

DOI: 10.33947/1982-3282-v16n4-4677

**CERVICAL MATRIX AS A RESTORATIVE APPROACH IN NON-CARIOUS CERVICAL LESIONS: CASE REPORT****USO DE MATRIZ CERVICAL COMO ALTERNATIVA RESTAURADORA EM LESÕES CERVICAIS NÃO CARIOSAS: RELATO DE CASO****MATRIZ CERVICAL COMO ENFOQUE DE RESTAURACIÓN EN LESIONES CERVICALES NO CARIOSAS: REPORTE DE CASO**

Jannefer Leite de Oliveira<sup>1</sup>, Adriana Barbosa Rodrigues<sup>2</sup>, Edna Fernanda Dias Leão<sup>3</sup>, Soraya Mameluque<sup>4</sup>, Tânia Coelho Rocha Caldeira<sup>5</sup>, Danilo Cangussu Mendes<sup>6</sup>

**ABSTRACT**

**Introduction:** Non-Carious Cervical Lesions (NCCL's) are pathological conditions of multifactorial etiology. **Aim:** This case report highlights the use of a cervical matrix for technical simplification of the procedure of class V restoration. **Case report:** Patient attended a specialized center for diagnosis and treatment of non-carious diseases, complaining of dentin hypersensitivity and aesthetic discomfort due to loss of tooth structure in the cervical region. The proposed treatment plan was basic periodontal treatment and subsequent restoration of all cervical lesions that had a loss of tooth structure greater than 1 mm. The transparent cervical matrix was used to promote correct anatomical contour of the cervical third of the buccal surface and the emergence profile. **Conclusion:** The use of the cervical matrix is presented as a facilitating tool for the restorative treatment of NCCL's.

**DESCRIPTORS:** Tooth Wear; Dental Restoration; Esthetics.

**RESUMO**

**Introdução:** As Lesões Cervicais Não Cariotas (LCNCs) são condições patológicas de etiologia multifatorial. **Objetivo:** Mostrar a utilização de uma matriz cervical para simplificação técnica do procedimento restaurador Classe V por meio de um relato de caso clínico. **Relato de caso:** Paciente compareceu a um centro especializado de diagnóstico e tratamento de lesões não cariosas, com queixa de hipersensibilidade dentinária e incômodo estético devido a perda de estrutura dentária na região cervical. O plano de tratamento proposto foi tratamento periodontal básico e posterior restauração de todas as lesões cervicais que tivessem perda de estrutura dentária maior que 1 mm. A matriz cervical transparente foi utilizada para promover um contorno anatômico correto do terço cervical da face vestibular e perfil de emergência. **Conclusão:** O uso da matriz cervical apresenta-se como uma ferramenta facilitadora para o tratamento restaurador das LCNCs.

**DESCRITORES:** Desgaste dos dentes; Restauração Dentária Permanente; Estética Dentária.

**RESUMEN**

**Introducción:** Las lesiones cervicales no cariosas (LCNCs) son condiciones patológicas de etiología multifactorial. **Objetivo:** Mostrar el uso de una matriz cervical para la simplificación técnica del procedimiento a través de un informe de caso clínico. **Informe del caso:** El paciente asistió a un centro especializado para el diagnóstico y tratamiento de lesiones no cariosas, quejándose de hipersensibilidad dentinal y malestar estético debido a la pérdida de estructura dental en la región cervical. El plan de tratamiento propuesto era el

<sup>1</sup> Undergraduate dentistry student at the State University of Montes Claros. 0000-0003-0422-8216. jannefer.oliveira@gmail.com

<sup>2</sup> Undergraduate dentistry student at the State University of Montes Claros. 0000-0003-2702-2878. rodriguesadrianabarbosa@gmail.com

<sup>3</sup> Undergraduate dentistry student at the State University of Montes Claros. 0000-0002-2575-4189. eleao17@gmail.com

<sup>4</sup> PhD in Restorative Clinic and professor of the undergraduate course in Dentistry at the State University of Montes Claros. 0000-0001-5711-9473. soraya.ferreira@unimontes.br

