Case Report

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Perio-Prostho Interrelationship: An Open Bite Case with Worn Out Dentition Requiring Crown Lengthening Procedure for Full Mouth Rehabilitation with Aesthetic Restorations

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ABSTRACT

Background: Rehabilitation of the severely worn dentition is one of the most challenging aspects in dentistry. The inadequate tooth structure in a worn dentition requires the need for a surgical crown lengthening procedure for gaining sufficient crown height. This procedure avoids the violation of the biologic width and maintains the integrity of the periodontium. The crown lengthening procedure followed by full mouth rehabilitation gives satisfactory results from a functional and aesthetic point of view. This article presents a case report of a 21-year-old female patient restored in aesthetics and function with full mouth rehabilitation of her hypoplastic teeth and anterior open bite.

Keywords: Full mouth rehabilitation, crown lengthening procedure, periodontics, prosthodontics, open bite.

INTRODUCTION

Oral rehabilitation is a procedure of restoring the aesthetic and functional integrity of the oral structures using a prosthesis. The restoration of the worn dentition represents a clinical challenge. Treating a case with enamel hypoplasia is complex due to hard, thin, and deficient enamel because of defective enamel matrix formation. Grossly worn teeth often pose problems due to unavailability of sufficient clinical crowns. Therefore, a crown lengthening procedure is crucial for the management of such teeth. Crown lengthening procedures increase the supragingival tooth structure for aesthetic or restorative purpose.

The concept of biologic width given by Gargiulo, Wentz and Orban describes the distance between the apical end of the gingival sulcus, and the alveolar crest which is of an average of 2.04 mm where 0.97 mm is occupied by the junctional epithelium and 1.07 mm is occupied by the connective tissue attachment.[1] Violation of the biologic width can have a deleterious effect on the periodontium.

Management of worn dentition is complex and difficult to restore. The comprehensive treatment plan involves clinical assessment, study models mounted on the semi-adjustable articulator and diagnostic wax-up. This article displays a case report of full mouth reconstruction wherein the crown lengthening procedure was done for functional and aesthetic purpose.

CASE REPORT

A 21-year-old patient reported to Nair Hospital Dental College, Mumbai, with the chief complaint of not good-looking gummy smile and generalized sensitivity in the posterior worn out dentition. (figure1,2,3,4,) The patient was systemically healthy. Extra-oral examination showed incompetent lips in rest and function. (figure5) No TMJ deformity and no abnormal sounds heard on opening and closing the mouth. On intra-oral examination teeth were small with yellowish discolouration. Generalized hypoplastic teeth with loss of tooth structure and

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Fig 1: Pre-operative frontal view

Fig 2: Pre-operative lateral view

Fig 3: Pre-operative maxillary occlusal view.

Fig 4: Pre-operative mandibular occlusal view.

Fig 5: Pre-operative smile view

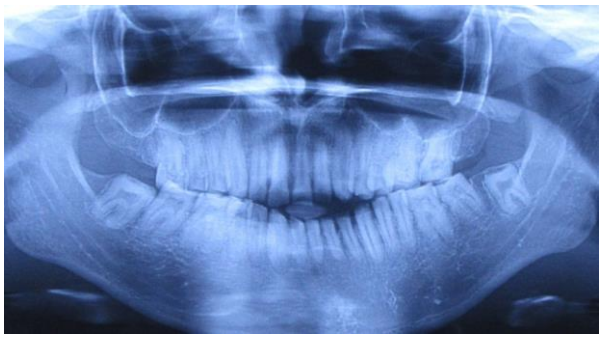

Fig 6: Digital orthopantograph.

Fig 7: High maxillary labial frenum held with a hemostat.

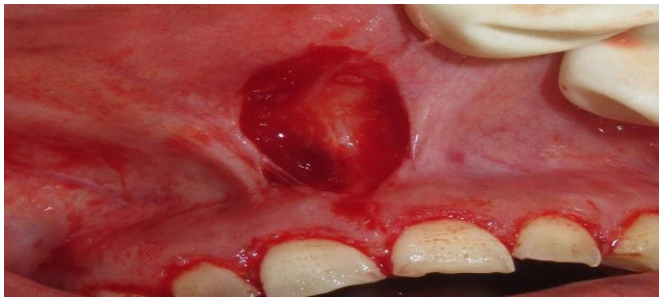

Fig 8: Diamond shaped wound created post frenectomy

Fig 9: External bevel gingivectomy maxillary arch (Frontal view)

