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Treatment of Reduced Interarch Space With Precision Attachment Prostho - Perio Interdisciplinary Approach – A Case Report

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Abstract
Adequate Inter-arch space is necessary in case of a successful prosthesis. Reduced interarch space can further affect the stability, crown/root ratio alteration, and poor aesthetics. Rehabilitation of a distal extension in partially edentulous patient become more difficult once the patient neither accepts the treatment choice of implant placement nor for a removable prosthesis. The solution in such a vital scenario is to place a combined prosthesis. The case report describes the management of reduced inter-arch area with periodontics and prosthodontics interdisciplinary approach. It encompasses of periodontal approach to extend the space for an ideal prosthesis.

Keywords:- *Dental Prosthesis, Precision Attachment, Reduced inter-arch space, Combined Prosthesis, Fixed-Removable prosthesis, Crown lengthening, Alveoloplasty.*

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I. Introduction

Adequate interarch space is necessary for the placement of a functional dental prosthesis. According to Misch, the interarch space should be at least 8–12 mm in vertical distance.[1] Reduced inter-arch space is often seen in cases of extensive tooth surface loss (caries and non-carious), missing teeth with a supra-erupted antagonist, genetic variation in tooth form, iatrogenic dentistry (excess tooth reduction, large endodontic access openings), trauma, insufficient passive eruption and mesially tipped teeth. Reduced inter-arch space can result in decreased stability, crown/root ratio alteration, and poor aesthetics. There are various treatment modalities like extraction of supra-erupted teeth, performing an intentional root canal therapy for the supra-erupted tooth and crown shortening, orthodontic intrusion of teeth using implants, or performing posterior maxillary segmental osteotomy.[2]

However, The Success of functional and aesthetic management is chiefly based on the consideration of prosthetic and periodontal health of the respective prosthesis, which incorporates soft tissue and hard tissue recontouring. Surgical crown lengthening procedures are done to provide a retention form that aids in precise tooth preparation creating impressions, positioning restorative margins, and esthetics.[3] The surgical procedure of Alveoloplasty is primarily executed to facilitate the fabrication of a prosthesis. Rehabilitation of Kennedy's class II is difficult for fixed prostheses. Prosthesis-like implant placement is unfeasible due to either cost or concern of surgical innervation in the patient and a fixed prosthesis is inaccessible as it has no distal abutment.[4] Therefore, combined prosthesis consists of a fixed prosthesis denture (crown) retaining acrylic partial denture with precision attachment as an obtained treatment choice. Precision attachment denture is a fusion of fixed and removable prosthesis, therefore, producing the most aesthetic partial denture possible.[5]The present paper reports a case of reduced interarch space in an aged patient. The interdisciplinary treatment approach included

Periodontic surgical procedure of alveoloplasty in relation to mandibular edentulous ridge and crown lengthening in relation to maxillary antagonist teeth, to increase the interarch space, followed by Prosthodontic treatment of Precision attachment denture in mandibular unilateral distal extension Kennedy's class II modification.

II. Case Report

A 50-year-old female patient reported in the department of Prosthodontics in a college of dental science Amargadh, dist. Bhavnagar. She complained of missing right and left mandibular posterior teeth i.e., 46 and 47, and 36. Supra eruption i.r.t 16, 17 (Figure 1)

Following an intensive dental check-up, clinical and radiographic analysis was done to rule out other dental problems. The patient had given a history of root canal treatment (RCT) in relation to 44, 45 and 37 and was confirmed in Intraoral Periapical radiograph. According to Kennedy's classification and Applegate's rule, the mandibular arch was classified as Class II modification 1. The patient was diagnosed as mandibular unilateral distal extension Kennedy's class II modification 1. The first choice of treatment was implant placement for missing teeth and crowns for the RCT-treated teeth, patient refused for implant procedure as well as for removable prosthesis. Hence, a combined prosthesis consisting of fixed prosthesis retaining acrylic partial denture with precision attachment was planned including 44 and 45, and fixed partial prosthesis in relation to 35, 36, and 37. Diagnostic impressions were created using alginate (Figure 2). Diagnostic casts were fabricated and mounted considering centric relation (Figure 3). A significant reduction in the interarch space was seen on the cast and there was observable supra eruption in relation to 16 and 17 due to the absence of 46 and 47. The patient was motivated by good oral hygiene practices. A preliminary treatment plan was formulated and discussed with the patient followed by informed patient consent. Treatment was rendered according to phases. The preliminary phase involves phase I therapy i.e. scaling and root planing followed by an intensional root canal along with correction of the occlusal plane were done in relation to 16 and 17(Figure. 4) Later the patient was referred to the department of periodontics in the College of Dental Sciences, Amargadh for consultation regarding inadequate interarch space.

