Case Report

Six phase full-mouth rehabilitation of an occupational bruxer: a case report
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Abstract
Aesthetic and functional restoration of severely worn dentition presents a significant clinical challenge. One of the most demanding aspects essential to long-term success of such cases involves the development of sufficient restorative space, while simultaneously fulfilling aesthetic, occlusal and functional parameters. Diagnosis is the most important part of treatment, as the clinician should gather enough information to help prevent further progression of pathology. Thus, the treatment plan must involve control of symptoms and removal of causes. This article focuses on the phase by phase treatment of such a patient including occupational /psychological counseling.

Key words: Provisionalisation; Psychological counseling; Occlusal splint.

Introduction
Tooth wear is a potential threat for dentition and masticatory function. Many factors may combine to produce worn dentition and the etiology often remains unidentified (1). Tooth wear has been classified into the following four types: (1) attrition- wear of teeth or restorations caused by tooth to tooth contact during mastication or para function (2) abrasion- loss of tooth surface caused by foreign substances other than tooth to tooth contact (3) erosion- loss of tooth surface by chemical processes not involving bacterial action and (4) abfraction- non-carious cervical wedge-shaped defects caused by occlusal stresses (2).

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Occlusal and incisal attrition can occur during deglutition and clenching. This becomes more severe during bruxism, as evidenced by advanced and often rapid wear of the teeth (3). Clinical signs are matching wear on occluding surfaces, shiny facets on amalgam contacts, enamel and dentin wear and possible fracture of cusps or restorations (4). Bruxism can be understood as a common parafunctional activity that includes tooth grinding or clenching. It can occur without any signs and symptoms, but may become problematic when contributing to increased tooth wear and pain (5, 6).

The etiology of bruxism is probably multifactorial. Besides peripheral (morphological) factors, central (pathophysiological and psychosocial) factors can be distinguished. In the past, morphological factors like occlusal discrepancies and deviations in the anatomy of bony structures of the oro-facial region were considered major causative factors. Now, these factors are assumed to play a smaller role compared to central factors. For example, bruxism has been suggested to be part of a sleep arousal response, the oral motor event either preceding or following the arousal. In addition, bruxism appears to be modulated by various neurotransmitters in the central nervous system. More specifically, disturbances in the central dopaminergic system have been described in relation to bruxism. Further, factors like medication, drugs, genetics, trauma, neurological and psychiatric diseases may be involved in the aetiology. Psychosocial factors like stress and personality disorders are frequently mentioned in relation to bruxism as well (7).

Irrespective of the causes, the effects of bruxism can be multiple and include altering the vertical dimension of occlusion, muscle pain and spasm and temporomandibular joint (TMJ) pain and dysfunction (8, 9). Depending on the degree of tooth wear, restorative treatment can range from placement of bonded composites in a few isolated areas to full mouth reconstruction (10). If diagnosed early, finding and eliminating the original cause(s) may cure bruxism. Later, habitual bruxism can be treated by habit-modification. Treating associated factors can reduce or eliminate the behavior where bruxism has not become habitual. Some treatment options are Dental guards and splints, occlusal equilibration, biofeedback, antidepressants and Botox (11). This article presents the stages of prosthodontic rehabilitation of a bruxer with severely worn dentition.

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Examination

A 52-year-old male police officer posted at crime branch, was referred to the Department for prosthodontic treatment. The patient’s chief complaint was poor appearance due to worn out teeth. An initial evaluation indicated a history of occupational stress, probably leading to parafunctional habits and a decreased vertical dimension secondary to bruxism (5mm) was diagnosed. As per the Turner and Missirlian classification of occlusal vertical dimension, the patient fell in category 1 i.e. excessive wear with loss of occlusal vertical dimension, Category 2 of this classification represents excessive wear without loss of occlusal vertical dimension but with inter occlusal space available, while category 3 includes patients with excessive wear without loss of occlusal vertical dimension and limited space (12).

Oral hygiene was average with no symptoms of periodontal affliction. Clinical & radiographic examination and diagnostic casts revealed severe attrition resulting in reduced clinical crown length, especially pronounced in anterior teeth and prominent masseter muscle activity (Figure 1).
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Treatment Strategy
A multiphase treatment protocol was planned as follows:

PHASE 1: Initial education and motivation of the patient, psychological counseling, comprehensive oral evaluation, pre-treatment records.
PHASE 2: Periodontal prophylaxis and maintenance, oral hygiene instruction, crown lengthening.
PHASE 3: Impressions, jaw relation recording, occlusal splint at increased vertical dimension, mock wax-up at increased vertical dimension.
PHASE 4: Tooth preparations, impressions, jaw relation recording, provisionalization.
PHASE 5: Definitive restorations.
PHASE 6: Post operative follow up.

