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### Abfraction: Etiopathogenesis, clinical aspect, diagnosis and treatment, a review literature

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#### Abstract

Dental abfractions are non-cariou lesions that can complicate their diagnosis and correct treatment due to their characteristics.

**Objective:** A literature review to analyze the etiopathogenic factors, clinical aspect, diagnosis, and treatment of dental abfractions.

**Methodology:** A compilation of articles published in the last 5 years 2017-2022 was carried out using the PubMed electronic database. Abstracts and full texts were identified that included information on the etiopathogenesis, clinical aspect, diagnostic, and treatment. The implementation of the search using operators AND, OR, and NOT. Within the keywords used for the search “abfraction” “etiopathogenesis”, “clinical aspect”, “diagnostic” and “treatment”.

**Results:** Abfractions have a multifactorial origin (diet, mechanical action) which is more associated with occlusal forces. Most abfractions have a cervical crescent shape. Diagnosis depends on knowledge of the etiology, clinical aspect, and clinical history. The difficulty of treatment depends more on the difficulty of having a good marginal seal.

**Conclusions:** According to the literature analyzed, the etiology of the abfraction process is the product of inadequately distributed occlusal forces, which are concentrated in the cervical area. The therapeutics of these lesions can range from conservative treatments such as abrasives. However, more studies are needed to see the durability of this type of restoration. Therefore, education is important to avoid this type of injury.

**Keywords:** Etiopathogenesis, clinical aspect, diagnosis and treatment, diet, mechanical action

#### Introduction

Abfraction is the loss of dental tissue <sup>[1]</sup> that is independent of the bacterial process <sup>[3]</sup>. These lesions are very common and frequently require treatment in clinical practice <sup>[4]</sup>. These lesions occur in the cervical area of the tooth, in the literature they are described as non-cariou lesions linked to the loss of structure in the cement-enamel junction <sup>[1]</sup>, they have a high incidence and significant prevalence and are associated with different lifestyles of the patients. people, such as stress, clenching, and grinding teeth <sup>[2]</sup>.

This alteration has a multifactorial etiology and can occur due to masticatory function, as signs and symptoms of these pathological activities, it can pathological wear, such as abrasion and erosion <sup>[5]</sup>. These are located in the cement-enamel junction of the tooth and are characterized by concavities with acute angles <sup>[3]</sup>.

The abfraction theory suggests that tooth bending in the cervical area is caused by compressive occlusal forces and tensile stresses <sup>[6]</sup>, resulting in micro fractures of hydroxyapatite crystals in enamel and dentin with increased fatigue and deformation of tooth structure <sup>[7]</sup>.

The treatment proposal for these injuries is complex because the causal factors must be considered so that these treatments are predictable, in this way the clinician must have the scientific knowledge that facilitates the adequate clinical treatment of these cases.

The objective of this work is to review the literature to know the abreactions from their etiopathogenesis, their clinical aspect, and their diagnosis and treatment so that the dentist is able to know when he is facing this non-cariou lesion.

## Methodology

50 articles were analyzed and only 31 published on the subject were chosen through the PubMed, SCOPUS, and Google Scholar databases, with emphasis on the last 5 years. The quality of the articles was evaluated using the PRISMA guidelines, that is, identification, review, choice, and inclusion. The quality of reviews was assessed using the Measurement Tool for Assessing Systematic Reviews (AMSTAR-2). The implementation of the search using operators AND, OR, and NOT. Within the keywords used for the search “abfraction” “etiopathogenesis”, “clinical aspect”, “diagnostic” and “treatment”. The keywords were used individually, as well as each of them related to the other.

## Results

### Etiopathogenesis

Abfractions are considered to have a multifactorial origin [8] and are characterized by the microstructural loss of hard dental tissue in areas of high-stress concentration [9]. One of the first theories is that the pathological loss of the structure of dental tissue [1] is caused by forces of paraxial biomechanics [10], which maintains that dental flexion in the cervical area is caused by occlusal compressive forces and traction stresses, having as an effect microfractures of the hydroxyapatite crystals of the enamel and dentin with greater fatigue and deformation of the dental structure [11] which it causes tooth enamel, dentin, and dental pulp to move away from the force application site [4]. It is also said that this type of injury is facilitated by the thin structure of the enamel and the low packing density of the Hunter-Schreger band in the cervical area [12]. Another theory focuses on the abrasive damage caused mainly by toothbrushing [13], as well as saliva [14] and erosion caused by acids of non-bacterial origin, which can be intrinsic or extrinsic [15].