The ideal interarch space should be at least 8–12 mm in vertical distance. However, on examination using a periodontal probe (GDC®, Williams) showed less than 5 mm space between the occlusal surface of 16 and the mandibular alveolar ridge (Figure 5). Thus, to increase the interarch space, 2 mm of alveoloplasty in 46 and 47 edentulous regions and 2 mm of crownlengthing in relation to 16 and 17 were planned.

Surgical Procedures

A local anesthetic was given to the patient using 2% lignocaine with 1:200000 adrenaline. Sulcular depth and transgingival depth (bone sounding) were measured using a periodontal probe (GDC®, Williams) to determine biological width level, the distance between the gingival margin and the height of creastal bone (bone sounding) was 5 mm and sulcular depth was 3 mm. Hence, maintaining the biological width soft tissue crown lengthening was done in which about 2mm of the marginal gingival tissue was removed on both the buccal and palatal side with internal bevel gingivectomy technique in relation to 16 and 17 (Figure 6)

Simultaneous alveoloplasty in relation to the 46 and 47 tooth region was done with crestal incision along with vertical releasing incision given with no 15 blade, a full-thickness flap was raised using periosteal elevators. 2 mm of bone reduction was done to increase interarch space with the help of bone file (Hu-Friedy®, miller #21). The buccal and lingual flap was approximated with Simple interrupted suture using 3-0 Non-absorbable silk. After surgery postoperative instructions were given to the patient including oral hygiene instructions, Patient was put on antibiotics and nonsteroidal anti-inflammatory medication for 5 days and Chlorhexidine mouthwash 0.2% were prescribed for 2 weeks. The patient was recalled after a week for suture removal. After 3 months of follow- up, the gingival form was well established and interarch space was increased from less than 5 mm to around 9 mm when measured with a periodontal probe (GDC®, Williams) (Figure 7).

Prosthetic Procedure

After regaining the desired space, a combined prosthesis retained by extra coronal castable precision attachment was planned. After clinical evaluation, a radiograph was taken of the RCT-treated teeth. A diagnostic cast was poured from the preliminary alginate denture session. Tooth preparation of 44 and 45 abutment teeth was done and temporary crowns were seated over the prepared teeth. A definitive impression was sent to the lab where casting was done. Trial denture was evaulated followed by bite\inter-occlusal recorded was done (Figure 8). Acrylisation of trial dentures was done (Figure 9).

The final Cementation of the crown was done with glass ionomer cement and the acrylic prosthesis was attached with the given attachment (OT Unilateral Rhein 83, USA). Occlusal contacts were evaluated in centric and eccentric positions (Figure 10). The patient was recalled after 1 day for post-insertion evaluation and instructed to maintain proper oral hygiene.

III. Discussion

According to N. Basutkar et al Optimal restoration of a patient with restorative space, issues depends on several interdependent factors such as the amount of restorative space available, amount of restorative space required for the proposed dental prosthesis and restorations, quality, and quantity of remaining dentition and residual alveolar ridge and functional patient demands and esthetic. Accurate clinical and radiographic examinations, careful determination of VDO, and systematic treatment planning using a diagnostic wax-up are key to predictable and successful treatment for patients with restorative space issues.[2]

Cheng et al,[6] reported that proper abutment selection enabled the placement of implant-supported prostheses in a patient with limited interarch space. Geckili et al,[7] described the treatment of a partially edentulous patient (Kennedy class II, the modification I) with a limited interocclusal distance using orthodontic intrusion and massive alveolar resection. Although prosthetic management techniques for patients with restricted interarch space have been reported, none of them applied to our patient due to the patient's compliance. In the present case,

Two surgical procedures were advocated to increase the inter-arch space i.e alveoloplasty in relation to 46 and 47 teeth region and crown lengthening with 16 and 17.

