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COMPARISON BETWEEN CONVENTIONAL AND NEUTRAL ZONE CONCEPT IN CONSTRUCTION OF COMPLETE DENTURES: A CASE REPORT

Dental Science

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ABSTRACT

In literature, Neutral zone concept has been for long-time heralded as the best technique to improve stability of removable complete dentures. In recent times, the focus has entirely shifted to implants for unstable dentures. Every prosthetic case however should employ this concept to improve not only the superstructure stability but also to improve substructures' (implants and abutments) longevity.

This case report explains such a scenario in detail step-by-step where use of Neutral zone concept has shown marked improvement in denture stability as well as shape and form in comparison to previous dentures.

KEYWORDS

Neutral Zone, Complete dentures, Dental Implants

Introduction

All oral functions, such as speech, mastication, swallowing, smiling and laughing, involve the synergistic actions of the tongue, lips, cheeks and floor of the mouth.[1]

Fish pointed that out of the three surfaces of the denture the polished surface is bounded by the tongue and the cheeks. These are involved in normal physiologic movements such as speech, mastication, swallowing, smiling, and laughing.[2]

[redacted]

According to the Glossary of prosthodontic terms, neutral zone is the potential space between the lips and cheeks on one side and the tongue on the other, that area or position where the forces between the tongue and cheeks or lips are equal.[4]

In the present case, a patient suffering from use of ill-fitting dentures for several years reported with his existing dentures which he wears only during social occasions and is forced to remove the dentures during mastication.

Upon careful examination and diagnosis, it was found that patient has resorbed ridges, heavily built tongue and cheeks which encroached on the existing denture space reducing the overall stability of existing dentures.

In the treatment plan, a denture with neutral-zone concept was advised as the treatment option for him and he was more than happy to comply with extra visits during the course of treatment.

Many techniques have been suggested to obtain neutral zone. The modelling plastic impression compound technique located in the neutral zone, using swallowing as the principle modelling function is most widely employed.[1]

Rinaldi and Sharry refer to a study which indicated that the tongues of aged persons showed no atrophic tendencies, which is not true of other tissues. It is advantageous to record the positions of the tongue during sucking, swallowing, and movement.[5]

This would help in utilizing the forces that help in seating the new set of dentures which were positioned in the neutral zone thereby minimizing the forces that tend to unseat a denture in function.

The clinical and laboratory steps of Complete denture fabricated using Neutral zone concept have been duly followed with reverse complete denture impression steps including external and internal impressions.

As expected, there is a significant difference in the position of teeth when compared with the previous conventional dentures.

CASE REPORT

Inpre-treatment assessment, a male patient aged 70 years reported with chief complaint of unstable existing dentures and difficulty in chewing food. He complains that his tongue feels locked between lingual surfaces of lower denture on both sides.

Patient expectations were realistic as in, a denture which is comfortable to use, remains stable during all functions and is good-looking.

In history, patient lost most of his teeth due to mobility about five years back. He has not used dentures for at least two years post-extraction. Then, he got the existing dentures made about three years back and was not satisfied with its form and function.

The existing dentures look acceptable in terms of occlusion but unacceptable in terms of comfort. They have been maintained fairly well and the posterior teeth seem to have worn out with use. No relevant medical history is presented. Patient hails from an average socio-economic family and is living a retired life currently. He has a good cordial relationship with his family and neighbours.

Upon clinical examination, in extra-oral features, patient's facial form is of square from, facial profile is straight, lower facial height has vertical dimension at occlusion increased with existing dentures in place. patient has normal muscle function but slightly decreased muscle tone and muscle development is of House's class I i.e., Heavy.

Upon lip examination, lips are adequately supported, healthy lips with normal mobility.Both upper and lower lips are thick and length is normal. Upon TMJ examination, no abnormalities were detected.

Patient's speech isaffected due to impaired articulation and abnormal co-ordination of speech with existing dentures. His neuro-muscular co-ordination seems fair.

In intra-oral features, patient has healthy mucosa with normal quality and quantity of saliva. Residual alveolar ridge examination revealedthat both upper and lower arches are small in size. Upper arch is ovoid and lower arch is tapering in form. Highly resorbed upper and lower ridges. Contour of upper ridge is flat ridge with smooth round edges whereas lower ridge hasknife edge ridge contour. Inter-Ridge relation is Angle's Class I i.e.,Normaland both ridgesareparallel to each other. Inter-arch space is excessive due to high resorption. Hard Palate is almost flat. Soft Palate is under Class II i.e.,makes 45^0 angle to the hard palate. Palatal throat form is of House's Class II i.e., medium sized

and normal in form, with a relatively immovable resilient band of tissues 3-5mm distal to a line drawn across the distal edges of tuberosities. Lateral throat form is of Neil's Class II i.e., moderate lateral throat form. Gag reflex and palatal sensitivity are of House's Class I i.e., Normal. Bony undercuts arepresent as moderate depth undercuts in anterior labial region of both upper and lower ridges. Tori are absent. Border attachments are of House's Class III i.e.,the distance between crest of the ridge and the attachment is less than 0.25 inches and frenal attachments are of Class II i.e.,frenum is located nearerto the crest of the ridge

Tongue examination reveals House's Class IIIi.e,large in size, development and function.With respect to tongue position, Wright's Classification does not mention large tonguein edentulous patients. This may be result of increased size of tongue resulting from long-standing edentulousness and also relative resorption of residual ridge.