ACTIVE CLINICAL TREATMENT:

Phase 1
The initial phase began with patient education and motivation about the cause of his present oral condition and treatment plan to correct the same. Psychological counseling was arranged with a professional who suggested a change in job profile, from apprehending criminals to a less stressful desk job. This would help in limiting the occupational stress suspected to be the main reason behind bruxism and clenching in this case.

Phase 2
Crown lengthening was essential to achieve proper abutment height. We had two options- perform endodontic treatment of vital non infected teeth and fabricate posts and cores, or achieve required clinical crown height by gingivectomy. We opted for the latter as it was a more conservative approach, preserving the vitality of affected teeth.

After oral prophylaxis, crown lengthening from 14 to 24 and 34 to 44 (FDI nomenclature) of about 3mm was done by gingivectomy using electro-cauterization. Osteoplasty was not required as soft tissue removal exposed adequate clinical crown height (Figure 2).

Phase 3
OCCLUSAL SPLINT FABRICATION
A maxillary occlusal splint was fabricated enabling favorable condylar repositioning, forgetting habitual harmful neuromuscular reflexes and reestablishing vertical dimension. A Permissive Full arch occlusal splint made up of heat cured clear poly methyl methacrylate was fabricated (13-15). The occlusal splint was fabricated to incrementally (the splint height was increased thrice at 4 week intervals) restore the 5 mm vertical dimension of occlusion (VDO) deficit. The adjustments were made according to the parameters of organic occlusion: occlusal forces directed along the
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long axis of posterior teeth in occlusion and no contact among maxillary and mandibular anterior teeth. The occlusal splint was used for 12 weeks, with regular clinical review appointments.

DIAGNOSTIC WAX-UP

Maxillary and mandibular casts were mounted on a semi adjustable Whip mix arcon articulator using jaw relations records at increased VDO and the articulator was programmed using protrusive and lateral wax bite records. Mock wax-up was completed on the mounted casts, establishing the occlusal plane using a custom made Broderick occlusal plane analyser (11) attached to the upper member of the articulator (Figure 3).

Figure 3: Programming of articulator

Phase 4

The full mouth rehabilitation technique used was advocated by Pankey,Mann and Schuyler, as modified by Dawson (16). Preparation of anterior teeth was done first (Dawson) following which provisionals were made using an additional silicone (Aquasil,Dentsply Caulk) putty index of the mock wax-up. The occlusal splint was modified to make space for newly cemented anterior provisional crowns by removing its anterior portion from canine to canine. The modified splint maintained VDO by providing posterior occlusal stops. Post cementation anterior provisional restorations were evaluated. After confirming that the anterior guidance was comfortable and harmonious with functional movements, preparation and provisionalisation of posterior teeth was completed segmentally (Figure 4) (17).

Patient’s occlusion and comfort was again evaluated for next 3 weeks. When provisional restorations were considered acceptable, impressions of maxillary and mandibular arches with these crowns were made. Casts thus obtained were used to make putty indices for developing form and contour of definitive restorations.

Phase 5

DEFINITIVE MANDIBULAR ANTERIOR RESTORATIONS

An impression of prepared mandibular anterior teeth was made using additional silicone impression material (Aquasil,Dentsply Caulk) by dual stage impression technique. The cast thus obtained was articulated against the replica of cemented maxillary provisional restorations using jaw relation records as before. The putty indices of mandibular anterior provisionals were used for establishing similar contours in definitive restorations (porcelain fused to metal). The mandibular anterior crowns thus fabricated were temporarily cemented (IRM, Dentsply Caulk) and evaluated for functional harmony, esthetics and comfort following which they were permanently cemented (GIC luting cement, GC Corp. Tokyo, Japan).

DEFINITIVE MAXILLARY ANTERIOR RESTORATIONS

An impression of prepared maxillary anterior teeth was made and the cast was articulated with a replica of the permanent mandibular anterior crowns using jaw relation records. The contours of maxillary
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anterior definitive restorations were developed as was done previously for mandibular crowns. The maxillary anterior crowns thus fabricated were temporarily cemented and evaluated for esthetics, functional harmony and comfort, following which they were permanently cemented.

DEFINITIVE POSTERIOR RESTORATIONS

The posterior teeth were restored segmentally, first completing one side and then the other. An impression and cast of the prepared posterior quadrant was made followed by articulation against a cast containing the replica of the provisional/definitive restorations of the opposing quadrant. The programmed articulator and putty indices of provisional restorations were used to give proper contours to the definitive prosthesis. The crowns thus fabricated were first cemented temporarily and then permanently as before (Figures 5 & 6). A maxillary occlusal splint was fabricated for protecting the restorations from patient’s parafunction.