According to a study carried out, there is a weak association between non-carious lesions and occlusal factors (interference in excursive movements, force, premature contacts, type of guidewire, and sliding from centric occlusion to maximum intercuspation). The study mentions that dentin demineralization helps the formation of non-carious lesions from an early stage, while occlusal stress is an etiological factor that contributes to the progression of these lesions [16]. While other studies propose that bruxism could be one of the causes of abfractions and that the bending of the teeth could be due to the tensile stress that led to the breakage of the cervical teeth [17]. Lee and Eaklenos mention that cervical injuries could be due to the impact of the traction stress of mastication and malocclusion [18].

It is often controversial to know the exact etiology and the mechanism in which abfraction lesions occur, but most conclude that the causal agent is always linked to occlusion, hence the knowledge of malocclusions by the dentist.

### Clinical Aspect

Abfraction is a theoretical term used that has been classified as a type of non-carious cervical lesion (NCCL) [9], which can cause tooth deformation [19]. The location of the abfraction lesions is mainly in the cervical area of the teeth [20], sometimes the patient feels sensitivity [21]. It is characterized by crack-like lesions [3], with sharp internal and external line angles [22] horizontal striae [11], plate-like lesions located at enamel level, crescent-shaped lesions [23], depression at the cusp tip in premolars and molars [4], the shape and size of the lesion depending on the direction, magnitude, frequency, duration and location of the forces that arise when the teeth

come into contact [22]. Since ancient times, they concluded that carious lesions were found near the point of support where there was a greater concentration of traction stress. In addition, they mentioned to us that two or more lateral forces result in a non-carious lesion composed of two or more overlapping non-carious lesions in the shape of a wedge [23].

This type of non-carious lesion is the product of a continuous process where tractional and compressive forces are created, which cause microfractures and internal imbalance in the tooth. Continuous flexing on the tooth helps create tension in the cervical region that alters the junctions of the enamel and dentin junctions, generating cracks and preventing the formation of chemical bonds.

### Diagnosis

A careful and complete history is crucial to establish a diagnosis [1]. Any systematic pathology should be analyzed, such as gastroesophageal reflux disease, eating disorders, dietary habits [24], and parafunctional habits (bruxism, finger sucking, etc.). It's important to diagnose because they are associated with it [13]. An evaluation of all contributing factors should be performed to differentiate abfraction from other NCCL [25]. A differential diagnosis to other lesions is wedge-shaped lesions and the associated contributing factors, such as erosion, abrasion, etc. [23]. The clinical manifestations of these lesions are that they are saucer-shaped with blunt angles and wider contours when exposed to these contributing factors [25]. An additional distinguishing feature for diagnosis is that these lesions may appear deeper than wide depending on the stage of progression and related etiologic factors [1].

A clinical history in which the patient informs us of all the diseases that he/she has, as well as knowing all the clinical characteristics of the abfractions, allows an adequate and precise diagnosis to be made.

### Treatment

The most important criterion for restoration is retention [1]. The treatment of these lesions includes both conservative treatment and invasive treatment. Within invasive or restorative treatment, such as flowable composites [27], glass ionomers modified with composite resin [29], composite resins modified with ionomers [29] and composite resins [31] can compensate for flexural stresses [32], when the modulus of elasticity of these materials is similar to that of dentin [30] allowing a uniform distribution of forces, throughout the dental structure and the cervical restoration [31].

The main reason for the failure of the restoration is the difficulty in achieving and maintaining a good seal between the restoration and the tooth at the margin. Therefore, the best treatment for this type of injury is resins, since they allow flexural stresses to be compensated. Although studies are still needed to know the durability of these.

### Conclusion

According to the analyzed literature, the etiology of the abfraction process is the product of inadequately distributed occlusal forces, which are concentrated in the cervical area. The therapeutics of these lesions can range from conservative treatments such as abrasives. However, more studies are needed to see the durability of this type of restoration. Therefore, education is important to avoid this type of injury.

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