<sup>5</sup> PhD in Restorative Clinic and professor of the undergraduate course in Dentistry at the State University of Montes Claros. 0000-0001-8192-1861. tania.coelho@unimontes.br

<sup>6</sup> PhD in Health Sciences and professor of the undergraduate course in Dentistry at the State University of Montes Claros. 0000-0003-4766-0009. danilo.mendes@unimontes.br. Department of Dentistry, Address correspondence to: State University of Montes Claros. Campus Universitário Prof. Darcy Ribeiro, Av. Prof. Rui Braga, s/n - Vila Mauriceia, Montes Claros - MG, 39401-089. Phone: 55-38 999671186

tratamiento periodontal básico y la posterior restauración de todas las lesiones cervicales con pérdida de estructura dental superior a 1 mm. La matriz cervical transparente se utilizó para conferir el contorno anatómico del tercio cervical de la cara vestibular y el perfil de emergencia. **Conclusión:** El uso de la matriz cervical es una herramienta facilitadora para el tratamiento restaurador de LCNC.

**DESCRIPTORES:** Desgaste de los Dientes; Restauración Dental Permanente; Estética Dental.

## INTRODUCTION

Non-Carious Cervical Lesions (NCCL) are pathological conditions characterized by loss of tooth structure at the level of the cementum-enamel junction unrelated to the carious process <sup>1</sup>. The NCCL's have multifactorial etiology and may be considered a public health problem <sup>1,2</sup>, due to its high prevalence ranging from 9.1% to 93% of the population worldwide <sup>3</sup>. Lesions are frequently found in premolars and molars and their extension and severity tend to increase with advancing age <sup>4</sup>.

It is essential to know which etiological factors contribute to the onset and progression of NCCL, both for the success of treatment and for the prevention of future injuries <sup>5</sup>. Several factors have been associated with this condition, however, there is a consensus that usually exists a synergistic action of two or three main etiological mechanisms: biocorrosion (erosion), friction (abrasion) and tension (abfraction) <sup>1,3</sup>.

The restorative treatment of NCCL is indicated when one or more of the following conditions are present: active cavitated caries lesions associated with NCCL; NCCL with subgingival margins, which makes it impossible to control plaque; excessive loss of tooth structure (greater than 1 mm), which compromises the integrity of the dental element or presents a risk of pulp exposure; persistent dentin hypersensitivity, prosthetic abutment for removable prosthesis; and esthetic demands by patients <sup>1,2,6</sup>.

There are several possibilities for the restoration of NCCL's. Choosing a correct restorative material involves the knowledge about its aesthetic, adhesive, and mechanical resistance properties. The Glass Ionomer Cement (GIC) is an option for the restorative treatment of NCCL due to its ability to chemically adhere to dental structures and promote a good marginal sealing because of its linear coefficient of thermal expansion similar to dentin. In addition, the GIC releases fluoride ions, which, incorporated into dental tissues promotes greater resistance to demineralization. As disadvantages, the GIC presents: lack of translucency, high surface roughness (due to the size of the particles), high internal porosity, short working time, sensitivity to moisture variations (syneresis and imbibition) and low mechanical resistance. In order to overcome these disadvantages, resin monomers such as HEMA and Bis-GMA were incorporated, in order to enable a light-activated cure process (this type of cement was called resin-modified glass ionomer cement). On the other hand, when compared to composite resins, the resin-modified glass ionomer cement presents inferior aesthetics and also poor polishing ability <sup>7</sup>.

In this way, composite resins are considered the material of choice for the treatment of NCCL. Composites demonstrate better physical, biochemical and aesthetic properties than GIC, showing a variety of color and translucency that favor greater aesthetic, naturalness and greater smoothness and superficial shine. Composite with lesser modulus of elasticity, such as nanoparticulates, microparticulates, micro or nanohybrids, are capable of absorbing part of the energy transmitted during chewing, preserving the tooth-restoration interface <sup>6,7</sup>.

