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FULL MOUTH REHABILITATION OF SEVERE FLUOROSIS CASE WITH WORN-OUT DENTITION WITH ALL- CERAMIC RESTORATION- A CASE REPORT

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ABSTRACT Dental fluorosis is the hypomineralization of the enamel due to overexposure to excessive fluoride concentration during the time of tooth development. Severe discoloration and tooth wear are the main adverse effects of this condition. This case report describes 28 year old patient with generalized attrition of full complement of teeth with brownish discoloration , pitting and reduction in the vertical dimension due to severe dental Fluorosis. Complete rehabilitation of entire dentition was the proposed treatment and occlusal splint was used to increase the vertical dimension. Once the new vertical dimension was established provisional fixed restoration followed by permanent rehabilitation.The following case report proposes that a promising clinical outcome was obtained by re-establishment of the vertical dimension with improvisation in esthetics and function.

KEYWORDS : Dental Fluorosis, Hypomineralization, Tooth wear, Discoloration, Full mouth rehabilitation, Vertical dimension, Attrition.

INTRODUCTION

Dental fluorosis is the hypoplasia of the enamel develops due to prolonged exposure to higher concentration of fluoride at the time of tooth development. As a result, enamel develops with a reduced mineral content and more porosity.1 The severity of Dental fluorosis depends on the duration of over exposure to fluoride. Fluoride in drinking water in excess of 0.5–1.5 mg/l can cause metabolic changes in ameloblasts, resulting in a faulty matrix and inappropriate calcification of teeth, a condition known as dental fluorosis.2 The incidence and severity of DF have been measured using a variety of indices. Because of its simplicity, Dean's index is the most extensively used amongst them. The appearance of enamel changes from chalky white to brownish or blackish discolouration with pitting on the affected surfaces as the severity of the condition increases. In case of moderate and severe type of dental fluorosis, all enamel surfaces of the teeth are impacted, and attrition-prone regions show wear.[3]

Rehabilitation of worn out dentition with severe fluorosis is complex and difficult especially when the available interocclusal space is limited. The vertical dimension is accessed via diagnostic mounting and wax up. If appropriate interocclusal space is not available, an overall increase in vertical dimension is required to provide space for dental restoration. The diagnostic occlusal splint or provisional restoration is used to temporarily increase the vertical dimension, which is then finalized based on the patient's tolerance.4 Conventional tooth preparation needed for all ceramic and porcelain fused to metal crown is 1.5 – 2.0 mm occlusally and 1.2-1.5mm axially. However, new all ceramic systems have been developed with better esthetic and mechanical properties which require minimal tooth preparation.5 The main challenge faced during rehabilitation of fluorosis affected teeth with all ceramic restoration is to achieve proper bonding with damaged tooth surface.

This clinical case discusses the prosthodontic rehabilitation of patient with severe fluorosis and attrition, with all-ceramic restoration emphasizing proper bonding protocol and maintenance of the restoration.

Case Report

A 28-year-old Yemeni patient reported to the Department of Prosthodontics, Yenepoya Dental College with chief complaint of discoloured and worn-out maxillary and mandibular teeth, and expressed dissatisfaction with the appearance of his dentition. His deciduous dentition was normal, but his permanent teeth had been stained since eruption, according to his dental history. Family history revealed presence of similar discoloured dentition among other family members. On extraoral examination, the patient's temporomandibular joints and masticatory muscles were found to be normal and had a low smile line. On intaoral examination, full complement of permanent teeth was present with group function occlusion and class 1 molar relation except the maxillary third molars. However, generalized brownish discoloration with pitting present on canine and posterior teeth was noticed. Generalized attrition had resulted in reduced clinical crown height and edge to edge occlusion. On soft tissue examination there was no gingival recession, periodontal pockets or bleeding on probing present [Figure 1].

figure 1: Preoperative Clinical Photographs: (A) Facial Photograph, (B) Smile, (C) Frontal View of Dentition, (D) Right Lateral View, (E) Left Lateral View, (F) Maxillary Occlusal View, (G) Mandibular Occlusal View OPG (Orthopantomogram) of the patient showed adequate alveolar bone support and absence of periapical pathology [Figure 2].

