

## Short Communication

# Preventive Approaches to Incipient Pit and Fissures Caries: A Literature Review

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- Glass ionomer cement

**Abstract**

The occlusal surface morphology is characterized by deep and retentive pits and fissures which naturally collaborate to form dental plaque deposits and increase the difficulty of cleaning, favoring the development of caries disease. With comprehension that the carious lesion must be avoided or have their progression delayed, the professional could use more conservative treatments for the occlusal surfaces. During the daily clinical work, several cases of deciduous or permanent molars, mostly those at the eruption stage, carriers of the disease activity in variable complexity levels or in serious risk of developing a carious lesion. The aim of this study is to present a guideline for the management of the occlusal surfaces with preventive therapy.

**INTRODUCTION**

Dental caries is a dynamic process that occurs on the teeth surface covered by bacterial deposits – the dental plaque – resulting in biochemical alterations between the dental surface and fluid of bacterial biofilm. After some time this ionic unbalance leads to mineral losses, in a great deal of incipient losses in an ultra-structural level until the total destruction of the tooth [1].

For a long time, the treatment was based on the carious tissue removal, a cavity preparation and the tooth restoration. Nowadays, with the knowledge of the dynamic phenomena of remineralization and demineralization, associated with a better understanding of the etiopathology of the disease, as well as the fluoride compounds evidence and its preventive-therapeutic mechanism, a new treatment philosophy was proposed. This refers to the idea that the carious lesion can and must be avoided or even reverted [1,2].

Then the caries disease is approached on a new paradigm known as health promotion. In this context, the people receive individualized assistance according to the caries activity presence or just the risk of it, establishing a preventive program or a treatment for the disease based on the problems found. Individual risk to caries may be related as the probability of a person to develop the disease or, in a specific period, change his health condition promoting the caries appearance [3].

The establishment of preventive measures after the disease clinical signs appearance makes the progression of the carious lesion slow and avoidable, changes the treatment philosophy from

early diagnosis and immediate restoration to early diagnosis and non-aggressive treatment [1,2]. Therefore, the concept when in doubt, restore, which guided the dental treatment for a long time was replaced by when in doubt, record the localization, institute health promotion measures, wait vigilantly and evaluate again [4,5].

Clinicians can observe daily a great number of children that search for treatment showing different levels of caries. In this universe, several cases of deciduous or permanent molars, mostly those at the eruption stage, carriers of the disease activity in variable complexity levels or in serious risk of developing a carious lesion. The aim of this work is to present a simple guideline and the management of the occlusal surfaces inserted in a preventive therapy.

**DISCUSSION**

The Dentistry lead the prevention and treatment of the occlusal surface by total obliteration of pits and fissures, thus it was the only treatment alternative to these regions considered areas that would invariably develop carious lesion [1,2].

Black [6] in 1908, introduced the extension for prevention and included pits and fissures in the cavity preparation, independently on being decayed or not, aiming to prevent the disease to settle down into these areas. The development and application of sealants represented a great advance cause it made possible the pit and fissures obliteration without removal of healthy tissue [7,8]. So, the indiscriminate utilization of this procedure would be the modern version for the classical

concept of the need to obliterate pits and fissures to avoid the development of the lesion on this surface.

Based on the studies that evaluated the morphology of the occlusal surface, the dental plaque accrual, the bottom of the fissure visual accessibility and its relations to the caries disease [9,10], it was evidenced that carious lesions begin on the fissure lateral wall not in the bottom of the fissure, which is an accessible area to the fluoride action. So, it wouldn't be correct to affirm that the lack of the mechanical control in the bottom of the fissures makes impossible the control of the caries, considering that the microorganisms in this area aren't viable [11].

The first manifestation of the occlusal caries appears as a white spot on the lateral walls of the fissure, and at this stage it's hardly identified clinically [1,7,12]. However, progressively, the enamel of the fissure entry also starts to present the white spot lesion, which is clinically covered by bacterial deposits with creasy and mat appearance. If the etiological factors of the disease were controlled at this stage, the occlusal lesions on the enamel could be paralyzed and keep on indefinitely as a cicatrix of the disease, remaining white but brilliant and glare, or pigmented [13].

During the tooth eruption, there is a more intense dental plaque accrual on the surface, because the condition of infraocclusion of the dental element and consequent inexistence of occlusal contact with the antagonist tooth obstructs the physiological removal through the mandibular movements. Besides, it makes difficult for the patient to accomplish its disorganization and removal through the conventional tooth brushing techniques of anteroposterior movements. Another factor to be considered is the mineral immaturity of the calcified dental tissue of an erupting tooth in which the post-eruptive maturation hasn't taken place, making it more susceptible to the acid products dissolution [12,14]. For all the reasons mentioned, this period is considered the most critical to the occlusal caries lesion development.