Class V restorations show low longevity mainly due to the preparation characteristic (low retentivity) and the problems inherent to the restorative technique (specially the difficulty of isolating the operative field) which increases the crevicular moisture. Besides, the difficulty to perform a correct cervical contour and a correct finishing and polishing (particularly close to the gingival tissue) are common problems. It is known that moisture control and gingival retraction are essential for the success of class V restorations, precisely because they interfere with the adhesive process<sup>8-10</sup>.

Thus, considering the high prevalence of NCCL and the technical difficulty involved in restoring these lesions, the aim of this work is to show the use of a cervical matrix for technical simplification of class V restorations through a clinical case report.

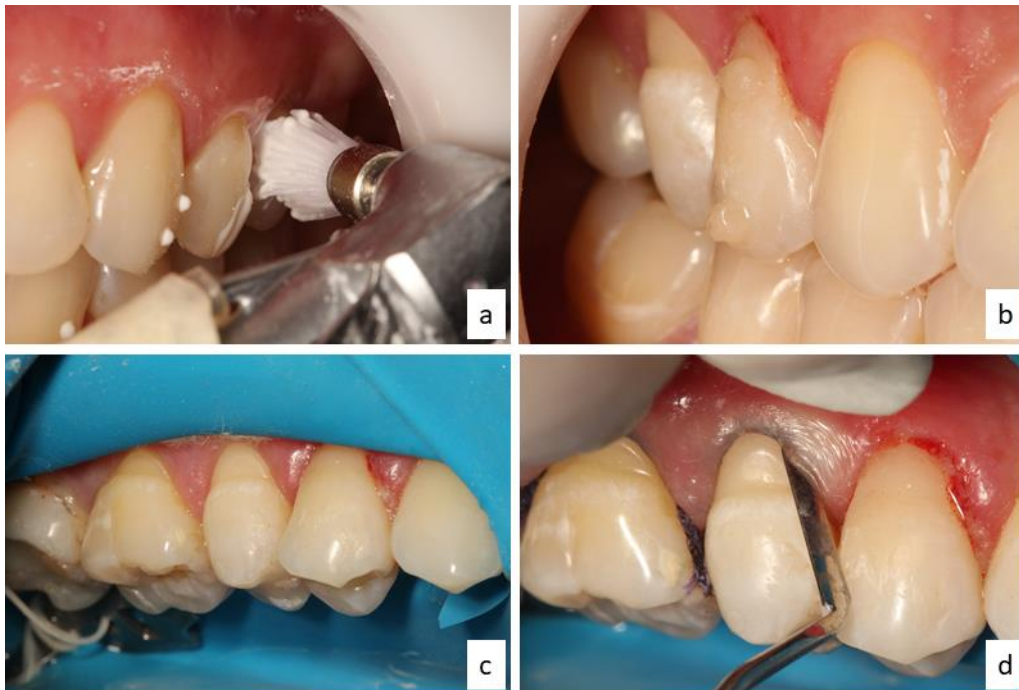
## CASE REPORT

A 30-year-old female patient attended a clinic-school complaining of dentin hypersensitivity (DH) and aesthetic discomfort due to loss of structure in the cervical region. A careful anamnesis and physical examination were performed to identify the main etiological factors involved in the formation of NCCL's and DH in the patient. Acidic food, history of orthodontic treatment, the presence of occlusal interference, dental clenching and excessive brushing were related as etiological factors. Therefore, the proposed treatment plan was ordered as follows: basic periodontal treatment and subsequent restoration of all cervical lesions that had a loss of tooth structure greater than 1 mm (tooth 14, 15, 16, 24, 25, 34, 35 and 45) (figure 1a-c). In addition, the patient was instructed in relation to the etiological factors, once the management of them is an essential step in the treatment plan.



**Figure 1** - a. Initial aspect in frontal view; b. Lateral view on the left side; c. Lateral view on the right side.

To perform the restorative procedures, initially the teeth were cleaned with pumice and water (figure 2a). After the color selection (figure 2b), the medium opacity resin A3.5 (body resin, Forma, Ultradent Products Inc, Indaiatuba, SP, Brazil) was chosen. The modified absolute isolation technique was performed (figure 2c), also inserting the retractor cord (Ultrapack #000, Ultradent Products Inc, Indaiatuba, SP, Brazil) in the gingival sulcus to contain gingival fluids, and to move away the tissue, allowing better moisture control and better visualization of the lesion margins (figure 2d).