Hence, Patient's tongue is large and positions above the crest of the ridge both anteriorly and posteriorly even in rest position.

Floor of the mouth examination does not reveal any abnormalities.

PRE-TREATMENT PHOTOGRAPHS

Fig 1: O with existing

Fig 2: E

PRE-TI s

Fig 3: Exi t

Fig 4: Existin oncept

Fig 5: Maxill

Fig 6: Mandi

Diagnosis wa maxillary and mandibular re ily developed peri-oral muscles and large tongue encroaching on the residual ridge at rest. Aims and objectives of treatment were"Replacement of lost form, function and esthetics". Treatment plan was to construct removable complete denture prosthesis in upper and lower arch With Neutral Zone concept.

TREATMENT PHOTOGRAPHS

Fig 7: Upper ith retention tags in place

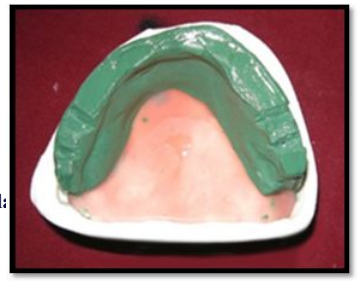

Fig 8: Maxill compound

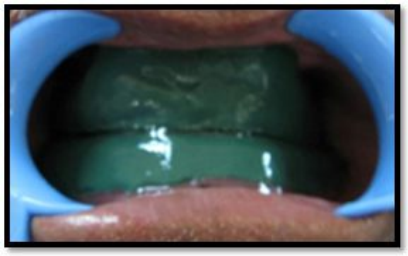

Fig 9: Ten

Fig 10: Se ecial tray, green stic le eugenol impressio

Fig 11

Fig 12

Fig 1 ture

Fig 14: E :r

Fig 15: M

Fig 16: M: :pt POST-TR

Fig 17: I

Fig 18: I

Fig 19: In o

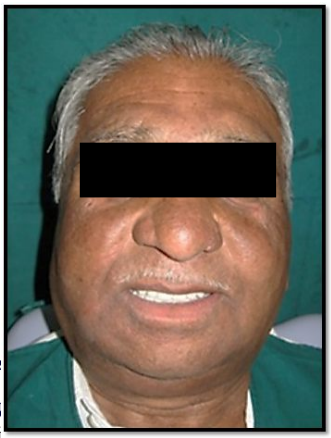

Fig 20: Post ins

DISCUSSION

The above clin ow and provide great retention, stability and support when employed to any complete denture case.

In the follow-up visits at 1 day, 1 week and 1 month, patient was not only happy with the stability of dentures but also expressed satisfaction over functioning and aesthetics of the dentures.

In our daily prosthodontic practice, we come across many patients who are not happy with their lower dentures. They complain of ill-fitting unstable dentures. Such patients rarely use the dentures except when visiting the dentist or for esthetics.

Many a times, when such patients visit us, we tend to direct the blame of instability of dentures to over-extended denture borders or to the resorption of residual ridges.

Such complaints are heard mainly over two main spectrum of complete denture cases. Firstly, patients transitioning from immediate dentures to conventional complete dentures. Secondly, such patients who exhibit excessive resorption and active peri-oral muscles.

Teeth are generally positioned by the conventional concept which dictates that a denture's stability is maintained by good tissue contact at impression surface and vertically directed forces along the teeth positioned at crest of the ridge. While it may be true for most of the cases, there are cases where excessive resorption of residual ridge and highly-active peri-oral musculature tend to dispel this conventional belief.

Overall influence of muscular environment is a major determinant of position of teeth even when it comes to natural dentition.

Several studies have compared denture fabricated by using neutral zone and conventional techniques, and it has been observed that neutral zone dentures are functionally more stable than conventional dentures, increase patient comfort and function, and experience minimum postinsertion problems.[6] However, according to Fahmy and Kharat, comfort and speech performance were better with neutral zone dentures than with the conventional dentures, which showed better mastication results.[7] Raja et al showed that in those with longer periods of edentulism, neutral zone dentures had better assessment results and success.[8] These dentures have the advantages of improved stability and retention, sufficient tongue space, reduced food trapping adjacent to the molar teeth, and good esthetics due to facial support.[9]

In cases of atrophic mandible, the option of dental implants helps in providing a more stabilized mandibular complete denture, but in cases where it is not possible to provide implants due to medical risks and economic limitations, an alternative procedure must be thought.[10]

CONCLUSION

Complete denture in resorbed ridge cases has to be considered as a mechanical object without anchors. In such a case, any force acting against the equilibrium between outer musculature and inner musculature will tend to unseat the denture.

The answer to these problems lies in Neutral zone concept for position of polished surface of denture including the facial and lingual surfaces of teeth.

It is the same concept that is advocated to reduce negative effects of horizontal forces applied on implant prosthetics. In future, if the patient is medically-fit for surgery and sufficient quality and quantity of bone is available, implants could be considered to provide better retention in the form of overdenture.

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