

Case Report

Association between Restorative Treatment and Toothpaste Indication for Resolution of Dentin Hypersensitivity: Case Report

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Abstract

Dentin hypersensitivity (DH) is a painful dental condition with a multifactorial etiology, usually associated with exposed dentinal surfaces. The development of non-carious cervical lesions (NCCL) is important factor for dentin exposure at the gingival margin. Several different therapies have been proposed to correct these lesions or condition. Objective: To review and describe a clinical management of the DH, demonstrating the association between the bioactive glass based-toothpaste use by patient and the restoration treatment for resolution of DH associated to NCCL. Case Report: The patient presented for treatment of NCCL and DH. It was prescribed a bioactive glass based-toothpaste (NovaMin™) and the NCCL were restored with composite resins and results were evaluated. DH was controlled and the patient is satisfied with case resolution. Conclusion: Resin restorations combined with toothpaste indication are conservative and safe approaches to treat DH associated to NCCL.

ABBREVIATIONS

NCCL: Noncarious Cervical Lesion; DH: Dentin Hypersensitivity

INTRODUCTION

Noncarious cervical lesion (NCCL) is a common problem with multifactorial etiology [1,2]. The NCCL is characterized by the loss of dental structure including enamel, dentin and/or cement without bacterial involvement and may be associated to several conditions: erosion, abrasion and abfraction [3]. NCCL usually is associated to dentin hypersensitivity because the dentinal tubules are exposed to the oral environment [4]. Stimuli such as osmotic changes, temperature variation, toothbrushing and other mechanical stimuli could promote acute pain [5,6]. The hydrodynamic theory [7] is the most accepted for explaining the mechanism of dentin hypersensitivity, since the pain occurs because of the movement of fluid in the dentinal tubules.

In patients with loss of dental structure the treatment most indicated is the restoration with dental composite resin. The restoration mechanically blocks the stimuli responsible for DH. However, some areas continue to be exposed to oral environment, such as the dentin/restoration interface or other dentin exposed areas without significant loss of dental structure.

Toothpaste is always recommended for hypersensitivity treatment [8,9] as it promotes maintenance of biodisponibility of desensitizing agents. Toothpaste containing bioactive glass shows effectiveness on reduction of DH [10]. The bioactive glass is capable of chemically binding to dental structure (especially dentin) and features high bioactivity [11]. The reaction between bioglass and ions present on saliva results in the formation of a layer of crystalline carbonated hydroxyapatite, similar to the natural apatite of the tooth [11-13]. This mineral formation physically occludes dentinal tubules contributing to reduction of DH [13].

The aim of this case report is discuss about the best treatment for the patient that presents NCCL considering the restoration material and your association with the toothpaste indication for controlling DH.

CASE PRESENTATION

A 50-year-old male patient attended for treatment at Piracicaba Dental School (University of Campinas, Piracicaba, SP, Brazil), relating DH by external stimuli in upper anterior teeth. After directed anamnesis, radiographic exam and clinical examination it was observed noncarious lesions, classified as Class V, with exposed dentin in teeth 12, 11 and 21 (Figure 1).



Figure 1 Initial Case. It is possible to observe the noncarious cervical lesions, Class V, on maxillary anterior teeth.

The patient reported traumatic toothbrushing with excessive force and high ingestion of acidic drinks (especially carbonated drinks). The lesions exhibit polished surface, regular shape and low depth. In buccal face the teeth presented enamel cracks and incisal wear. The 22 element presented gingival inflammation, tissue recession without a significant loss of tooth structure. Regarding cervical lesions, the etiology was considered multifactorial especially due the combination of factors. The first stage of treatment was based on instructions of oral health, removal of prejudicial habits and prescription of a bioactive glass based-toothpaste (NovaMin™ - Sensodyne Repair & Protect, SmithKline Beecham Consumer Health Care, Berkshire, United Kingdom). The patient was instructed to brush three times a day with this dentifrice prior to restorative treatment. The second clinical stage was the restorative treatment with a dental restorative composite.

For restorative treatment, by virtue of an intimate relationship with the periodontium, it is essential the choice of composites with good polishability. In current case report was established the use of nanohybrid composite (Empress Direct, Ivoclar-Vivadent, Schaan, Liechtenstein). Initially, the biofilm was removed by dental prophylaxis using a mixture of water and pumice. The shade selection was executed with material incremental allocation in the buccal surface contiguous to the region where the restoration will be placed (the tooth color was matched to shade A3). No cavity preparation was performed.