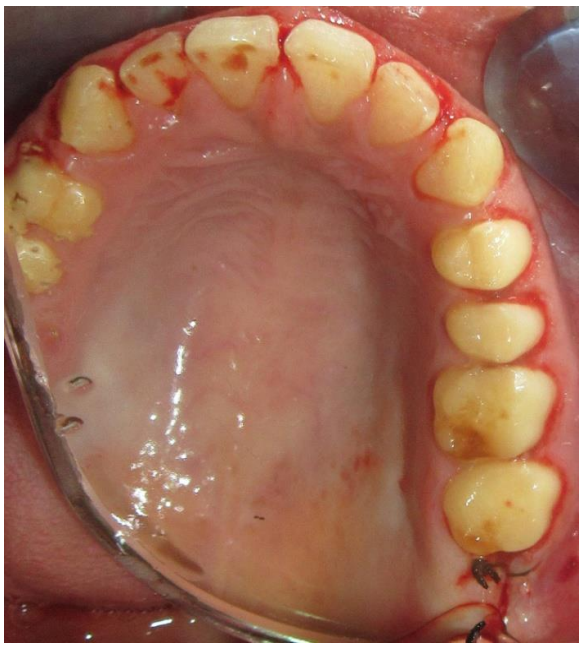

Fig 10: Flap approximated with sutures for distal wedge (Occlusal view).

Fig 11: External bevel gingivectomy mandibular arch (Frontal view)

Fig 12: Frontal view after minimal preparation

Fig 13: Occlusal maxillary view after teeth preparation.

Fig 14: Occlusal mandibular view after teeth preparation

Fig 15: Face bow record.

Fig 16: Posterior zirconia coping on model.

Fig 17: Anterior bite registration with the help of modified handle with impression compound coated with alu wax.

Fig 18: Maxillary anterior emax restorations for etching with phosphoric acid gel.

Fig 19: Mandibular anterior emax restorations for etching with phosphoric acid gel

Fig 20: Post-operative frontal view.

Fig 21: Post-operative right lateral view.

Fig 22: Post-operative left lateral view.

Fig 23: Post-operative smile view.

sharp enamel edges were present. This formative defect indicated for complete coverage restoration against laminates and occlusal top-ups. The complexity was increased due to anterior skeletal open bite making it difficult to regain the lost vertical dimension due to tensed muscles of mastication.

Treatment options were explained to the patient. Orthodontic treatment was excluded because the tooth structure was weak. The treatment opted by the patient was full mouth rehabilitation after crown lengthening procedure. The treatment plan was developed to improve the occlusion, restore the masticatory efficiency and aesthetics while treating the sensitivity. The radiographs were obtained for visualization of the cervical bone level, screening to check for the pathology, if present and for record purpose. (figure6) The diagnostic impression of maxillary and mandibular arches was made using addition silicone, and the casts were poured using dental stone for treatment planning. Facebow record was taken for orientation relation of the maxillary arch. (figure 15) The casts were mounted on a semi-adjustable articulator using centric and protrusive records with alu wax. A diagnostic wax-up was done for treatment planning of the required aesthetic correction. After patient approval, maxillary and mandibular wax-up models were duplicated using dental stone. The maxillary and mandibular hard acrylic stents were fabricated depending upon the required crown exposure.

Transgingival probing was done to assess the distance between the gingival margin and the alveolar crest, and a decision was taken to do external bevel gingivectomy due to sufficient width of attached gingiva with respect to maxillary and mandibular arch. Distal wedge procedure was planned due to bulbous maxillary tuberosity and prominent retromolar pad areas creating a hindrance with the vertical dimension of occlusion.

Surgical procedure - Perioral preparation with povidone-iodine was done followed by a pre-surgical chlorhexidine rinse. Local anaesthesia was given, followed by stent placement and marking the extent of the crown exposure. An external bevel incision was placed directed coronally with respect to the maxillary arch and mandibular arch (both buccal and palatal aspect) in two subsequent visits.(figure9,11) A frenectomy procedure was done due to high maxillary labial frenum.(figure7,8) On the distal aspect of molars, two parallel incisions followed by a perpendicular incision was placed to remove a rectangular wedge of tissue. Following flap, approximation sutures were placed followed by a periodontal dressing. (figure 10)

The patient was advised soft diet in the first week following the surgical procedure and use of 0.12% chlorhexidine mouthwash 15ml for 60secs twice daily to be continued for six days. The patient was recalled for 1,2,4 weeks, and three months later, prosthodontic treatment was started for the patient.

