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GUIDE PLANES: RETENTION AID IN ARAMANY'S CLASS IV DEFECT

Dental Science

Anumeha Jha* MDS Prosthodontics and crown and bridge, Resident, Department of Prosthodontics, Government Dental College, Raipur, Chhattisgarh, India *Corresponding Author

Sanjoy sahoo MDS Prosthodontics and crown and bridge, Private practitioner, Kolkata West Bengal, India

Mahendra Anant MDS, Prosthodontics and crown and bridge, Lecturer, Department of Prosthodontics, Government Dental College, Raipur, Chhattisgarh, India

Manu Verma Prosthodontics and crown and bridge, Lecturer, Department of Prosthodontics, Government Dental College, Raipur, Chhattisgarh, India

KEYWORDS

Guideplanes, Aramany Class IV Defect, Occlusal Rests, Embrasure Clasp, Framework Design

INTRODUCTION

Fabrication of maxillofacial prosthesis is a tedious and challenging practice. Amongst the six classes proposed by Aramany, Aramany type IV class presents with remaining teeth in a linear configuration. This disposes cross arch stabilization of prosthesis rendering condition unfavourable for retention and stability of prosthesis. Various authors have proposed methods for enhancing retention like combination of buccal and palatal clasp retention, guide planes incorporated in full veneer retainers, guide planes bonded to palatal surfaces of remaining teeth etc. In such situations the use of guide planes has shown not only to restrict the path of insertion but also provide reciprocation and indirect retention and thus, enhance the stability and retention of the prosthesis. This case report compares the advantages and disadvantages of the usage of guide planes in Aramany's class IV situation to other methods of retention.

CASE REPORT

A 58 year old male patient reported to the Department of Prosthodontics and Crown and Bridge, R. Ahmed Dental College and Hospital, Kolkata, after 4 months of subtotal maxillectomy[1] (fig.1). The patient was in a state of good general health but had complaint of regurgitation of food through nose since surgery, difficulty in mastication and poor aesthetics.

Figure 1- Class IV Aramany's maxillary defect; remaining teeth in one quadrant and have a linear configuration.

After general, oral and radiological examination the patient was suggested for a removable cast partial denture for rehabilitation of maxillary arch. The prosthesis was planned in accordance with the linear arrangement of the remaining maxillary teeth. The remaining right maxillary second premolar, first molar and second molar were planned to receive cast metal full veneers and the maxillary first premolar for porcelain fused to metal full veneer crown. Occlusal rest seats on all remaining teeth were planned for support providing wider distribution of stress (fig.2). Buccal cervical undercuts for embrasure clasps and palatal guide planes terminating gingivally in a ledge were planned as modification in full veneer crowns.

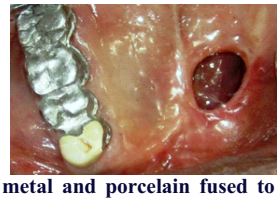

Figure 2- Cast metal and porcelain fused to metal full veneer restorations with palatal guide planes and occlusal rests.

Mouth preparation was done for the planned prosthesis and final impression made. A maximum intercuspation record was registered in modelling plastic impression compound on the defect side[2]. Also, an aluwax record of the first and second molar was recorded with the modelling plastic impression compound bite in place to maintain the vertical dimension.

The full veneer crowns were fabricated aided by surveying. The crowns were checked for fit and occlusion intraorally followed by cementation. A new final impression was made for fabrication of metal framework. After intraoral adjustments of the metal framework, a maximum intercuspation record was made in wax occlusion rims and casts articulated. Teeth arrangement was done followed by try in. Acrylized denture was given to the patient along with post insertion instructions on usage and maintenance of the prosthesis (fig.3).

Figure 3- Cast partial denture in situ.

