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Multidisciplinary Effort For Re-establishment Of Esthetic And Function Of Severe Tooth Wear In Elderly: A Case Report

Case Report

Sara Alice Zago Jeziorski[1], Júlia Machado Saporiti[1], Fabíola Jardim Barbon[1], Noéli Boscato[1*]

[1] Graduate Program in Dentistry, Federal University of Pelotas, Pelotas, 96015-560, Brazil.

Abstract

The rise of life expectancy has risen attention to elderlies' chronic systemic diseases and oral health impairments that accompany the aging process. Severe tooth wear (STW) is a pathological process that affects function, aesthetic and quality of life. This case report describes a rehabilitation of an 80-year-old men with severe tooth wear, resulting in impaired esthetic and function due to reduced vertical dimension of occlusion (VDO). This case represents a challenge to clinical practice due to severe crown destruction of the anterior and posterior teeth and limitations concerning peculiarities of the clinical case and patient's age and low income. Digital planning and diagnostic wax-up were performed. The restorative treatment involved the planning of provisional removable partial dentures (PRPDs) for reestablishing reduced VDO, followed by crown restoration with glass fiber posts in anterior and posterior teeth using direct composite resin technique. Finally, a definitive mandibular removable partial denture (RPD) was manufactured. The treatment plan had low-cost and provided satisfactory esthetic and function, increasing patient well-being.

Keywords: Tooth Wear; Vertical Dimension; Elderly; Occlusion.

Introduction

The interests in chronic diseases that accompany the aging process has increased due to the rise in life expectancy worldwide, once these diseases become multiple as people get older, with influence in the quality of life [1]. Aging is a life physiological process and elderlies are more likely to experience chronic systemic and oral health impairments such as partial or total edentulism. Nevertheless, private and public oral health services' improvements have allowed the maintenance of a greater number of teeth, rising the prevalence of chronic oral diseases including severe tooth wear (STW) [2]. Tooth wear (TW) is described as a physiological process that occurs over time [3], and it could be considered a pathological process when negatively affects function, aesthetic and quality of life.4 TW is considered severe when compromises more than 50% of the natural crown of several teeth, and physiologically incompatible with the patient's age [4]. Progressive TW can cause morphological changes such as reduced vertical dimension of occlusion (VDO), compromising esthetic and functional activities [5]. Also, it could predispose, trigger, or prolong orofacial pain because comprises the masticatory muscles, the temporomandibular joint, and its associated structures [6].

The treatment described in the present case represents a challenge to clinical practice due to severe coronary destruction of the anterior and posterior teeth, peculiarities of the clinical case, patient's age and low income. It is therefore essential to assess the magnitude of VDO's reduction and determine the restorations and prosthetic intervention required to obtain functional masticatory performance, phonation and esthetic rehabilitation, providing comfort, health and the return of normal activities [7]. This case report describes a multidisciplinary effort to address the esthetic and functional requirements of an 80-year-old man with STW.

Case Report

This clinical report is described in accordance with the CARE guidelines [8]. An 80-year-old man with STW sought dental care at the Extension Project of Federal University of Pelotas, Brazil. The patient also reported a heart attack suffered 20 years ear-

***Corresponding Author**:
Noéli Boscato,
Graduate Program in Dentistry, Federal University of Pelotas, Postal address: 457, Gonçalves Chaves Street, room 505, Pelotas, RS, 96015-560, Brazil.
Tel/Fax: +55 53 32226690
Email ID: noeliboscato@gmail.com/noeli.boscato@ufpel.edu.br

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lier, requiring regular medications (Carvedilol, AaS, Captopril, Alprazolam, Ansitec and Simvastatin). The patient reported being dissatisfied with his smile esthetic and impaired masticatory function. Also, he reported low income to afford a private dental treatment, since his oral health needs have not been met in public service. Extraoral examination revealed the compromised esthetics of the patient (Figure 1) and intraoral clinical examination revealed bleeding on probing in both arches and dental calculus in the mandibular anterior region. STW was found in the maxillary (13 to 23) and mandibular teeth (34 to 44), teeth loss (35 to 38 and 45 to 48) (Figure 2A). Radiographic examination (Figure 2B) showed endodontic treatment in tooth 22 and absence of periapical bone lesions.

After being informed of his oral health conditions, treatment possibilities were explained and the patient signed a statement of voluntary informed consent, authorizing the proposed treatment and photographic documentation of all stages.

