CASE STUDY

CONTENTS

Rehabilitation of the facial aesthetics of a patient with an abnormal occlusal plane as a consequence of perennial bruxism

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ABSTRACT

This study aims to present a clinical case of rehabilitating facial aesthetics in a patient with a disturbed occlusal plane due to years of practicing occlusal parafunction. The patient, aged 41, came to see a dentist because of significant tooth wear and a desire to improve aesthetics. The patient's reduced occlusal height resulted in temporomandibular joint (TMJ) disorders and abnormal masticatory muscle tension. The patient's treatment was planned in two stages. The first stage was to create a Michigan relaxation splint with a recommendation to wear it for a period of 3 months. The next stage of treatment was to fix the raised occlusal height, improve the occlusal plane and the patient's appearance using Wax-up and Mock-up techniques, from which the target prosthetic restoration was created. A significant improvement in occlusal conditions and aesthetics was achieved. The final result of the work was satisfactory for the patient both functionally and aesthetically. The patient reported no more complaints from the temporomandibular joints or facial and neck muscle tension. Aesthetic rehabilitation of the patient is important not only for improving the appearance and psychological well-being of the patient but also for the proper functioning of the dental apparatus. Long-term parafunction leads to disturbances of the occlusal plane. Deconditioning of the proper muscle tone achieved by wearing a relaxation splint and restoration of the correct occlusal height prevents further complications of bruxism.

KEY WORDS: bruxism, attrition, temporomandibular joint, tooth wear

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INTRODUCTION

DEFINITION

According to the World Health Organisation (WHO), bruxism is the unconscious, habitual clenching and grinding of the teeth and/or the propping and pushing of the jaw. It affects between 5 and 50% of the adult population, as well as children [1]. Cultivated parafunctions lead to morphological and functional abnormalities of the masticatory organ, resulting in dental integrity problems [2]. Bruxism is divided into nocturnal bruxism SB (during sleep) and awake bruxism AB (during wakefulness) [1, 3]. According to the International Classification of Sleep Disorders (ICCS), the criteria for the diagnosis of nocturnal bruxism include grinding teeth during sleep for at least three nights per week over not less than three months and one of the following symptoms, i.e. teeth grinding, transient morning fatigue or pain in the masticatory muscles, transient headaches or morning limitations of mobility in the temporomandibular joints [5]. Nocturnal bruxism is also defined as rhythmic (phasic, where muscles alternately tense and relax) or non-rhythmic (tonic, where muscles tense and do not relax for long periods). Awake bruxism, on the other hand, is an increased activity of the masticatory muscles during the day and after waking up. The problem of parafunction, especially in adults, often arises from a psychological background [1,6]. Prolonged stress, too many hours of work in relation to rest, or even too much exercise at the gym, can be the cause of increased masticatory muscle tension [7]. In the treatment of bruxism, the primary diagnostic criteria are occlusal abnormalities caused by missing teeth, improper tooth position and wear or improperly performed fillings, resulting in a fixed, abnormal mandibular trajectory and abnormalities in the morphology and/or function of the TMJ.

Fig. 1. A photo of the patient's teeth before treatment, anterior view.

Fig. 2. A photo of the patient's side teeth before treatment, lateral view.

REHABILITATION OF FACIAL AESTHETICS

In the rehabilitation of bruxism, the correct spatial relationship of the mandible to the maxilla, the so- called skeletal relationship, should be determined first and foremost, allowing muscle relief by synchronizing the right and left sides. In addition, skeletal relationship allows for the correct positioning of the mandibular heads in the pits of the TMJ. One method of fixing it is the use of relaxation splints, which further provide protection for the teeth against the progression of pathological abrasion [8]. Physiotherapeutic methods such as myofascial relaxation, dry needling, kinesiotaping or laser therapy aim to restore correct muscle tone and range of motion in the face and neck region [9]. Minimally invasive therapeutic methods include injections of botulinum toxin type A (BTX-A), which temporarily inhibits skeletal muscle activity by impeding acetylcholine production and inactivating calcium channels in nerve endings [10]. Once the correct musculo-articular relationships have been obtained and established, the next stage of dental treatment should be to rebuild the occlusal height to avoid the growth of the alveolar bone, which compensates for abnormal loads [2]. The choice of treatment should be guided by the individual needs of the patient, resulting from a thorough analysis of the causes and consequences of bruxism.