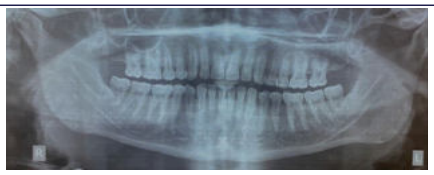

Figure 2: Panoramic radiographic image before treatment.

The condition was diagnosed as generalized attrition of full complement of teeth with brownish discoloration, pitting and reduction in vertical dimension due to severe dental fluorosis. The proposed treatment was to completely rehabilitate the entire dentition with All- Ceramic restoration.

prosthodontic Rehabilitation

Diagnostic Impression and initial assessment:

In the 1st appointment, diagnostic impression of maxillary and mandibular arch was made using irreversible hydrocolloid impression material and intraoral and extraoral photographs were taken for evaluation. Facebow transfer was done and interocclusal record was taken with bite registration paste (Zhermack Occlusofast Rock) to mount in semi-adjustable articulator (HanauTM Wide-Vue).

Establishment of New Vertical Dimension At Occlusion

The incisal rod was raised by 4mm to increase the OVD.A occlusal splint was fabricated at the new OVD to facilitate transition to the new OVD [Figure 3]. Patient was instructed to wear the occlusal splint for a period of 4 weeks and every week patient was recalled for evaluation. There was no evidence of tenderness or hyperactivity of masticatory muscle and abnormality of the temporomandibular joint.

Figure 3: Diagnostic Occlusal Splint

After 1 month, Customized Lucia jig was fabricated using impression compound at the increased VDO and was used to maintain the VDO while interocclusal records were taken. These records along with facebow transfer were used to mount the maxillary and mandibular cast in semi-adjustable articulator. After programming, a diagnostic wax-up was done [Figure 4].

Figure 4: Diagnostic Wax Up

To achieve canine guided occlusion, the anterior guidance and posterior disocclusion on excursive movement were established. Silicone putty index is made and is used to fabricate provisional crowns with bis- acrylic composite material (ProTemp 4; 3M ESPE, Germany).Spot etching was done using 37% phosphoric acid followed by cementation of provisional crowns using self adhesive resin cement (RelyX™ U200).All occlusal interference were cleared to ensure canine guided occlusion. Patient was reviewed twice after cementation at 1 month time interval. Interim restorations were altered for two months and utilized as a reference for the final oral rehabilitation [Figure 5]. After 2 months, silicone putty index of the modified provisional restoration was used as a guide to fabricate definitive restoration.

FIGURE 5: Provisional Restoration

Replacement of provisional restoration with final restoration is done in three phases in order to maintain the established VDO.

Phase 1: Maxillary and mandibular anterior teeth provisional restorations are replaced by definitive restoration.

Phase 2: Right side maxillary and mandibular posterior teeth.

Phase 3: Left side maxillary and mandibular posterior teeth.

Tooth Preparation

At the established VDO, there was enough interocclusal space to avoid occlusal tooth preparation on the posterior teeth and palatal tooth preparation on the maxillary anteriors. Hence these surfaces were only polished to eliminate sharp line and point angles. Axial wall preparation of 1- 1.2 mm was done all around with 1mm shoulder finish line having rounded internal axiogingival line angle. double cord gingival retraction (Ultrapack , Ultradent) was done. Final impression was made using double mix double step technique with polyvinyl siloxane impression material (Zhermack Hydrorise Putty and light body) and facebow transfer was done. At new VDO, interocclusal records were taken to mount the master casts on semi adjustable articulator.

Fabrication of Definitive crowns

Definitive crowns were fabricated using Computer aided designing (AmannGirbachCeramill® mind), Scanner(AmannGirbachCeramill® map400). A design of full contour crown design with 0.8 mm cutback for ceramic veneering was used to fabricate crowns with Ceramill Zolid HT+ material.