For better access to the cervical margin, it was decided to proceed the relative isolation and installation of non-impregnated gingival retractor cord (Pro Retract, FGM, Joinville-SC, Brazil) (Figure 2). The lesion did not show well-defined contours in hard tissue, and also the clamp stabilized in cervical region could cause gingival damage. Thus, the gingival retractor cord was inserted in gingival sulcus, exposing lesion edge and controlling the gingival crevicular fluid. Relative isolation with cotton rolls was performed to control humidity and contamination. After isolation, the adjacent teeth were protected with a polyester matrix. The next step was the selective acid etching of the enamel for 30 seconds (Figure 3A) using 35% phosphoric acid (UltraEtch/Ultradent Products, South Jordan, UT, USA). The dental structure was washed during 30 seconds (Figure 3B) and dried with slightly damp cotton that aimed the humidity control of dentin (Figure 3C). The primer was actively applied for 20 seconds (Clearfil SE Bond, Kuraray, Japan) and gently air dried for 5 seconds to solvent evaporation (Figure 3D). The fine adhesive layer was applied and light-cured for 20 seconds using a third-generation LED source (Ultradent, South Jordan, UT, USA).

For restorative treatment with composite resin stratification technique was used. This technique is based on small increments insertion (thickness <2mm) in order to reduce stresses generated by polymerization shrinkage (Figure 4A). Three increments of composite resin were inserted and adapted sequentially. With a help of a brush the material excess was removed and the increment was light-cured for 20 seconds (according of manufacture's instruction). The use of a brush for this type of restoration is important for promoting better adaptation of composite resin and aiding for smooth and uniform thickness along the restoration surface (Figure 4B). After final light-curing the gingival retractor cord was removed and the polishing procedure was viable.

Material excesses were detected by an explorer probe (Figure 5) and removed using diamond burs numbers 2200F and 2200FF (KG Sorensen). After one week, finishing and polishing were performed. Contouring and polishing discs (Sof-Lex™ 3M ESPE) with different granulation (Figure 6) and abrasive rubbers (KG Sorensen) (Figure 7) were used for promoting a



Figure 2 Relative isolation and installation of non-impregnated gingival retractor cord.

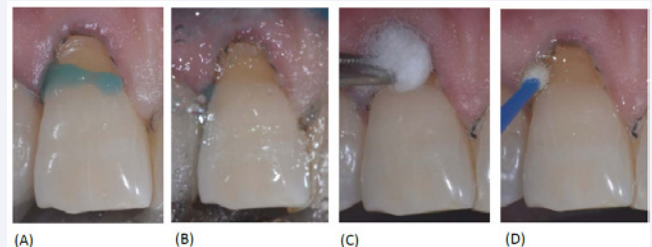


Figure 3 (A) – Acid etching of the enamel for 30 seconds (35% phosphoric acid). (B) –Rinsing during 30 seconds. (C) –Drying with slightly damp cotton that aimed the humidity control of dentin. (D) – The primer was actively applied for 20 seconds and gently air dried for 5 seconds to solvent evaporation. The adhesive layer was applied and light-cured for 20 seconds.

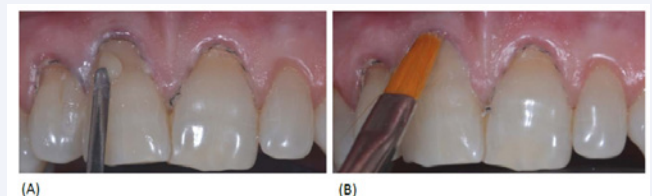


Figure 4 (A) – Insertion of composite resin by the stratification technique. (B) –Use of a brush for promotes a better adaptation of resin composite and a smooth and uniform thickness.

smooth surface. The final polishing was performed using silicon carbide (Figure 8A) and felt discs with diamond paste (Figure 8B). The final restoration can be observed in Figure 9, where it can be highlighted good marginal adaptation; smooth, bright and polished surface, which reproduced tooth natural structure. In this case, the association between restoration and toothpaste use controlled DH along 6 months of preservation. The patient stays in constant assessment and no change in control of DH was found.

DISCUSSION

Non-carious cervical lesions appear as a result of gingival recession, abrasion, erosion, abfraction or a combination of



Figure 5 Detection of the excess by an explorer probe.