Fig. 3 A-B. A photo of the patient's occlusal plane before treatment, maxilla and mandible respectively.

AIM

The aim of this study is to present a treatment approach using a clinical case example of a 41-year-old man with symptoms of bruxism.

CASE REPORT

A 41-year-old man presented to the dentistry clinic because of his desire to improve the aesthetics of his smile and persistent, recurrent incidents of losing fillings. The patient's medical history shows that he has not been treated by other specialists and is not taking any medication on a regular basis. The patient grinds his teeth at night (from his wife's account) and frequently nibbles on sunflower seeds during the day, and has a habit of biting on hard objects such as nails.

PHYSICAL EXAMINATION OF THE PATIENT

During the first visit, the patient underwent a physical examination to assess the occlusal height, the degree of tooth wear, the ranges of mobility of the temporomandibular joint, and any pain or hypertrophy of the masticatory muscles. Significant tooth wear, hypertrophied masseter muscles, malocclusion (anterior bite), and missing teeth 12 and 22 were found (Fig. 1, 2, 3A-B).

A history and pantomographic radiographs (OPG) allowed confirmation of a malformation in the form of hypodontia of the 12 and 22 teeth. The same OPG showed the presence of numerous fillings and missing teeth 18, 26, 28, 48 lost due to caries (Fig. 4). In addition, the patient informed the doctor of nocturnal clenching and grinding of teeth, nocturnal apnoea (snoring), and increased stress in daily life.

REHABILITATION TREATMENT

During the first dental visit, the patient was instructed on how to improve daily oral hygiene. A detailed analysis of the case indicated the need for a two-stage treatment. In the first stage, it was decided to apply a Michigan relaxation splint to the upper dental arch with a flat bite surface and a canine guide of an individually selected height to restore the correct mandibular-jaw relationship and normalise muscle tension. The splint fixed the mandibular position in a central position with "freedom in the centre" and provided canine guidance during eccentric movements. The patient was advised to use the splint round-the-clock for three months with breaks for eating. In addition, he was instructed in daily myofunctional therapy of the masseter and temporal muscles. Follow-up visits were made on a schedule of 7, 14, 30, 60, 90 days after the splint was given.

At the follow-up visits, occlusal contacts were checked each time in central position of the jaw and lateral movement, ruling out the presence of contacts on the balancing side. The patient adapted quickly to the new occlusal conditions and reported no complaints of muscle or temporomandibular joint pain.

The next, second stage of treatment involved fixing the new bite conditions, creating a proper occlusal plane, and thus improving the aesthetics of the patient's smile.

In order to processing the treatment, the patient's dentition was scanned and a virtual wax-up was created on a digital model. A Digital Smile Design (DSD) design of the work allowed the patient to visualise the future prosthetic restoration using full ceramic crowns and dental bridges. Once the patient accepted the design, a silicone index under a mock-up was made on the 3D model of the maxilla and mandible using Struktur2®

Fig. 4. A panoramic photo (OPG) of the teeth before treatment.

Fig. 5. A model of full ceramic crowns.

material to visualise the target work in the patient's mouth and to check the functionality of the future work. The patient was instructed to use the temporary work for one month. During this time, the patient made no complaints. A medical check-up revealed no signs of damage. Subsequently, the patient had the temporary work removed. All teeth were sandblasted, dried and prepared for cementation of definitive crowns using the conventional technique with Riva glass ionomer cement (Fig. 5, 6 A-B). Occlusal contacts were checked, moreover, the presence of single occlusal contacts in central occlusion and canine guidance in eccentric movements was confirmed. The patient's dental arches were scanned and another 2mm-thick Michigan splint for upper jaw was made for prophylaxis and protection of the prosthetic work.