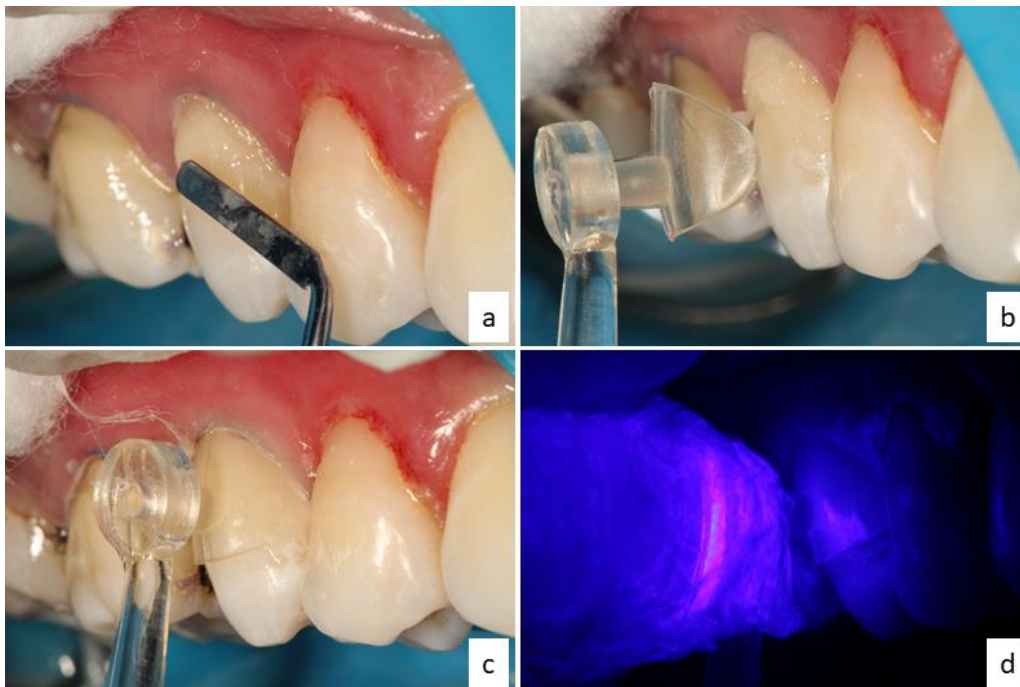
**Figure 2** - a. Pumice prophylaxis; b. Color selection of composite; c. Modified rubber dam isolation; d. Insertion of retractor cord.

Then, 37% phosphoric acid (Ultra-Etch, Ultradent Products Inc, Indaiatuba, SP, Brazil) was used for enamel conditioning (figure 3a), followed by washing (figure 3b) and moisture control (figure 3c) for application of the adhesive system (Ambar universal, FGM, Joinville, SC, Brazil) (figure 3d), according to the manufacturer's instructions.



