EVALUATION OF NEUTRAL RIDGE POSITION IN RELATION TO MANDIBULAR ALVEOLAR RIDGE WITH DIFFERENT EDENTULOUS PERIODS

Kumar Durga Dutta¹, Rajni Kumari³, Gyanendra Kumar Singh¹, Anu Kumari¹, Ravi Anjan⁵

¹,³PG Student, Department of Prosthodontics and Implantology, Vananchal Dental College and Hospital, Garhwa, Jharkhand, India,
²Reader, Department of Prosthodontics and Implantology, Vananchal Dental College and Hospital, Garhwa, Jharkhand, India,
⁴Consultant dental surgeon, Dutta Oro Dental, Hajipur, Bihar, India
⁵Dental Medical Officer, ECHS, Daltonganj, Jharkhand

ABSTRACT

Background: Complete denture prosthesis is primarily biomechanical artificial device, which is fit in the edentulous mouth to rehabilitate the handicapped edentulous jaws and to function with good retention and stability. The present study was conducted to assess neutral ridge position in relation to mandibular alveolar ridge with different edentulous periods.

Materials & Methods: 60 patients of both genders were divided into 2 groups. Group I patients had <1 years and group II had >1 year of edentulism. The neutral zone was clinically recorded for all patients with impression compound. The shift between neutral zone and ridge crest in different edentulous periods was analyzed radio graphically.

Results: Bucco-lingual width of alveolar ridge 3 mm at right retromolar, left retromolar and anterior midline in group I was 5.86 mm, 5.84 mm and 5.67 mm and in group II was 5.52 mm, 5.64 mm and 5.36 mm. Bucco-lingual width of mandibular occlusal rims at right retromolar, left retromolar and anterior midline was 16.07 mm, 16.09 mm and 15.9 mm and 15.8 mm, 15.9 mm and 15.7 mm in group I and II respectively. A significant difference distance between centres of neutral zone and alveolar ridge crest at different locations was recorded (P< 0.05).

Conclusion: Neutral zone may be lingually shifted in relation to alveolar ridge crest in patients with prolonged edentulous period.

Key words: Alveolar ridge, Edentulism, Neutral zone

I. INTRODUCTION

Complete denture prosthesis is primarily biomechanical artificial device, which is fit in the edentulous mouth to rehabilitate the handicapped edentulous jaws and to function with good retention and stability. The prosthesis must be made so that they are in harmony with normal neuromuscular function. Successful treatment of patients with complete denture depends on the proper positioning of artificial teeth in relation to the basal seat and surrounding tissue.¹

The primary objective of complete denture prosthesis is to construct dentures that will satisfy the three basic requirements of the edentulous patient: maximum comfort, efficiency and aesthetics. This objective can be achieved only if the dentures are both stable and retentive.² Tooth position has also received considerable attention, but essentially from a purely mechanical or leverage point of view. Complete dentures are primarily mechanical appliances, but since they function in the oral cavity, they must be fashioned so that they are in harmony with the normal neuromuscular system. All oral functions- speech, mastication, swallowing, smiling, laughing involve the synergistic actions of the tongue, lips, cheeks and floor of the mouth, which are very complex and highly individual in themselves.³
Lammie claimed that the direction of mandibular ridge resorption allows mentalis muscular attachments to fold over the alveolar ridge.\textsuperscript{4} This results in posterior positioning of neutral zone. Subsequently mandibular anterior teeth may be positioned more lingually. However, Fahmy proposed that Lammie’s findings are true for patients, edentulous for less than 2 years. Neutral zone is labially located by a mean of 2 mm in patients edentulous for more than 2 years.\textsuperscript{5} The present study was conducted to assess neutral ridge position in relation to mandibular alveolar ridge with different edentulous periods.

II. MATERIALS & METHODS

The present study was conducted among 60 patients of both genders. The consent from all patients was taken before starting the study.

Demographic profile such as name, age, gender etc. was recorded in case history proforma. Patients were divided into two groups, according to period of edentulism. Group I patients had <1 years and group II had >1 year of edentulism. The neutral zone was clinically recorded for all patients with impression compound. Impression compound was used to record the mandibular neutral zone for each patient during function. Individual standardized casts were made from mandibular base plates. Casts were made parallel to the horizontal by means of a base former. The shift between neutral zone and ridge crest in different edentulous periods was analyzed radio graphically. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

III. RESULTS

Table I Bucco-lingual widths of crest of residual ridge and mandibular occlusal rim