FINAL RESULT OF THE TREATMENT

A significant improvement in oral hygiene was observed at the follow-up visit on day 7 after completion of treatment. The final result of the work was very satisfactory for the patient, both functionally and aesthetically. After one year, the patient continued to report no complaints from the temporomandibular joints or facial and neck muscles.

DISCUSSION

The consequence of many years of practising occlusal parafunctions such as grinding and/or clenching of teeth is pathological abrasion of the teeth and thus bite disorders, generating forces that lead to disorders of masticatory muscle tone, functional

Fig. 6 A-B. Reconstruction of the theeth with full ceramic crowns - zirconium oxide. The final effect of dental treatment.

disorders and thus reflexive bone deformation. In addition, there is concomitant headache, face and neck pain and even limitations of mobility of the TMD temporomandibular joints [2]. Teeth grinding and clenching can result from chronic stress. Advanced wear of the occlusal plane is further encouraged by poor oral hygiene and erosions resulting from poor diet and inadequate tooth brushing.

Many authors indicate that occlusion is a major factor in temporomandibular joint dysfunction [4, 11, 12]. Khayat et al. studied 494 patients with bruxism symptoms and TMD disorders, who were divided into 4 groups: 177 patients with painful TMD, 64 patients with disc displacement, 64 patients with both painful TMD and disc displacement and 149 patients without TMD. The researchers found a statistically significant correlation between painful TMD and bruxism ($p < 0.05$), while there was no correlation between disc displacement and SB and AB [11]. Similarly, Sinclair et al. found that in 46% of the patients studied with SB bruxism symptoms, a TMD problem coexisted [13]. Here again, no correlation was found between TMD and SB ($p=0.675$). The main problem of the patients studied was pain in the region of the TMJ, of muscular origin, which confirms the validity of using treatment to normalise muscle tone [13].

Thorpe-Matthisson L. described the case of a 44-year-old woman with symptoms of tooth wear in whom the vertical dimension of the stenosis was restored with cavity-oriented lateral overlays and ceramic anterior veneers, resulting in a satisfactory functional and aesthetic outcome [14]. One of the primary therapies for bruxism is dental treatment involving the use of occlusal-relaxation splints during sleep. These splints protect the teeth from pathological abrasion and normalise facial muscle tone [8]. Adults adopt well and are willing to use this type of treatment, as confirmed by the case described in this paper. Another complementary treatment for bruxism is physiotherapy to relax the facial muscles and reduce pain. Massage treatments, myofascial techniques, dry needling or laser therapy are used [15, 16]. Determining the clinical management strategy for a patient with bruxism symptoms is a challenge for the treatment team, i.e. the dentist, the rehabilitation therapist as well as the patient himself. Nocturnal grinding and clenching of teeth and increased eccentric movements of the mandible can result in occlusal abnormalities and altered relationship/location of the dentition in the oral cavity. Early diagnosis and treatment of bruxism is extremely important not only for aesthetic reasons, but also to inhibit the worsening of pathological changes occurring in the temporomandibular joints and to reconstruct lost structures [17].

CONCLUSIONS

The rehabilitation of the facial aesthetics of a patient with a disturbed occlusal plane as a consequence of perennial bruxism is a complex problem and requires a multidisciplinary approach. Diagnosis and a thorough interview with the patient is crucial in the selection of the therapeutic method. Currently, there are no clear standards of management. It is a serious clinical problem because of the consequences of bruxism such as teeth grinding, facial muscle pain and even possible facial deformity. Preventive measures should focus on

the elimination of bad daily habits and include regular check-ups with the dentist. The dentist is obliged to assess bite disorders and muscle tone, but also to implement an appropriate one. Additionally, it is important to restore the original bite conditions, preferentially with a material with a hardness close to the hardness of the enamel. Normalisation of the muscular tone prevents further abrasion of the teeth, allows the restoration of an appropriate occlusal height and thus reduces the symptoms and effects of bruxism.

Thus, the prosthetic rehabilitation of the patient is extremely important not only for aesthetic reasons but, above all, for the health of the entire stomatognathic system.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest.

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