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Case Report

Comprehensive rehabilitation of a worn out dentition with complete coverage ceramic restorations

Col M. Viswambaran ^{a,*}, Maj Tarun Dabra ^b^a Commanding Officer & Classified Specialist (Prosthodontics), Military Dental Centre, Jabalpur 482001, India^b Graded Specialist (Prosthodontics), Military Dental Centre, Jabalpur 482001, India

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Introduction

Rehabilitation is an art and science, to be more exact a creativity which restores the functional and esthetic requirements of the patients. Any kind of dental treatment, be it fabrication of removable or fixed restoration or a simple restoration of decayed tooth with amalgam is part of oral rehabilitation. Restoration can be done with different treatment options including inlays, onlays, crowns, bridges, implant supported prostheses and removable dentures. There are variety of conditions which require rehabilitation such as attrition, abrasion, mutilated occlusion, loss of periodontal support, and migration of teeth. One of these conditions which require full mouth rehabilitation is severe attrition of teeth or combination of variety of clinical situations described before. Badly worn out teeth with loss of anterior guidance is a real

restorative challenge. It is difficult to lengthen the appearance of the upper teeth without opening the bite or severely steepening the anterior guidance. This usually calls for a compromise that permits the lower incisal edges to move forward on a fairly flat guidance and then progress gradually to a steeper incline through a concave pathway.¹ To make the concave contour possible, it is usually necessary to restore the worn lower teeth with full coverage, to narrow the broad incisal edges from the labial and to position the incisal edge lingually. By moving the incisal edges lingually, the lower incisors can be lengthened to provide an overjet; the upper incisors can then curve down from the cingulum-centric spot, providing more length for the upper anterior teeth. Such a procedure enhances both esthetics and function.² Excessive occlusal wear may manifest itself in a reduction of the vertical dimension of occlusion. Restored occlusal vertical dimension is based on the concept that by providing the patient with an interocclusal splint designed to restore the previously lost occlusal vertical dimension, all abnormal muscle activities will be eliminated or reduced.³ This case report documents the treatment of destructive occlusal wear that resulted in an anterior open bite relationship.

Case report

A 50 years old male patient reported with the chief complaint of difficulty in chewing since last one year. The patient gave a history of difficulty in mastication due to worn out teeth & unaesthetic appearance. He was psychologically distressed due to continuous wearing away of the teeth without realizing the cause for it. Medical history was non-contributory. Past

* Corresponding author. Tel.: +91 (0) 9165269306 (mobile).

E-mail address: mviswambaran@rediffmail.com (M. Viswambaran).

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dental history revealed endodontic treatment of both maxillary and mandibular incisors and restoration of 37 from civil hospital. The positive finding was that he had the habit of grinding his teeth (Bruxism). It was later confirmed by the patient's spouse as well. There was no evidence of any systemic disease. Mouth opening was well within the normal range and the mandibular movements were unrestricted. Intraoral examination revealed that probing depths in both arches were between 2 & 3 mm with minimal bleeding; however, a generalized mild marginal gingivitis was present. No abnormal tooth mobility was noted. Centric occlusion did not coincide with maximum intercuspation. Generalized advanced erosion and attrition were noted on the incisal and occlusal surfaces of the teeth in both arches. Other noticeable features were generalized attrition (Fig. 1), missing third molars, anterior open bite, dental caries in 47, silver amalgam restoration in 37 and endodontically treated 11, 12, 21, 22, 31, 32, 41 & 42. The salivation was adequate and no other abnormalities detected in soft tissues. Investigations carried out were a series of full mouth intraoral periapical radiographs & an orthopantomogram (OPT). The OPT confirmed the clinical findings. Radiographically, the trabecular bone pattern was generally normal with a finely woven pattern.

Treatment protocols

The treatment plan was presented to the patient. The type of restorations, restorative materials, esthetic expectations, complications, limitations and oral hygiene requirements were discussed. The patient appeared to understand and provided his consent. Maxillary and mandibular incisors required post and core restorations before crown preparations. Two sets of diagnostic casts were prepared using irreversible hydrocolloid and Type IV high-strength dental stone. A centric relation record was prepared. A Hanau, ear-piece type face bow was used to record the relationship of the maxilla with a transverse horizontal axis. The diagnostic casts were mounted on the semi-adjustable articulator (Hanau, H-2 series) using the Hanau face bow and a centric relation record. Diagnostic wax patterns, developed to provide a mutually protected occlusion, were prepared on one set of diagnostic casts with the occlusal vertical dimension opened 2.0 mm at the central incisors. The wax patterns were used to fabricate the tooth preparation guides and provisional restorations. A maxillary occlusal splint was fabricated at an increased occlusal vertical dimension of 2.0 mm, using heat-processed acrylic resin. The occlusal splint was inserted and adjusted.

