue space; position of posterior teeth and anterior teeth arrangement) were selected and evaluated. All these factors are directly related with the general assessment of mandibular denture. Although each factor was individually analyzed but they have strong interrelation and have a direct or indirect affect on each.

Successful dentures can be provided to the patients by both techniques. Both methods yielded adequate result. But neutral zone seemed to have slightly superior edge over selective pressure impression technique. This success may be due to the fact that factors

like polished surfaces, teeth positioning and tongue space are better addressed by neutral zone.

As in atrophic ridges impression surface area is decreased and polished surface area relatively increases. Utilization of the neutral zone concept is beneficial to patients with a history of unstable and loose fitting dentures. Since the neutral zone also defines the exterior contour of a denture base (polished surfaces), in order to work in harmony with adjacent supporting and stabilizing muscle actions, the prosthesis has a more natural feel to the patient. Makzoume in a pilot study also claimed that dentures made by neutral zone have an edge over others".

Tongue control also aids in retention and stability of mandibular denture if polished surfaces are in harmony to its functional activities. In addition correct positioning of occlusal plane and harmonious arrangement of teeth also helps the orofacial musculature to stabilize the lower denture. The tongue can be a powerful adjunct in the achievement of stability when above conditions is met.

There has been disagreement about the optimum facial-lingual placement of mandibular teeth relative to the residual alveolar ridge. One of the possible reasons may be that alveolar ridge does not resorb uniformly. Leverage is the major concern while placing the teeth on centre of the ridge whereas neutral zone considers muscular forces created during function. The lack of favourable leverage in neutral zone may be counterbalanced by controlling action of muscles surrounding the denture. This may have led to increased retention and stability in neutral zone technique.

In our study analysis showed nonsignificant values at every step. One possible reason may be small sample size. Comparison between large groups may lead to more obvious results. In a comparative study, Falimy has concluded that conventional dentures were found to be better for mastication. In spite of this all the patients prefer to use dentures made with neutral zone"4. So patients' opinion may also be helpful to signify one method better than other. Hence further research may be carried out keeping in view these points.

CONCLUSION

Successful dentures were made by using both techniques, but statistically neutral zone concept proved to be better than selective pressure impression technique. This highlights the critical role of polished surfaces and arrangement of artificial teeth in denture success.

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