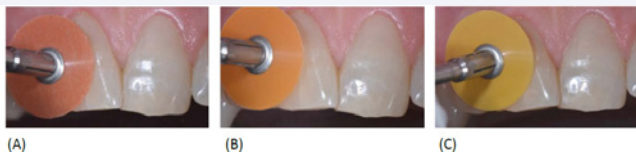


Figure 6 Finishing and polishing. (A) - Contouring and polishing disc of high granulation. (B) - Contouring and polishing disc of intermediary granulation. (C) - Contouring and polishing disc of fine granulation.

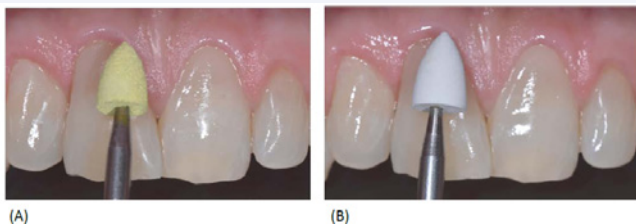


Figure 7 Finishing and polishing. (A)- Abrasive rubbers of intermediary granulation. (B) - Abrasive rubbers of fine granulation.



Figure 8 Finishing and polishing. (A) - Application of silicon carbide. (B) - Application felt discs with diamond paste.



Figure 9 Final restoration. Marginal adaptation; smooth, bright and polished surface, which reproduced tooth natural structure.

multiple factors [14,15]. These lesions lead to DH, characterized by an acute and transitory pain when tooth is exposed to cold liquids, brushing and touch of any other instruments [16]. Also, these lesions like any other accumulate biofilm and are more prone to structure loss.

Class V restorations represent a complex substrate for adhesive restorations because they do not provide macromechanical retention and have both enamel and dentin margins. Class V lesions include sclerotic dentin [17], with some occluded tubules [18]; a hypermineralized layer, which sometimes prevent acid-etching; exposed dentin to the oral environment, representing free access for bacterial contamination. Considering that substrate characteristics play an important role on the restoration success, material choice is an important step on clinical routine.

Nano-hybrid composite, like Empress Direct, are a good alternative for anterior restorations. These composites aggregate favorable mechanical properties such as: great flexural modulus, flexure strength and fracture toughness [19]. Besides, these materials exhibit great polishability enabling high smoothness on restoration surface, essential characteristics for esthetic restorations. Smooth and glossy surface favors restoration brightness and better color stability over time [20].

For non-carious cervical lesions originated from gingival recession, without structure loss, others approaches are indicated. Still, in these cases dentinal hypersensitivity can occur. Professional can make use of adhesive systems, desensitizing in-office gels or periodontal plastic procedure [21-24]. Also, not least important, is to guide patient oral hygiene habits. Patient must be aware of the influence of heavy pressure on brushing and the more suitable toothpaste for controlling the hypersensitivity issue.

The toothpastes are established part of oral hygiene practices in the world. Thus, the indication of toothpaste is relevant since it promotes maintenance of active principle in sufficient biodisponibility for reactivity with the dental hard tissues. In present case report, it was indicated a toothpaste containing Novamin™ that is a bioactive glass (calcium sodium phosphosilicate), noted for the capacity of bonding chemically to tooth structure. This biomaterial can work like a calcium, phosphate and sodium supply attracted by collagen fibrils and dentin surface [12]. This mineral precipitation, known as carbonated hydroxyapatite, mechanically occludes dentinal tubules, preventing interstitial fluid movement and blocking consequent painful stimulus [10,13]. The bioglass incorporated

into toothpaste is known for its efficacy against DH after 6 to 8 weeks [8,10,13] and preserve this effect for a period of time because of the stability of mineral deposits formed in oral environment. This is very important when the patient has an acid diet, once the toothpaste form durable occlusive deposits [25].

Apart from non-cariou cervical lesion etiology in which there is tooth structure loss, it is indicated a Class V restoration. In the present case, it could be observed three NCCLs indicated for restorative procedure and one that were not. So, Class V restorations were accomplished with self-etching adhesive system and nanohybrid resin (Empress Direct) on vestibular surfaces of 12, 11 and 21 elements. The self-etching adhesive was choice based on the evidence [26] that this bond system is related with reduction of postoperative sensibility that was important in present case report. Moreover, the patient was oriented in respect to applied force on toothbrushing, toothpaste use and prejudicial food habits.

The effective treatment of NCCL involves resin restorations combined with toothpaste indication for conservative and safe approaches to treat DH associated to NCCL. Based on this patient characteristic, the toothpaste associations helped in DH control acting especially in areas with not covered tubules and promoted treatment for everyday sensitivity relief.

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