DISCUSSION

Thomas D. Taylor and Arcuri[2] summarized the basic principles for designing framework of definitive obturator prosthesis as 1. Maximum distribution of support for the obturator, derived from occlusal and cingulum rests placed on all available abutment teeth 2. maximizing the retentive potential of the remaining teeth as well as retention from the defect side, 3. Moderate retention located at the extreme points of remaining teeth

[Desjardins, 1978] 4. Maximum resistance form or indirect retention from parallel guide plane surfaces on as many abutment teeth as possible.

Desjardin 1978[3] described different designs and features of obturators for rehabilitation of surgically resected maxillary arches. He mentioned that with unilateral location of teeth and retentive areas located on one side, rotation of the prosthesis out of the defect and of the clasps out of the retentive undercuts may occur. He supported the use of palatal guide planes and retentive clasps.

In literature three designs for an Aramany class IV defect[4] have been mentioned. Beumer, Curtis and Firtell[5] 1979 mentioned the use of lingual retentive clasp arms along with buccal reciprocating arms. This design disengages the teeth when the prosthesis is displaced superiorly, thus, being kind to them. But the disadvantage is lesser retention and greater motion around the fulcrum line.

Gregory R. Parr et al[6] described a combination of buccal retention on

the premolars and palatal retention on the molars. But this design presents the following problems 1.loss of bracing and stabilization, 2. increased rotation and 3. small irritating spaces in the major connector design.

Taylor et al[7] 1988 opined that the only effective method available to counteract the rotational tendency is to create guide plane on the sides of the teeth facing the obturator i.e. the palatal surface for Class IV Aramany defect.

Use of lingual guide planes for reciprocation has been advocated to assist reciprocation of the non-vertically exerted forces on the abutment teeth[8]. Also Stewart and Rudd proposed that lingual guide planes can be used to stabilize periodontally weakened teeth[9]. Other benefits that have been suggested are improved gingival health, avoiding proliferation of the gingival cuff, a feature associated with the use of full length guide planes which allow a properly supported denture base to make contact with the mucosa [10].

With respect to the above mentioned case the potential source for retention, support and stability were the remaining teeth and residual hard palate to some extent. Embrasure clasp used in combination with palatal guide planes provided retention. Guide plane restricted the path of insertion, provided reciprocation and indirect retention as well, enhancing the stabilization of the prosthesis. Occlusal rests on each tooth support the prosthesis and were used for wider distribution of stresses. The ledge resists the tissue ward displacement of framework preventing the gingival irritation caused by guide plane.

Although guide plane incorporation immensely aids retention and stabilization of prosthesis it has the disadvantage of locking the framework to the remaining teeth due to palatal guide planes and embrasure clasps.[2] Also, the repair and replacement of any part will be tedious and will greatly influence the fit of the prosthesis. Taylor et al[2,7] have described the use of resin bonded metal guide planes on slightly modified palatal surfaces of teeth to overcome this problem. But it has the risk of debonding of the metal guide planes as well as inadvertent swallowing/ aspiration.

CONCLUSION

Fabrication of a maxillofacial prosthesis is not only a tedious but a challenging practice. Compliance of the patient relates directly to the intraoral inconspicuousness of the prosthesis. This is possible when retention, support and stability of prosthesis suffice in function. Every treatment modality has associated advantages and disadvantages and is not universally applicable. The above mentioned case was treated keeping in mind the difficulty of restoring a resected maxillary arch with only few remaining teeth that too in a linear configuration and absence of any retentive or supportive features on defect side. The prosthesis was designed to achieve following

1. The incorporation of guide planes aided retention and stability of the prosthesis, especially when there were no undercuts on the defect side that could have been used for the same.
2. Occlusal rests on each tooth were used to compensate for the absence of any hard and soft tissue support on the side of defect. Rests also ensured distribution of stresses amongst all remaining teeth reducing the probability of overload of a single tooth.
3. The disadvantage of such a design is the extensive preparation of otherwise healthy teeth to incorporate retentive, supportive and stabilitizing features. This can be prevented by using resin bonded metallic guideplanes on palatal suface of teeth. But these can be frequently associated with debonding issues under occlusal loading.

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