Digital planning was performed using predetermined metrics (Figure 3) and diagnostic wax-up was performed (Figure 4 and 5). Centric relation (CR) and VDO were recorded by the "Lucia Jig" (Figure 6). The VDO needed to be reestablished based on metric, esthetic and phonetic aspects [9]. Several treatment options were presented to the patient, but he refused any procedure that involved greater cost or surgical procedures such as dental implants or fixed partial denture. Due to the patient's financial limitations, the rehabilitation with a removable partial denture (RPD) for the mandibular posterior region and crown restorations in composite resin with intraradicular glass fiber posts in the maxillary anterior region were recommended as the best option to supply tooth loss and TW.

Figure 1. Extraoral examination showing the compromised esthetics of the patient.

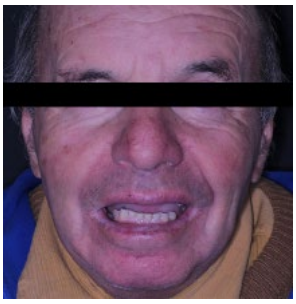


Figure 2. A) Intraoral examination showing severe tooth wear in both arches. B) Initial panoramic radiography.

Figure 3. A) Intraoral examination showing severe tooth wear in both arches. B) Initial panoramic radiography.

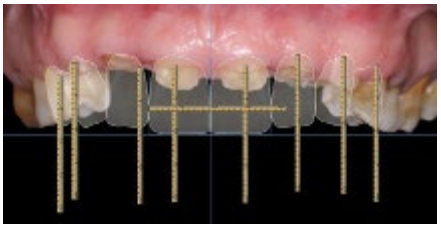


Figure 4. Maxillary diagnostic wax-up.

Figure 5. Mandibular diagnostic wax-up.

Initially, maxillary and mandibular provisional removable partial dentures (PRPDs) were made to reestablish the VDO subsequent rehabilitation. After PRPDs installation, endodontic treatments were performed in 13 to 23 and 33 to 43 in maxillary and mandibular teeth, followed by intraradicular posts cementation and restorations.

After the defiling and preparation of root canals, glass fiber posts were chosen (Whitepost DC System, FGM Dental Products, Joinville, SC, Brazil), sectioned, silanized and cemented with self-adhesive resin-based Relyx U200 (3M ESPE, St. Paul, MN, USA) luting agent [10]. (Figure 7). Excesses were removed and light-cure was performed for 40s with LED irradiance of 1400 mW/cm2 (Radii-Cal, SDI, Bayswater, Australia).

Remaining coronal structure of maxillary teeth were directly restored with nanoparticulate composite resin in translucent color for palatal faces (Filtek Z350 CT, 3M ESPE, St. Paul, MN, USA), using a lingual guide made of polyvinyl Siloxane (Addition Silicone Virtual Putty Regular, IvoclarVivadent, Schaan, Liechtenstein) from the diagnostic wax-up. Direct incremental technique using enamel (shade A1) and dentin (shade A2) composite resin were used (Filtek Z350 A1E, 3M ESPE, St. Paul, MN, USA). Each composite resin increment was light-cured for 20s. Composite resin excesses were removed with number 12 scalpels and diamond burs (numbers 3195, 3118 and 2135, KG Sorensen, Barueri, SP, Brazil), followed by finishing with the same diamond burs in fine and extra-fine granulations, abrasive discs of the green series (Superfix, TDV Dental, Pomerode, SC, Brazil), metallic abrasive strips (TDV Dental, Pomerode, SC, Brazil) and polyester finishing strips (Sof-Lex 3M ESPE, St Paul, MN, USA) [10]. After occlusal adjustment, polishing was made with silicone rubber tips (Enhance, Dentsply, York, Pennsylvania, USA) and felt discs (Diamond Flex, FGM Dental Products, Joinville, SC, Brazil) with diamond-based polishing paste (Diamond Excel, FGM Dental Products, Joinville, SC, Brazil). The extraoral final appearance after direct restoration technique with composite resin is shown in Figure 8. Similar steps were carried out in mandibular teeth 32 to 42 and 34. definitive mandibular RPD was planned. Then the occlusal rest seats preparation was performed and the models were sent to laboratory to manufacture the metallic infrastructure. The infrastructure was clinically checked and approved and artificial teeth (shade 66, Biotone, Dentsply, York, Pennsylvania, USA) were selected. Next, the mandibular RPD was installed and occlusal adjustments were made.

Discussion

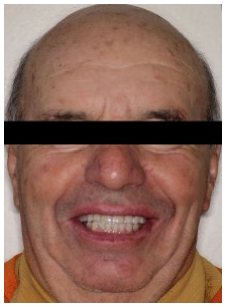
The increase in life expectancy worldwide associated with the decreased tooth loss noted in elderlies, resulted in a greater maintenance of natural teeth, allowing the occurrence of chronic oral conditions, such as tooth wear [11]. The prevalence of TW rises exponentially with age, with greater progression and severity in males, negatively affecting aesthetics and function [12].