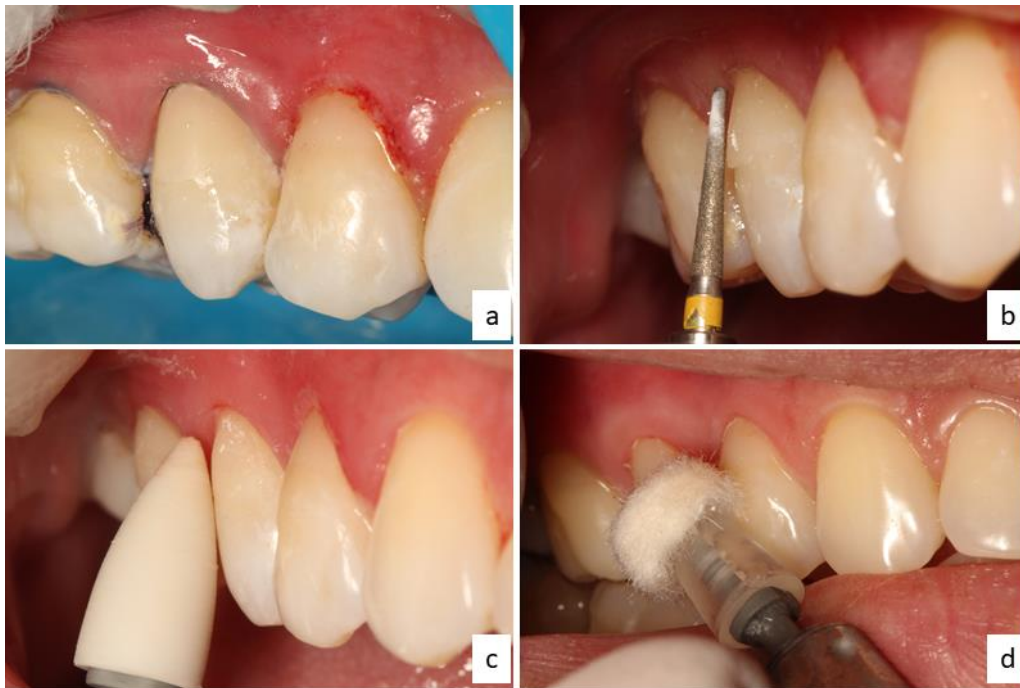
**Figure 3** - a. Conditioning of enamel with 37% phosphoric acid; b. Washing; c. Moisture control; d. Adhesive application.

The restoration was carried out with the nano-hybrid composite resin Forma in a single increment when the cavity had a depth of up to 2 mm (figure 4a) and in 2 increments when the cavity had greater depth. The transparent cervical matrix (TDV, Pomerode, SC, Brazil) was used to achieve the anatomical contour of the cervical third of the buccal surface and emergence profile with precision and time-saving (figure 4b). The cervical matrix used is a flexible plastic stick, whose “shell” shape adapts to the cervical curvature of the teeth (figure 4c). The transparent plastic material allows the visualization of the resin during photoactivation and protects it from moisture (figure 4d). Photoactivation was performed for 40 seconds (LD Max photoactivator, Gnatus, Barretos, SP, Brazil) with the cervical matrix held under pressure. After this first photoactivation, a new photoactivation was performed, now without the cervical matrix.



**Figure 4** - a. Composite application in unique increment; b. Selection of cervical matrix in accordance with the tooth; c. Placement of cervical matrix; d. Photoactivation with cervical matrix in position.

After the restorative procedure (Figure 5a), the restorations were finished with an extra fine granulation diamond bur (3195FF KG Sorensen, Cotia, SP, Brazil) (Figure 5b) and abrasive discs (Superfix, TDV, Pomerode, SC, Brazil), followed by pre-polishing with rubber disc (American Burns, Palhoça, SC, Brazil) moistened with water-soluble lubricant (Figure 5c). The final polishing was performed with a felt disc (American Burns, Palhoça, SC, Brazil) with polishing paste (Diamond R, FGM, Joinville, SC, Brazil) (Figure 5d). At the end of the restorative procedure, photography was performed to analyze the emergence profile and anatomy of the restoration (Figure 6a-c).



**Figure 5** - a. Immediate result after photoactivation; b. Excess removal with extra fine diamond burr; c. Use of rubber point; d. Final step using felt disc and polishing paste.



**Figure 6** - a. Final result in the front view; b. Right view; d. Left view

This work was written following the guidelines from CARE (Case report guidelines)<sup>11</sup>. This case report was approved by the Research Ethics Committee of the State University of Montes Claros, Minas Gerais state, Brazil (#4.618.034). Participant's images and information were obtained through signed informed consent. All ethical precepts were followed according to the 466/12 resolution, ensuring the preservation of data and confidentiality.

## DISCUSSION

The data observed in the literature on the prevalence of NCCL demonstrate a high variety, depending on the characteristics of the studied population<sup>3</sup>. The data from the systematic review by Teixeira et al. (2020)<sup>3</sup> also show an average prevalence among adults of 46.7%, with a higher prevalence in older populations than in younger. South America proved to be the region with the largest number of individuals affected by NCCL (69%), followed by Asia, Europe and North America (61%, 35% and 19%, respectively)<sup>3</sup>.