<table>
<thead>
<tr>
<th>Groups</th>
<th>Bucco-lingual width of alveolar ridge 3 mm</th>
<th>Bucco-lingual width of mandibular occlusal rims</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right retromolar</td>
<td>Left retromolar</td>
<td>Anterior midline</td>
</tr>
<tr>
<td>Group I</td>
<td>5.86</td>
<td>5.84</td>
<td>5.67</td>
</tr>
<tr>
<td>Group II</td>
<td>5.52</td>
<td>5.64</td>
<td>5.36</td>
</tr>
</tbody>
</table>

Table I, graph I shows that bucco-lingual width of alveolar ridge 3 mm at right retromolar, left retromolar and anterior midline in group I was 5.86 mm, 5.84 mm and 5.67 mm and in group II was 5.52 mm, 5.64 mm and 5.36 mm. Bucco-lingual width of mandibular occlusal rims at right retromolar, left retromolar and anterior midline was 16.07 mm, 16.09 mm and 15.9 mm and 15.8 mm, 15.9 mm and 15.7 mm in group I and II respectively. The difference was significant (P< 0.05).

Graph IBucco-lingual widths of crests of residual ridge and mandibular occlusal rim

Table II Distance between centres of neutral zone and alveolar ridge crest
Table II shows a significant difference distance between centres of neutral zone and alveolar ridge crest at different locations (P< 0.05).

**IV. DISCUSSION**

The ultimate goal of dentistry is to keep all the teeth of an individual healthy and in comfort throughout his life. If however teeth are lost despite all efforts to save them, the prosthesis should be fabricated in such a manner so as to function efficiently and comfortably in harmony with the muscles of the stomatognathic system and the temporomandibular joints. The soft tissues that form the internal and external boundaries of the denture space exert forces that greatly influence the stability of the dentures. The central thesis of neutral zone approach to complete dentures is to locate that area 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. As the area of the impression surface decreases and the polished surface area increases, tooth position and contour of the polished surface become more critical. In other words, where more of the alveolar ridge has been lost, denture stability and retention are more dependent on correct positions of the teeth and contour of the external surfaces of the dentures. The present study was conducted to assess neutral ridge position in relation to mandibular alveolar ridge with different edentulous periods.

In present study, bucco-lingual width of alveolar ridge 3 mm at right retromolar, left retromolar and anterior midline in group I was 5.86 mm, 5.84 mm and 5.67 mm and in group II was 5.52 mm, 5.64 mm and 5.36 mm. Bucco-lingual width of mandibular occlusal rims at right retromolar, left retromolar and anterior midline was 16.07 mm, 16.09 mm and 15.98 mm, 15.98 mm and 15.8 mm in group I and II respectively. Bhorgonde et al in their study the position of the neutral zone to alveolar ridge crest was investigated in 30 edentulous patients comprising of both males and females divided into three groups, Group I consisted of ten patients whose period of edentulousness varied from 0 -4 years. Group II included ten patients who were edentulous for more than 4 years but less than 8 years. Group III consisted of ten patients whose period of edentulousness varied between 8-12 years. The results of the present study state that the neutral zone serves as a guide and suggests that the period of edentulousness should be considered while arranging the teeth for complete dentures.

We found a significant difference distance between centres of neutral zone and alveolar ridge crest at different locations (P< 0.05). Raja et al in their study patients with edentulous period for at least 6 months exhibiting normal range of maximal mouth opening (40 -50 mm) and normal temporomandibular joint movements were included and allocated into two groups, according to period of edentulism. Patient with any intra oral soft tissue or bony pathology and reduced intermaxillary space were excluded. The neutral zone was clinically recorded for all patients with impression compound. The shift between neutral zone and ridge crest in different edentulous periods was analyzed. In longer edentulous period (> 2 years), neutral zone was lingually shifted by an average of 1.06 mm in anterior, premolar and molar regions.

In a study by Jain et L group I had 15 human subjects edentulous for 0 months to 2 years, Group 2: 15 human subjects edentulous for 2 years to 5 years and Group 3: 15 human subjects edentulous for more than 5 years. Neutral zone recording was performed for each human subjects and the bucco-lingual relationship of the crest of the mandibular alveolar ridge and position of neutral zone was examined. The results suggested that the location of neutral zone varies from individual to individual depending on their musculature and there is significant relation to the duration of edentulism. As the duration of edentulism increases, there is more lingual positioning of neutral zone at the molar region of both side of the arch. At premolar region, there is no change in position of
neutral zone, it remains constant since resorption of the alveolar ridge is directly under the buttress. In anterior region, there is more labial positioning of neutral zone as duration of edentulism increases.

V. CONCLUSION
Authors found that neutral zone may be lingually shifted in relation to alveolar ridge crest in patients with prolonged edentulous period.

REFERENCES