



Case Report

Periodontal management of compromised abutment for rehabilitation of aesthetic zone: A case report

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ABSTRACT

Fixed Dental Prosthesis is a treatment modality to replace the missing tooth by utilizing the adjacent teeth as abutments. The health, periodontal surface area, crown root ratio and other parameters govern the condition of abutment. The examination of these teeth by clinical and radiographic parameters determine its usage as abutments to support and retain the prosthesis. Adjunctive therapy like crown lengthening, foundation restorations and others can be used to improve the condition of abutments keeping in mind the basic periodontal and prosthodontic principles. This case report highlights the importance of Perio-Prosthodontic relationship in successful rehabilitation of a questionable abutment in esthetic region.

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1. Introduction

A fixed dental prosthesis (FDP) is the most popular and time tested clinical treatment procedure for replacement of missing teeth. For success of a FDP, the abutment evaluation is of paramount importance. Various authors have proposed many criteria for evaluation of prospective abutment with Johnston's criteria being most widely accepted.¹ Modification of abutment to provide support and retention to a prosthesis is a part of mouth preparation which deserves due importance in the treatment planning and execution.

Multidisciplinary approach including endodontic treatment, periodontal therapy and minor oral surgical procedures enhance the condition of abutments and ensure success of prosthesis. The clinical height of crown and crown root ratio can be improved with adjunctive periodontal therapy, maintaining the physiological biological width and the condition of alveolar bone. Inadvertent forces of the abutment and improper designing

of prosthesis exerts leverage forces of the prosthesis, thereby compromising the state of abutment.¹ The success of a prosthesis is based on the condition and health of the abutments, the edentulous site and the maintenance of hygiene. This case report aims to highlight a multidisciplinary approach for rehabilitation of partially edentulous mandibular arch with questionable abutment utilizing common periodontal procedure to enhance the overall prognosis of the treatment.

2. Case Report

A 39 years old patient reported with the chief complaint of dislodged prosthesis in lower front tooth region since 15 days. Past dental history revealed pain and bone loss in lower front tooth region 04 years back, followed by extraction of mandibular right central incisor having poor prognosis and endodontic treatment of mandibular lateral incisor on right side and central incisor on left side with a three unit FDP. Intraoral examination revealed endodontically treated 31,42 with compromised clinical crown and missing 41 (Figure 1). The condition of residual

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ridge was well healed. Radiographic investigation revealed bone loss in the area of edentulous ridge, the clinical crown length was inadequate with adequate root length and adequate bone supporting abutments (Figure 2). Based on clinical and radiographic examination a diagnosis of PDI class II partially edentulous arch irt 41 with questionable abutments was made. The treatment options were immediate extraction and immediate implant placement irt 31,42 followed by a three unit FDP to replace missing 41, post and core of endodontically treated 31,42 and a three unit FDP or Crown lengthening maintain the biological width, followed by FDP.²

To improve the condition of abutment, crown lengthening was planned followed by four unit FDP irt 32,31,41 and 42. The treatment was divided into 4 phases, with scaling and maintenance of abutments and evaluation of endodontic treatment as phase I, Phase II included surgical crown lengthening of 31 and 42 and tooth preparation irt 32,31 and 42. Phase III included Prosthodontic rehabilitation of missing 41 and Phase IV was maintenance phase with a routine follow up at 01 week, 01 month, 03 months and subsequently every 03 months.



Fig. 1: Pre-Operative intraoral view.

Diagnostic impressions were made and diagnostic mounting was done. The clinical crown available was 3mm for 42 and 2mm for 31. This was considered inadequate for retention and resistance form and hence, surgical crown lengthening was planned. The area was anesthetized with 2% lignocaine with 1:80,000 adrenaline. Once the area was anesthetized, no. 12 surgical blade was used to give an internal bevel incision removing a part of marginal gingiva surrounding the tooth, surgical bur was used to remove the crest of alveolar bone, maintaining the optimum biological width (Figure 3). Sutures were placed and zinc oxide eugenol based perio-pack (Coe-Pak, GC, USA) was applied and left undisturbed for 01 week. After 01 week, the pack and sutures were removed. The gingiva appeared healthy with healing tissue. After 02 weeks of maintenance of the area, tooth preparation was done following prosthodontic protocol (Figure 4). Gingival retraction using 000 retraction cord (Sure cord, Sure endo, Korea) was done and two stage putty was impression using



Fig. 2: Pre-operative radiograph.



Fig. 3: Surgical crown lengthening.