According to GPT-9, "Precision attachment is a retainer consisting of a metal receptacle (matrix) and a closely fitting part (matrix); the matrix is usually contained within the normal or expanded contours of the crown on abutment tooth/ dental implant and the matrix is attached to a pontic or a removable partial denture" (Ferro,2017).

Mukherji et al state that the long-term success of all restorations and prostheses depends on the preservation of biological width. A case of short clinical crown length can be successfully restored by crown lengthening and placement of a prosthesis that does not encroach on the biological width. In such cases, the high prognostic value of the treatment can be achieved by an interdisciplinary treatment approach.[3] According to Gupta et al, Precision attachment is mostly indicated for non-parallel abutments distal extension bases, and long-span edentulous arches. It is a connector consisting of two or more parts. One part is connected to the root, tooth, or implant, and another part is to the prosthesis. The attachment system used is an extra coronal castable attachment positioned on the distal surface of the crown as an extension. The castable male component can be shaped easily with crowns during the wax-up stage. The female component within the acrylic partial denture completely covers the male component. The fixed removable prosthesis was first introduced by Dr. James Andrews. With proper case selection, diagnosis, and treatment plan, a precision attachment denture is a good treatment option. The limitations associated with this attachment are its fabrication requires well-trained lab technicians and with time due to wear and tear parts of the attachment need to be replaced.[8]

IV. Conclusion

The high prognostic value of the treatment can be achieved by an interdisciplinary treatment approach. This case report represents the successful management of a partially edentulous patient with reduced inter-arch space by periodontics- prosthodontic approach.[9] An increased interarch space was achieved by intentional root canal treatment with crown lengthening in supra erupted teeth and alveoloplasty in the edentulous region followed by the fixed prosthesis and combined prostheses of acrylic retained by extra coronal precision attachment system (OT unilateral attachment system, Rhein 83, USA).

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

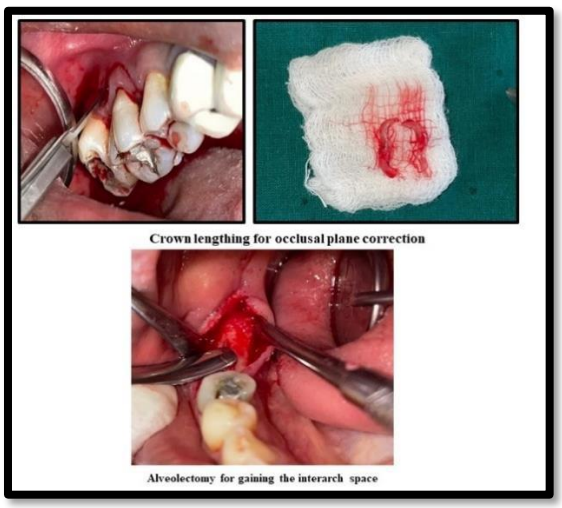

Figure 6

Figure 7

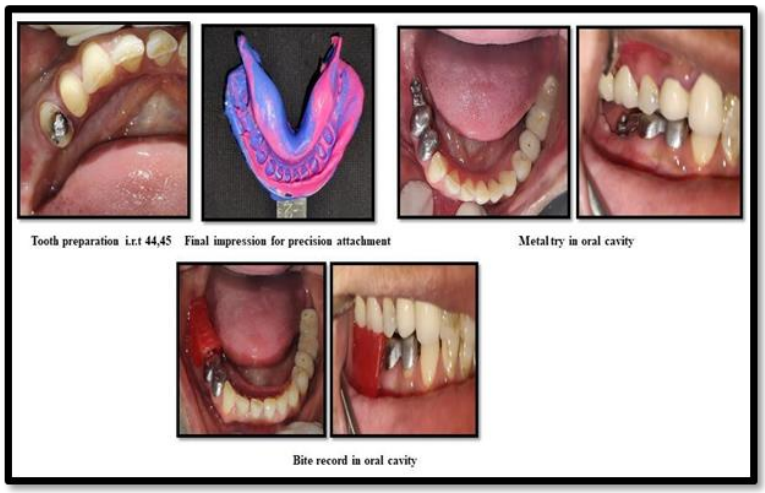

Figure 8

Figure 9

Figure 10

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