The aging process is characterized by several chronic diseases that influence elderly's oral health and quality of life [13]. Among this diseases, diabetes mellitus, pneumonia and cardiovascular diseases are highly prevalent among elderlies and strongly linked with oral health, since the pathogenic biofilm may enter the blood stream, predisposing these pathologies [14]. Also, the poor motor coordination and the cognition impairment can lead to worse oral hygiene, enabling the occurrence of infections and reducing the chewing efficiency, which in turn can lead to malnutrition [15].

Figure 6. Maxilomandibular record in centric relation with Lucia JIG.

Figure 7. Cemented glass fiber posts in maxillary teeth and silicone matrix performed to guide the composite restorations.

Figure 8. Extraoral final appearance after direct restoration technique with composite resin.



The low income status of most Brazilian elderlies has a large impact on oral health once these individuals have difficulties in accessing dental care, for economic reasons, lack of accessibility and functional limitations [16]. Thus, the chronic diseases that affect elderlies also compromises their financial situation, increasing the expense with several medications. To solve this issue, less invasive treatments such as adhesive restorative procedures and RPD, are a viable option under these limitations when compared to other invasive and costly rehabilitation options [17]. Direct composite resin restorations preserve remaining tooth structure and provides cost-effective treatment for elderlies [18].

The provisional and definitive RPDs were planned to provide stabilization of the mandibular position in CR and maintenance of the reestablished VDO, enabling the restorative procedures [19]. The restorations of teeth with STW aimed to reestablish the reduced VDO, restoring muscle tone, as well as mandibular movements guides - damaged by anterior teeth destruction - helping the physiologic repositioning of the temporomandibular joint and related structures [18].

Knowledge regarding functional and aesthetic morphology is essential to plan and establish oral rehabilitation. The use of photographs in the digital planning makes it possible to analyze characteristics that would likely not be visualized during the first appointment, enabling predictability of the outcome, thereby satisfying functional and esthetic demands [20]. In the case report, the digital planning not only assisted in visualizing and predicting the outcome, but also guided the diagnostic wax-up, since the crowns of the teeth (13 to 23) were completely destroyed without any reference of width and height.

The impaired patient's financial situation determined the execution of the RPD as well as the use of intraradicular posts and direct composite resin restorations rather than implants and fixed prostheses, which demands longer time treatment strategies. It's important to note that the patient reported that already had sought treatment at public health care system, but he have been not attended. According to epidemiological studies, 68,7% of Brazilian elderlies (65-74 years) need some type of prosthetic intervention [21], and only 43% of the oral health teams in public health make dental prosthesis, with unequally distribution through national territory [22]. It's important to emphasize that the current Brazilian public health system is still unable to supply the prosthodontic oral rehabilitation that elderlies need, being characterized by the predominance of low complexity procedures in the last decades [21].

Glass fiber posts were chosen not only due to its esthetics, but also because of their mechanical behavior, as their elastic modulus is similar to the dentin, to the resin-based luting agents and also to the composite resins [23]. These posts provide retention and resistance to the coronal restoration thereby providing uniform mechanical behavior, which tends to reduce the possibility of root fractures [24].

Restorative procedures using direct composite resins are undoubtedly a less costly and more conservative treatment [25]. Nevertheless, when composite resin has been used in teeth with STW, its success and longevity are unpredictable and controversial in the literature [26]. Studies with long-term follow-up have shown that the most recurrent complications were color alterations and small restorable fractures [27]. However, the composite repair of these restorable fractures in classes III or IV can increase the survival of restorations on anterior teeth [28].

The composite resin was selected aiming mechanically resistant and esthetically pleasant restorations. In esthetic terms, no difference was found between nanoparticle composite resins compared to microhybrids, showing that the type of material has no clinically perceptible differences, regardless of the patient's age [29].

Studies have shown that age does not exert an influence on the survival rate of restorations, which are more affected by individual factors, such as dental caries [28, 29]. Thus, chronic conditions that affect the oral cavity of elderly individuals, such as TW, can certainly be treated with restorations in composite resin using the direct technique, which is an efficient and inexpensive form of treatment. In addition, the longevity of treatment depends on the establishment of effective oral hygiene and periodic maintenance to ensure the conservation of esthetics, function and quality of life.

The rehabilitation of an elderly with STW involves a substantial clinical challenge that requires effort to address restorative treatment and emotional assistance. Composite resin restorations made by direct technique, intraradicular fiber post and RPD-demonstrated to be a low-cost and suitable treatment for treating STW and reduced VDO of an 80-year-old man.

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