Identifying the Etiological Factors Involved in the Occurrence of Non-Carious Lesions

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ABSTRACT: The study group comprised a total of 21 subjects (10 women and 11 men) from the urban area aged 20 to 72 who presented themselves to treatment at the Dental Office during July-December 2018. The purpose of the study was to identify the etiological factors responsible for the occurrence of non-carious lesions in the patients involved in the study. The study group of 21 patients (10 women and 11 men) from the urban area, aged 20 to 72 years, were clinically examined and dental impressions were obtained in order to ascertain the study patterns. Subjects diagnosed with non-carious lesions filled a questionnaire based on which the risk factors that led to these changes were identified. The study models were used to assess the degree of cervical tooth damage, according to SMITH-KNIGHT index. The main etiological factors found to be responsible for the occurrence of non-carious lesions in the studied group were the excessive consumption of acidic and carbonated beverages (71.42%), the presence of gastro-esophageal reflux disease (14.28%), incorrect technique of brushing (28.57%), vicious habits - nail biting (14.28%), daily consumption of sunflower seeds (9.52%), use of toothpicks as auxiliary hygiene (19.04%) and night teeth grinding (4.76%).

KEYWORDS: Dental wear, dental abrasion, erosion, non-carious cervical lesions

Introduction

Non-carious cervical lesions can affect the structural integrity of the tooth, facilitate bacterial plaque retention, contribute to dental sensitivity, influence pulp vitality and aesthetics, [1,2,3].

The incidence of lesions increases as the population ages, and the teeth are still present on the arches [4,5].

Most specialized studies show that regardless of the type of non-carious lesion, their etiology is multifactorial [6,7,8,9,10].

Therefore, the clinical examination should also consider the evaluation of gastro-esophageal reflux disease, eating disorders, occlusion, vicious habits and parafunctions, occupational behaviors and rituals.

The interaction between biological and behavioral factors can explain why some people have multiple types of cervical wear compared to others [11,12].

Identifying the causal factors of cervical lesions is useful in establishing the diagnosis and individualized/patient treatment plan.

Objectives

The study aimed at identifying the etiological factors that may be involved in the occurrence of non-carious cervical lesions in patients diagnosed as carriers of these changes.

Material and Method

The study consisted of 21 subjects, including 10 women and 11 men aged 20 to 72, all of whom came from the urban area who presented themselves for consultation and dental treatment between July and December 2018 in the Dental Office, accounting for 5.83% of the total number of patients who received consultations and dental treatment during the aforementioned period.

We have obtained a written informed consent of each patient and have reviewed the data in the patient transcript files.

The criteria for inclusion in the study group were:
- age over 20 years;
- the presence of pathological wear in the dental structures;
- the general state of health to allow for dental treatments;
The study itself consisted in: preparing and then filling a questionnaire (Table 1), which includes the etiological factors involved in the occurrence of non-caries cervical lesions, in order to detect the ones specific to each subject.

Table 1. Questionnaire with questions for detecting the factors involved in the occurrence of non-caries lesions

<table>
<thead>
<tr>
<th>NO</th>
<th>QUESTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you often consume fruits, fruit juices, carbonated drinks?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Have you been diagnosed with eating or gastrointestinal disorders?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>How many times a day do you perform your dental brushing?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>How do you perform dental brushing?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>What activities do you run daily?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>How often do you go to the pool?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>What occupation do you have?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Do you gnash the jaws during the day or night?</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Do you have the habit of collecting objects between your dental arches?</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>What is the consistency of the foods you prefer to eat?</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Do you use drugs that induce decreased salivary flow?</td>
<td></td>
</tr>
</tbody>
</table>

Results

Based on the questionnaire, it was established that each participant confirmed the presence of at least two factors involved in the occurrence of these changes.

Depending on sex, there was a higher degree of wear in male gender.

Figure 1 shows the results obtained after completing the above mentioned questionnaire by each participant in the study and shows that: 14.28% (3 subjects) had signs of gastro-esophageal reflux disease, 71.42% (15 subjects) with non-caries cervical lesions have claimed frequent consumption of fruit, fruit juices and carbonated beverages.

In terms of vicious habits, 14.28% (3 subjects) admitted they practice nail biting and 9.52% (2 subjects) admit daily sunflower seed consumption.

Dental brushing, using an incorrect technique of 28.57% (6 subjects) of those examined, 19.04% (4 subjects) use toothpicks as ancillary hygiene and 4.76% (1 subject) has nighttime bruxism.

For all subjects non-caries lesions are the result of the action of at least two etiological factors.
The extent of non-curious lesions was appreciated using the Smith and Knight index, but we did not find studies that correlate the depth of these changes with the presence of a certain etiological factor (Table 2).