Final Cementation

Intaglio surface of Zirconia Crowns were air- particle abraded using silica coated alumna particles of 60µm size at below 2 bar pressure. Tooth surface was pre- acid etched using 37% phosphoric acid (3M ESPE Scotchbond echant) for 15s and rinsed with water using 3 way dental syringe for 15s .On the sandblasted surface of the crown, a coat of Single Bond Universal TM (3 M ESPE) was applied and left for 15–20 seconds. To eliminate excess, the surface was air-dried and was light-cured for 10 sec. Same adhesive was rubbed on the air-dried tooth surface for 20 s which was blow dried and light cured for 10 s. The dual cure resin cement was then applied into the pretreated crown and placed over the prepared tooth, Tack cured for 2 s for easy removal of excess cement. This was followed by light curing for 20 s. [Figure 6]

Figure 6: Postoperative Intraoral Photographs:(A) Frontal View of Dentition, (B) Protrusive Movement, (C) Right Lateral Excursive movement, (D) Left Lateral Excursive movement, (E) Maxillary Occlusal View, (F) Mandibular Occlusal View.

Maintenance

After the definitive restorations, Essix retainer was made for the maxillary arch to safeguard the restoration against nocturnal bruxism. The patient was told to wear the retainer at night [Figure 7].

Figure 7: Essix Retainer

Figure 8: (A) Pre Op, (B) Post Op

DISCUSSION

The main goal of treatment was aesthetic rehabilitation of existing dentition to improve the quality of life of the patient. In this case, patient was diagnosed with Generalized occlusal tooth wear and discoloration of entire complement of teeth due to sever fluorosis. Turner had classified the extent of tooth wear based on VDO loss in 1984 and the present case demonstrated category 2 that is generalized wear of dentition without loss of VDO but with limited space available for restoration.6 There are numerous methods reported in the literature to increase the VDO and achieve sufficient amount of interocclusal space for definitive restoration. The use of diagnostic occlusal splint7 is the most commonly used technique by majority of clinicians and is the method used in present case. This is followed by provisionalization of entire dentition to maintain established VDO.

The occlusal splint covers the entire occlusal surface of one arch and provides stable contact with opposing dentition at centric relation. It ensures posterior disocclusion on eccentric movements by maintaining anterior guidance.In addition to establishment of new VDO, occlusal splint acts as muscle deprogrammer and reposition the mandible to the most stable position that is centric relation.8 The wearing period of diagnostic splint is 3 weeks to 5 months and of provisional fixed restoration is 2 to 6 months.9 Since the patient had no temporomandibular joint problem or masticatory muscle tenderness during the recall visits, the occlusal splint was replaced with provisional restorations after 4 weeks. The parent's tolerance to the established VDO along with esthetics and phonetics was evaluated for 8 weeks before proceeding with the definitive treatment.

The reason for the generalized brownish discoloration being dental fluorosis, there was a need to use esthetically superior restorative material to mask the discoloration. Ceramill Zolid HT+ (Amann Girrbach) was the material used for rehabilitation because of its superior strength and ability to mask the severe discoloration. The flexural strength of the material was 1100 MPA . Even though the previous long term studies have suggested poor survival rate of the zirconia crowns, with the advancement in adhesive materials better clinical performance of the material is being reported. According to the systemic review of Christel Larsson10 et al the survical rate of zirconia crowns are 95% over a period of 5 years. According to the recent studies11, 12, the long term survival rate of zirconia with ceramic veneering was reported to be above 90% over a period of more than 10 years.

The most common failure very frequently reported is the chipping of veneered ceramic. The cut-back of full contour crown design had proved to reduce the chipping of ceramic by providing sufficient support and space for ceramic veneering. The major challenge is to achieve proper bonding of the crowns to the fluorosed tooth surface.To achieve long term bonding between resin and zirconia a protocol was introduced by Markas et al14 called APC Concept. “A” stands for air particle abrasion of intaglio surface of zirconia crown with silica containing alumina particle, “P” for surface treatment with Zirconia primer or at least with MDP containing bonding agent followed by cementation with dual cure resin cement indicated by “C”. This concept is being used in this case for cementation. Also it is proved through various studies that even while using universal bonding agent, pre-etching of tooth surface with 37% phosphoric acid aids in improving the bonding. Hence this technique is used in this case.

CONCLUSION

Full mouth rehabilitation with all- ceramic crowns was successful in this patient in achieving satisfactory esthetics as well as function. Maintenance of the restoration is of greater importance as that is crucial for long term success of any treatment, especially a complex one.

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