One week later, the patient reported no difficulties in adapting to the new position; he was recalled every 2 weeks for 4 months. After the patient got adjusted to the change in vertical dimension, the teeth were prepared for metal-ceramic restorations in the maxilla and mandible. This allowed for provisional restoration of all teeth at an increased vertical dimension with a stable occlusion. Heat-cured acrylic resin provisional shells (DPI-Heat Cure Tooth Molding Powder; Dental Product of India, Mumbai, India) were fabricated, relined intraorally and cemented with eugenol free interim cement. They were adjusted to provide a mutually protected occlusion. The patient functioned on the provisional restorations for 12 weeks to further assess the adaptation of the proposed vertical dimension for the final restorations. Centric relation records were obtained by using interocclusal bite registration material (3M). A face bow transfer of the maxillary arch was recorded using the same three points of reference as in the initial face bow transfer at the diagnostic phase of the treatment. Irreversible hydrocolloid impressions were prepared from the provisional restorations to fabricate a custom anterior-guide table to aid in the fabrication of the final restorations. After 12 weeks of comfortable functioning in the provisional restorations, preparations were refined for definitive impressions. At the time of the impression, all soft tissues were healthy. Maxillary and mandibular full arch impressions were made using poly vinyl siloxane impression material (Express, 3M ESPE). Gingival retraction was obtained using plain braided cord moistened in aluminum chloride solution. Each impression was poured twice with type IV dental stone and two separate casts were obtained from each impression. The casts were articulated using a semi-adjustable articulator with interocclusal records and sent to the laboratory for lab procedures. The articulator adjustments were done as per Hobo's recommendations (Table 1) and laboratory procedures carried out using Hobo's twin stage technique.⁴ The metal frameworks were tried intraorally for adequate position and tightness of the proximal contacts, acceptable marginal adaptation, stability and internal adaptation. It was ensured that there was no proximal contact in the metal framework before ceramic application. The castings were returned to the laboratory for the application of porcelain. Bisque trials for verification of the fit, interproximal contacts and occlusion were accomplished. A mutually protected occlusion was achieved and verified intraorally using articulating paper and 12- μ m thick shimstock. The intaglio surfaces of the restorations were microetched with 50- μ m aluminum oxide, cleaned and luted with glass-ionomer cement (Fuji-1) (Fig. 2). The cementation was done quadrant

Fig. 1 – Pre-rehabilitaion intraoral view.

Table 1 – Articulator adjustment values for Hobo's twin stage procedure.

Condition	Condylar path		Anterior-guide table	
	Sagittal condylar path inclination	Bennett angle	Sagittal inclination	Lateral wing angle
Condition 1: without anterior teeth	25	15	25	10
Condition 2: with anterior teeth	40	15	45	20

wise to control the occlusion as the rest of the provisional crowns in place acted as stops. Initially posterior segment followed by anterior segment. Periapical radiographs were taken as a baseline for future follow-up and to verify the complete removal of excess cement. Oral hygiene instructions included a review of brushing, flossing and the use of fluoride toothpaste. The patient returned 24 h after insertion for the final evaluation. Irreversible hydrocolloid impressions were prepared. A heat-processed, clear acrylic resin maxillary occlusal splint providing a mutually protected occlusion was given to the patient to wear while sleeping and during the daytime as required. Instructions on the care of and when to wear the occlusal splint were given to the patient. The patient returned after 2 and 4 weeks for an occlusal analysis and for soft tissue evaluation. He was placed on 6-month-periodic recall for prophylaxis. The prognosis was favorable. It was explained to the patient that the long-term prognosis of the restorations would depend on the maintenance of oral hygiene and the wearing of the occlusal splint for the protection

of the restorations. There was considerable improvement in esthetics as seen in the comparison of pre rehabilitation and post rehabilitation views (Figs. 3 and 4).

Discussion

Tooth wear is commonly found in every dentition and may have physiologic or pathologic causes. Loss of incisal edge morphology can be regarded as physiologic in a young adult and the degree of the present wear increases with age. Tooth wear is considered excessive or pathologic when compared with the amount of wear typical for the patient's age and when an intervention is necessary for cosmetic or functional purposes.⁵ Tooth wear can be classified according to its cause: attrition, a gradual loss of the dental hard tissues as a result of functional or parafunctional activity of the teeth; abrasion, a pathologic tooth wear caused by the frictional action of a foreign body on the teeth, such as that caused by tooth brushing; and erosion, the loss of hard tooth substance due to

Fig. 2 – Maxillary and mandibular crowns after cementation.

Fig. 3 – Comparison of pre and post rehabilitation intra-oral views.

Fig. 4 – Comparison of pre and post rehabilitation extra-oral views.

a chemical process not involving bacteria.⁶ A differential diagnosis is not always possible because in many situations there is a combination of these processes. Bruxism is also considered to be a contributing factor for excessive tooth wear.⁷ The case described had a history of bruxism and therefore postoperatively the patient was instructed to wear an occlusal splint during nighttime. The reconstruction of a severely worn dentition is a very complex and difficult problem, representing a real challenge to the dentist.⁸ The various treatment options may be a combination of removable and fixed options including crowns, laminates, onlays and cast partial dentures. Conservative treatment options like laminates and onlays were ruled out in this case because of the extensive nature of involvement of dentition. The best treatment for any wear depends on its early recognition, but this is an ideal that is difficult to achieve. It is important to distinguish between physiologic and pathologic tooth wear and to determine when and how to intervene. When teeth become worn, a serious problem is created, especially if there is no vertical space for restorations and an alteration in the VDO is necessary.⁹ Despite warnings against increasing VDO, there is evidence from long-term observations that supports the view that, as general rule, the patient adapts to such an increase and that the new VDO is stable. In the case presented here, the patient was clinically monitored to evaluate the adaptation to the provisional restorations. Once the compatibility of the new VDO was confirmed, the permanent reconstruction could be initiated. Rehabilitation was carried out using the well accepted Hobo's twin stage technique to achieve mutually protected occlusion.^{4,10} In this clinical report, a satisfactory clinical result was obtained by restoring the VDO, with an improvement in esthetics and function, thereby justifying the procedures used.

Conflicts of interest

All authors have none to declare.

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