Phase 6

We were successful in persuading the patient to change his job profile. The patient was asked to attend a scheduled post treatment follow-up to assess effects of the para functional habit, like dislodgement of restoration and fracture. Oral hygiene measures and severity of bruxism were also evaluated. The occlusal splint had to be adjusted/ remade from time to time.

Discussion

Rehabilitation of severe cases of tooth wear is one of the most complex treatment modalities in dentistry. In addition, patient compliance with the treatment is extremely important. Diagnosis is an important part of treatment and the clinician should be able to elicit sufficient information for a differential diagnosis and prevention of progression of pathology (18). Worn dentitions are usually related to the presence of bruxism which leads to occlusal instability & reduced vertical dimension as observed in this case. Reduced vertical dimension may be asymptomatic or may lead to muscle tenderness, TMJ pain and dysfunction (19). Thus, the treatment plan must involve control of symptoms and removal of causes.

Bruxism involves local, systemic, psychological and hereditary factors and it has been demonstrated that dental treatment modalities may not completely eliminate its occurrence. Therefore, the patient needs to return to a healthy functional condition prior to any rehabilitation therapy (20).

The psychological factors are related to depression, anxiety and emotional stress which play an important role in starting and perpetuating bruxism, as well as in its frequency and severity (21-24). It is believed that such individuals present a greater predisposition for developing bruxism mainly during sleep, as a response to releasing daily emotional stress (25).
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Police officers have long been a matter of concern. Police officers have been reported to have higher rates of cardiovascular and gastrointestinal disorders as well as higher divorce and suicide rates (26-28). They are exposed to many different types of stress such as physical injury, injuring others in the line of duty and witnessing death or injuries to other officers and civilians (29). In addition, police officers are exposed to chronic non-traumatic stress arising from the demands of their work environment. It is natural that police officers engaged in operational activities would be more stressed than those who work in organizational or bureaucratic activities.

Counseling of patients to move to a less stressful working environment has shown long term benefits. Also, if the dentist educates patients about how bruxism overstresses the stomatognathic system beyond its ability to adapt, the patient could contribute to reduction/elimination of the habit proactively (30).

Pharmacologic treatment and intraoral appliances such as occlusal splints, are some of the other treatment modalities (11). For many years, splints were used only as guards for protection of tooth structure. However, as TMD therapies have evolved, various types and designs of splints have been developed to help counteract the dysfunctional effects of bruxism (30). These splints need to be regularly adjusted to permit the establishment of normal occlusal parameters.

Occlusal adjustment therapy is used in an attempt to provide stable occlusal contacts during bruxism or clenching episodes (31). The occlusal adjustment contributes to comfort and better function of the stomatognathic system (19). Providing esthetics with the correct anterior guidance and occlusal contacts is the key to long-term occlusal stability (32).

Depending on the degree of tooth wear, full-mouth rehabilitation of worn dentition can be accomplished by conservative composite resin restorations, crowns and post-and-core restorations (33). The success of cast restorations is linked to patient related factors (oral hygiene, eating habits etc) and treatment plan related factors (occlusal adjustment, bruxism control etc) in addition to the technique and materials employed (14, 34). According to Dawson: anterior teeth play a dominant role in establishing the functional path that the mandible can travel. Therefore, the position and contours of lower anterior teeth should be the starting point of occlusal design as they are the beginning of functional movements that establish anterior guidance and the envelope of motion (17).

A flat occlusal plane can be harmful by creating stressful crown-root ratios, since the curvature of the supporting alveolar bone does not match to a reasonable degree with the curvature of the occlusal plane. The curvature given to the posterior plane of occlusion, in an anteroposterior direction to avoid this stress, is called the "curve of Spee" and is based on the spherical theory of occlusion. The Broderick Occlusal Plane Analyzer as suggested by the Pankey-Mann-Schuyler Occlusal Rehabilitation concept helps to develop this curve (16).

Some authors have recommended occlusal splints as an efficient treatment approach (14). With their insertion, it is important to recognize the location and extent of damage to teeth and the corrections necessary to reduce the wear. Abnormal occlusal conditions are overlooked by dentists in many patients, because of lack of knowledge or interest. The key to success is a multidisciplinary treatment approach and constant communication with patients to make them understand the disorder and proactively participate in treating it (30, 31).

Conclusions

In the treatment of severely worn teeth, an anterior guidance should be established in harmony with functional jaw movements and all posterior teeth discluded.
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during any eccentric jaw movement. Taking the guidance into account during provisionalization, ensures minimal adjustments in the definitive restorations and greater long term predictability. If there is habitual bruxism, an occlusal splint should also be delivered post rehabilitation of the patient. Also, psychological counseling is of immense value in ensuring favourable treatment prognosis.

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References
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