Different terminologies in the literature have been used to describe the NCCL in relation to the main etiological mechanism, such as "cervical erosion", "cervical abrasion" and "abfraction" <sup>12</sup>. However, in the most current literature there is a tendency to standardize these terms as biocorrosion replacing erosion, friction replacing the term abrasion and stress replacing the term abfraction <sup>5</sup>. In biocorrosion, enamel and dentin are chemically dissolved by the action of dietary or stomach acids. In the friction lesion, physical wear occurs through objects or substances that come into frequent contact with the surfaces of the teeth, resulting in mechanical wear. On the other hand, stress lesion originates biomechanical loading forces that cause tooth flexion, which results in microfracture and loss of tooth structure in the cervical region (fulcrum region) <sup>5,13</sup>. In this case report, the etiological mechanisms related to the onset and progression of NCCL were in fact multifactorial, with occlusal interference, premature contact, tooth clenching, brushing with excessive force and acid diet being observed.

Since NCCL is the most important factor involved in dentin exposure at the cervical level, it can be considered one of the predisposing factors for dentin hypersensitivity (DH), which is an intense and short-lived painful condition through thermal, tactile and osmotic stimuli <sup>14</sup>. Thus, the management and correct treatment of NCCL also improves the painful symptoms of DH <sup>14</sup>.

The restorative treatment of LCNC should be minimally invasive. Among the restorative techniques, the adhesive system and the composite resin are materials of choice for most professionals due to their mechanical and aesthetic properties and longevity <sup>1</sup>. It is important to emphasize that the operator has a fundamental role in the longevity of the restorative procedure, being responsible for the quality of care, proper isolation of the operative field, minimally invasive dental preparation, correct application of the adhesive and composite system, finishing, polishing and preservation of the restoration <sup>1</sup>. Resin composites are commonly used to restore NCCL, as they do not require high removal of the dental structure, in addition to having a modulus of elasticity similar to dentin, good mechanical retention, preserving the dental structure and favoring aesthetics. Furthermore, the adhesive restoration protocol is simple and accessible <sup>4</sup>.

In relation to the size of fillers, microhybrid, nanohybrid and nanoparticulate composite resins are the resins of choice for restoring NCCL as they provide favorable aesthetics and strength. Regarding to viscosity, fluid resins have lesser modulus of elasticity and higher microleakage, and their use is less indicated in areas of high stress, such as NCCL. Regular consistency resins are recommended in places of stress because of the higher flexural strength, little abrasive wear and low shrinkage due to the smaller size and greater quantity of fillers. Bulk- fill composite resins are recent on the market and demand greater scientific evidence, but the increased translucency influences the aesthetics of the cervical area, which is basically composed of dentin and just a little enamel thickness <sup>4</sup>.

The restorative treatment aims to restore the lost anatomical shape, function and aesthetics. In the last decades, professionals and companies have been trying to facilitate the technique of making class V restorations. According to the modified technique carried out by Jefferies (1990) <sup>10</sup>, the Mylar matrix associated with a photoactivated elastomeric resin allowed an excellent and effective moisture control, besides favoring the visualization of the gingival margin of the lesion during the restorative procedure of an NCCL. A benefit in the restorative procedure was also found when associating

the Mylar matrix with a photoactivated gingival barrier, in order to stabilize the matrix<sup>9</sup>. The choice of the plastic matrix of this system is due to its transparency, allowing better light transmission and for reducing the damage to soft tissues. The technique in question is an alternative when the rubber dam isolation is not used in class V cavities and allows the insertion of materials in the cervical wall, which contributes to facilitate the procedure and the possibility of reduce the stages of restoration finishing and polishing<sup>9</sup>.