Fig. 4: Tooth preparation

Table 1: Management of questionable abutments.

| Periodontal | Endodontic | Prosthodontic | Treatment option |
|---|---|---|---|
| Gingiva healthy No Clinical Attachment Loss No Pocket | Good Apical Seal No Periapical Pathology No Root Resorption | Adequate Clinical Crown C:R Ratio = 1:1 Adequate Occlusal Clearance | Full Coverage/Partial coverage |
| Gingivitis/Periodontitis Mobility Pocket | Healthy | Healthy | Periodontal Therapy TFO Full Coverage Restoration out of Occlusion Splinting |
| Healthy | Deep Caries Periapical Radiolucency | Healthy | Root Canal Therapy DPC/IPC Full Coverage Restoration |
| Healthy | Healthy | Inadequate Coronal tooth structure | Secondary Retentive features, Post & Core Crown Lengthening Full Coverage Restoration with subgingival margin |

**Fig. 5:** PMMA provisional restoration in-situ.**Fig. 7:** Definitive restoration in-situ**Fig. 6:** Mounting on a semi-adjustable articulator (Stratos 200)**Fig. 8:** Pre-treatment and Post-treatment comparison.

Polyvinyl siloxane impression material (Affinis, Coltene Whaledent Ltd, Switzerland) was made for fabrication of definitive restoration. Provisional restoration was fabricated by indirect-direct method (Figure 5). Master cast was fabricated in type IV die stone, facebow record was made using UTS 200 facebow and mounted on Stratos 200 semi-adjustable articulator using centric record (Figure 6). Metal copings were fabricated in Ni-Cr base metal alloy and try-

in was done. Shade selection for veneering ceramic was done based on the area of gingiva and tooth in gingival, cervical, middle and incisal region and definitive restoration was fabricated (Figure 7). The prosthesis was tried and luted using type I luting glass ionomer luting agent (GC Fuji, Tokyo). Improved esthetics and patient confidence was seen and he was kept on a regular recall (Figure 8). A follow up of 18 months revealed healthy gingival margin with intact restoration.

3. Discussion

Abutment is defined as a tooth, a portion of a tooth, or that portion of dental implant that serves to support and/or retain the prosthesis.³ A well supported abutment is a prerequisite for a successful fixed dental prosthesis. Various factors that govern the choice of abutment include root configuration, crown morphology, Crown: Root ratio, periodontal support and surface area, Ante's law, root proximity, parallelism and others.⁴ Mouth preparation and need for local adjunctive therapy to enhance the condition of abutment has also been acknowledged in the American College of Prosthodontics classification criteria.²

Zitzman proposed considerations for evaluation of teeth and gave a prognostic criteria based on periodontal, prosthetic and endodontic evaluation. Questionable abutments are those with <3mm wall height or >25 degree convergence angle. These compromise the retention and resistance form, thereby encroaching on mechanical principles of tooth preparation. These abutments may need use of additional secondary features like grooves, box or slot, periodontal surgeries to improve the periodontal support including crown lengthening, endodontic therapy in cases of deep caries approaching pulp, orthodontic extrusion or repositioning or prosthodontic procedures like post and core to improve the prognosis of the treatment procedure and longevity of restorations.⁵ (Table 1) Crown lengthening is defined as a surgical procedure that aims at exposing sound tooth structure for restorative purposes via apical repositioning of the gingival tissue, with or without the removal of alveolar bone.⁶

Biological width and width of attached gingiva are the important parameters that direct the choice of procedure and its prognosis.⁷ Biological width is the part of the supracrestal tissue that occupy the space between the base of gingival crevice and the crest of bone. If the biological width is encroached, it predisposes to development of a zone of chronic inflammation. Insufficient width of junctional epithelium compromises the sealing effect of the dentogingival unit, thereby, making the tissue prone to damage by routine mechanical oral hygiene procedures. This may also hamper proper plaque control leading to inflammatory changes creating an unhealthy periodontal environment.^{8,9} A minimum width of 2mm of biological width must be maintained post crown lengthening to avoid accumulation of inflammatory mediators and loss of crestal

bone. This maintains the health of the periodontal tissue and ensures longevity of restoration.

A semiadjustable articulator allows mimicking the movements of the joint and fabrication of restorations which are in harmony with the entire stomatognathic system. For successful rehabilitation post crown lengthening, 3-4 mm of sound tooth structure should be obtained coronal to the crest of bone, with 2mm bracing on sound tooth structure and atleast 2 mm of biological width. If not, alternate treatment modalities should be sought.¹⁰ Keeping these principles in mind and using an interdisciplinary approach, the life of a tooth and longevity of the restoration may be increased multifold as preservation is the ultimate goal of a successful dental therapy.

4. Conclusion

Though in the present era, implant dentistry is the first choice of treatment for rehabilitation of any missing tooth, it is important that the basic concepts of preservation of natural tooth should not be compromised. The endeavour should be to explore all the alternatives with the help of all dental specialties and the treatment options should be carefully eliminated to decide what is best for the patient.

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6. Conflict of Interest

None.

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