**Table 2. Degree of extension of non-curious lesions on dental surfaces (v-vestibular, l-lingual, o-occlusal, i-incisal, c-cervical)**

<table>
<thead>
<tr>
<th>SCORE</th>
<th>SURFACE</th>
<th>CRITERION</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>V/L/O/I/C</td>
<td>- no change in the contour of the tooth;</td>
<td>0%</td>
</tr>
<tr>
<td>1</td>
<td>V/L/O/I/C</td>
<td>- minimal loss of contour;</td>
<td>28.57%</td>
</tr>
<tr>
<td>2</td>
<td>V/L/O/I/C</td>
<td>- defect with a depth of 1mm; - loss of enamel and dentine exposure for one third of the surface;</td>
<td>47.61%</td>
</tr>
<tr>
<td>3</td>
<td>V/L/O/I/C</td>
<td>- defect with a depth of 1-2mm; - considerable loss of enamel and dentin without the exposure of secondary dentine or pulp chamber;</td>
<td>4.78%</td>
</tr>
<tr>
<td>4</td>
<td>V/L/O/I/C</td>
<td>- defect with a depth of 2mm; - exposure of the secondary dentine or pulp chamber</td>
<td>19.04%</td>
</tr>
</tbody>
</table>

The presence of signs of gastro-esophageal reflux disease confirmed in the patient's questionnaire shows the loss of dental tissue in the form of large cavities with dentine exposure on the palatal faces of the teeth on the upper arch.

**Fig.2. Male patient aged 68 years with non-curious lesions due to gastro-esophageal reflux disease; (case study Dr. Adi Olaru)**
Patient with generalized erosion, compromised coronary structure of teeth, glossy enamel, exposed dentin, presence of complications due to pain caused by pulp inflammation, so that the patient went for avoiding the consumption of basic food and incorrect oral hygiene.

Disease caused by dietary erosion, with loss of dental tissue in the superior canine to the patient, which asserts the daily consumption of citrus and carbonated beverages.
Daily consumption of sunflower seeds, confirmed by the patient, shows the loss of hard dental tissue at the incisal edge of the upper right central incisor.

![Image of teeth]

Fig. 6. Male patient aged 32 years with non-carious lesion having as an etiological factor the exaggerated use of sunflower seed; (case study Dr. Adi Olaru)

Erosion dental injuries, located on the vestibular faces of the teeth, due to the use of an inappropriate dental brushing technique.

Fig. 7. Male patient aged 31 years with non-carious lesions due to dental brushing using an inappropriate technique; (case study Dr. Adi Olaru)

The presence of multiple abrasion lesions of different forms at various stages of progression to the patient that assert the presence of night bruxism.
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**Fig. 8.** Female patient aged 72 years with multiple abrasion lesions of different forms characteristic of different stages of progression; (case study Dr. Adi Olaru)

Advanced late stage abnormalities with localization in the second premolar and first left upper molar.

**Fig. 9.** Female patient aged 48 years with abrasion lesions at upper 2 PM and upper M 1; (case study Dr. Adi Olaru)

**Discussions**

The combined aetiology of non-carious cervical lesions was endorsed by some authors through a study based on dietary questionnaires [15].

Like other studies in the literature, [16] we also found the role of gastro-esophageal reflux in the appearance of non-carious lesions without patients associating gastric discomfort and eating disorders with defects in the teeth (Fig.2 and Fig.3).
A study [17] on the progression of non-carious lesions showed wear increase by associating a dental brush of more than twice a day with the consumption of dietary acids. Other studies, [18] show that, dentine exposure occurs by wear increase caused by acidic undermining of the enamel.

Concerning the consumption of fruit juices and carbonated beverages, the results obtained are consistent with previous studies [19], with dietary erosion being present at 71.42%, i.e. 15 of the subjects included in the study (Fig.4 and Fig.5).

Frequent interposition between the teeth of some objects, in our case, sunflower seeds and nail biting, are reported as etiological factors in the appearance of dental wear especially at the incisal edges of the teeth in the anterior region (Fig.6), as shown from our study.

Previous studies [20,21,22,23] show that inappropriate brushing techniques can cause the wearing of the canine and premolar vestibular faces with the modification of the anatomical contour of the tooth (Fig.7).

Was noticed [24], an increase in the frequency of cervical lesions in patients who brushed their teeth twice a day, compared with those who brushed more often.

Other studies [25] associate a very good hygiene with the occurrence of non-carious lesions and a bigger alteration of the left hemiarcade teeth in the right, but the difference was not significant, or more frequently, of the front teeth by aggressive dental brushing, conclusions drawn also from our study case.

Some authors [26] suggest that toothpaste is more important than toothbrush in causing abrasion, and other studies [27] indicate that the force we use on the brush vary according to the brushing technique, the groups of teeth brushed, brush rigidity and individual brushing habits.

There are authors [28] who argue that abfraction is the root of all non-carious cervical lesions, while others [29] have proposed a multifactorial etiology, the combination of occlusal distress with abrasion and erosion.

There are also studies that associate a very good hygiene with the occurrence of non-carious lesions, such as the greater lesion of the left hemiarcade teeth in the right-handed persons, or more frequently the front teeth by excessive brushing, conclusions that also result from the study conducted by us.

According to the studies [30,31], the frequent localization of the abrasion lesions is at the level of the premolars, in the group of subjects studied by us, we have detected the presence of such lesions of different shapes, widths and depths characteristic of the various stages of progression (Fig.8), not only in the premolars but also in the molars (Fig.9).

Other studies [32,33,34,35] showed that the lateral forces applied to the occlusal surfaces of the premolars increased stress in the cervical area, affecting the vestibular walls and less of the oral ones.

Conclusions
Etiologic factors rarely act individually but interact with each other causing injuries to the hard dental tissues, and the combination of these factors results in the continued maintenance and development of these lesions.

It is difficult to select a specific etiology, since non-carious lesions occur as a result of the abrasion, wear and erosion process.

Identifying and managing potential etiological factors is of major importance in establishing a correct diagnosis and developing an appropriate treatment plan.

References

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