More recently, the TDV cervical matrix was launched on the national market<sup>15</sup>. This is a device that adapts to the cervical region to model composites in class V restoration, favoring the achievement of an excellent anatomy, reducing the finishing time and improving the performance and final quality of the restoration<sup>15</sup>. The benefit of a cervical matrix can be realized in Class V restorations with glass ionomer or resin composite in promoting adequate cervical contour and correct emergence profile of the restoration, even when using a fluid consistency material<sup>16</sup>. The plastic cervical matrix does not adhere to the restorative material during photopolymerization and can be subjected to sterilization, which allows its use more than once, as long as it does not deform. Besides, it eliminates the oxygen inhibition layer, providing a smooth surface that will require less adjustments<sup>15</sup>.

This case report has some important limitations. Firstly, the study type, which does not allow testing and compare other techniques and products. Also, it is necessary to take into account the individualities of each patient, not confirming the results for the general population, once the results were obtained from a specific case. However, this study has its clinical relevance by demonstrating the step by step of a new product as a facilitating tool in the process of restorative treatment of NCCL.

## CONCLUSION

Non carious cervical lesion and Dentin hypersensitivity are increasingly common conditions, affecting a large part of the population worldwide. The use of the cervical matrix can be considered a facilitating tool for the restorative treatment of NCCL's, once it offers a correct anatomical contour and emergence profile reducing the time to execute the restoration and finishing and polishing.

## REFERENCES

1. Peumans M, Politano G, Van Meerbeek B. Treatment of noncarious cervical lesions: when, why, and how. *Int J Esthet Dent*. 2020;15:16-42.
2. Kina M, Vilas Boas TP, Tomo S, et al. Lesões cervicais não cariosas: protocolo clínico. *Archives of Health Investigation*. 2015;4(4).
3. Teixeira DNR, Thomas RZ, Soares PV, Cune MS, Gresnigt MMM, Slot DE. Prevalence of noncarious cervical lesions among adults: A systematic review. *J Dent*. 2020;95:103285.
4. Soares PV, Grippo JO. *Noncarious Cervical Lesions and Cervical Dentin Hypersensitivity: Etiology, Diagnosis, and Treatment*. Quintessence Publishing; 2017.
5. Grippo JO, Simring M, Coleman TA. Abfraction, abrasion, biocorrosion, and the enigma of noncarious cervical lesions: a 20-year perspective. *J Esthet Restor Dent*. 2012;24:10-23.

6. Barbosa L, Prado Jr R, Mendes R. Lesões cervicais não-cariosas: etiologia e opções de tratamento restaurador. *Revista Dentística on line*. 2009;8:5-10.
7. Moura AG, Beck H. MATERIAIS RESTAURADORES PARA LESÕES CERVICAIS NÃO CARIOSAS. *Revista de Odontologia da UBC*. 2017;7(1).
8. Giachetti L. A Simple Method for Treating Subgingival Class V Lesions. *Oper Dent*. 2019;44:333-5.
9. Perez CR. Alternative technique for class V resin composite restorations with minimum finishing/polishing procedures. *Oper Dent*. 2010;35:375-9.
10. Jefferies SR. Use of a visible light cured elastomeric resin to stabilize cervical matrix in restoration of Class V erosion lesion. *J Esthet Dent*. 1990;2:79-81.
11. CARE-Checklist. CARE Case Report Guidelines (care-statement.org). <https://www.care-statement.org/checklist>.
12. Kolak V, Pesic D, Melih I, Lalovic M, Nikitovic A, Jakovljevic A. Epidemiological investigation of non-carious cervical lesions and possible etiological factors. *J Clin Exp Dent*. 2018;10:e648-e56.
13. Yoshizaki KT, Francisconi-Dos-Rios LF, Sobral MA, Aranha AC, Mendes FM, Scaramucci T. Clinical features and factors associated with non-carious cervical lesions and dentin hypersensitivity. *J Oral Rehabil*. 2017;44:112-8.
14. Canadian-Advisory-Board DH. Consensus-Based Recommendations for the Diagnosis and Management of Dentin Hypersensitivity. *J Can Dent Assoc*. 2003:221-6.
15. TDV. Matriz Cervical TDV- restaurações classe V. <http://tdv.com.br/produtos/matrizes/cervical-matrix/?lang=en>.
16. Torres CRG. *Modern operative dentistry: Principles for clinical practice*: Springer Nature; 2019.