The teeth were prepared to receive zirconia crowns on posterior teeth for performance and all-ceramic crowns on anterior teeth for better aesthetics. (figure12,13,14) The anterior guidance was not established due to an open bite. Temporary restorations were fabricated using tooth-coloured acrylic resin with putty index made on diagnostic wax-up. Occlusal interferences were verified in all

the excursions, and temporary crowns were cemented by zinc phosphate cement. Evaluation of the patient was done for acceptance of the corrected vertical dimensions and occlusal stability for two weeks. Once the tooth preparation was complete, the gingival retraction was done using retraction paste by 3M. The final impression was made using addition silicone polyvinyl siloxane impression material. Interocclusal records were made with aluwax in specially modified tray. (figure 17)

The posterior zirconia crowns copings were evaluated for fitting. Figure (16) After occlusal layering with ceramic was cemented with glass ionomer cement. Anterior crowns were bonded using all-ceramic bonding protocol with translucent light cure composite. (figure18,19) All excursive movements were carried out to check for the interferences, and polishing was done using a chair side kit. Group function occlusion scheme was given with canine disclusion. (figure 20,21,22) The follow-up of the patient showed remarkable results. Aesthetic improvement helped the patient to gain confidence in self-expression and socialization. (figure23) Clinically it reduced sensitivity and improved comfort of the patient during mastication and speech.

DISCUSSION

Enamel hypoplasia is described as an incomplete or definitive formation of the organic matrix of enamel.[2],[3] The enamel irregularities increase the susceptibility to caries, increased plaque accumulation and impaired aesthetics. The function is affected due to reduced vertical dimensions and complete loss of occlusal harmony. Due to the overloading of the posterior teeth in lateral excursions, further tooth structure loss is accelerated. The purpose of full mouth rehabilitation is to improve the functional integrity, improve the appearance and self-esteem of the patient. Full mouth rehabilitation includes preparation of all the teeth, making impressions, provisionalization, master cast fabrication and the final reconstruction of the oral cavity.[4],[5]

A well-defined preparation margin is a prime requirement for the restorative and prosthetic procedures. The best control of the marginal fit of the prosthesis may be difficult to achieve in situations where the margins extend deeply to the subgingival area. Thus, crown lengthening of the clinical crown might help to improve the clinical results. The retention and stability of the prosthesis would improve along with the gain in the vertical dimension. Violation of the biologic width may result in gingival inflammation, periodontal pocket formation, bone loss and gingival recession.

When the biologic width is violated there will be a reaction by the periodontium called as the tissue rebound effect. The alveolar bone will resorb inconsistently in an attempt to provide space for a new connective tissue attachment.

The objectives of crown lengthening involve improvement of the restorative needs, increasing the clinical crown height lost due to caries, fracture or wear, to access subgingival caries, produce a ferrule for restoration, to access a perforation in the coronal third of the root, to relocate margins of restorations that are impinging on biological width and for aesthetics.

The surgical lengthening of the clinical crown in case of adequate sulcular depth and sufficient keratinized tissue (width of attached gingiva >3mm) involves external bevel or internal bevel gingivectomy whereas, in case of inadequate width of attached gingiva, it is best to go for the apically positioned flap. If the bone crest is low, the osseous reduction is not required, whereas if the bone crest is high, the osseous reduction would be required.

Restorative procedures should be delayed for 3 to 6 months post crown lengthening procedures. Longer period reduces the risk for gingival margin shrinkage in case of subgingival margin placement. Provisional restorations can be reshaped 3-4 weeks after surgery, but margin placement should be supragingival in such cases.

A systematic review by Pilalas et al. 2016 concluded that crown lengthening surgery results in the increased crown length and possible gingival margin rebound.[6] A systematic review to assess periodontal stability in surgical crown lengthening pre-prosthetic interventions shows that a temporization period of 12 months is recommended and studies accomplished between 6 and 12 months show a tendency of stabilization of the periodontal structures.[7]

CONCLUSION

An interdisciplinary approach is crucial for improving the prognosis of the treatment. A case of worn and hypoplastic teeth with open bite was successfully restored by surgical lengthening procedure and full mouth reconstruction using porcelain crowns, thus restoring the aesthetic and functional stability of the dentition.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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