The early diagnosis associated with the adoption of preventive actions that lead the patient to the dental plaque home control and the ingestion of a low fermentable carbohydrate diet should be intensified at this stage. Furthermore, the need of a dental plaque professional control should be evaluated, as well as the fluoride topical application and the seal of the erupting teeth using glass ionomer cement.

The occlusal lesions diagnose requires that the professional make an elaborate and careful clinical examination. An adequate prophylaxis, a properly dry field, an excellent illumination and often the magnifying glasses use are also required. The explorer utilization is not recommended with this purpose, because it doesn't differentiate active lesions from the paralyzed ones, so that the effect of probing in occlusal surfaces can provoke irreversible damage to the enamel which could be remineralized. Moreover it transports *Streptococcus mutans* from an infected area to a non-infected one [2].

Considering that caries is a disease that presents the dental plaque as one of its etiologic factors, controlling it represents one of the most effective prevention strategies to the carious lesion. It's

necessary to understand that the dental plaque mechanic control aim is not the total elimination but the obtention of adequate hygiene levels that avoid the appearance or development of the caries disease. The pediatric patient, supervised by the family unit, must be motivated by the professional to the self-control, becoming the authentic responsible for his health maintenance, having the professional as a counselor to the preventive actions and the results evaluator, viewing the maintenance or modification of the treatment. The guidance and motivation to the dental plaque control must involve a special attention to the eruption periods of the different dental groups, besides the deciduous and permanent teeth importance should be discussed with the patient and his family, motivating him to make that control. Carvalho et al., 1991 [4] and 1992 [5], observed that non-aggressive individualized dental programs were able to reduce the dental plaque and the carious lesion activity on the occlusal surface of permanent first molars through the patient's education associated with the periodical dental plaque professional control.

Clinicians must use as a protocol to the dental plaque periodical professional control, the chemical evidenciation, followed by the notes for the evaluation of the patient's self-control evolution. Then, the prophylaxis must be done preferentially with bicarbonate sanding due to its efficiency in cleaning the sulcus and fissures area, besides the lower abrasiveness of this system when compared to the prophylaxis with brushes, both to the regularly mineralized enamel and to the artificially desmineralized one. When this resource is not available, the prophylactic rubber cup to the glare surfaces and the brushes to the occlusal surfaces can be used in association with the prophylactic paste. Although, the problem faced in the utilization of pumice-stone or prophylactic paste for performing the previous prophylaxis to the dental caries clinical exam is the difficulty in the remaining residues removal of these materials from the interior of the fossas and fissures, making difficult the adequate evaluation of these regions. Afterwards, there is an inspection followed by the diagnosis of the occlusal surface condition, in dry and light operating field.

Researches demonstrated that preventive programs instituted right after the dental eruption, including the dental plaque periodical control and fluoridization, proved to be as effective as or more than the procedure of pits and fissures sealant application as a preventive action to the occlusal caries on permanent first molars [4,5,15].

This way, not all the erupting teeth or totally erupted teeth are sealed. We decided for the indication of pit and fissure sealant on erupting or totally erupted teeth when there is an accrual of dental plaque, and the patient is not motivated to self-control or professional periodical control is not possible. We also indicate when erupting teeth or totally erupted teeth present white spot occlusal lesion restricted to enamel. This way, that such teeth run the risk of lesion development or progression of the lesions already existent.

However there are different materials to be used as a sealant, the subject opts for the glass ionomer cement because of its anticariogenic properties concerning the development of occlusal caries when compared to the resin-based fissure

sealant. The fluoride liberation and the recharge potential of this ion give to the material a chemical protection associated to physical protection, specially when used in caries lesions restricted to enamel. Instead of presenting less resistance and retention, several clinical researches demonstrated that there was a decrease in the dental caries incidence on teeth sealed with glass ionomer cement, even when a clinical loss of the material happened [8,16-19] because according to Torppa-Saarinen et al. [20], in 1990, and Carey et al. [21], in 2003, there are remaining retained particles of the material in the bottom of the fissures keeping its preventive effect. Moreover, new strategies have been developed using bioactive-containing materials associated a glass ionomer based sealant. The effects of these materials with calcium phosphate derivatives on caries have been studied and appears to be a good choice to protect enamel demineralization [22].

In addition to the dental plaque mechanical control, the professional can use the fluoride compounds, considering their confirmed efficiency in the caries disease prevention [13,14,23] what made usual the utilization of these substances in Dentistry. However, it's necessary that the professional found the use of these products in rational bases, quitting the fluoride indication to all patients indiscriminately.

The teeth react in a dynamic way to the oral ambient. Sub and over-saturating physical-chemical conditions concerning the product of hydroxyapatite solubility induce respectively the demineralization and remineralization phenomena. So, the fluoride operates in a therapeutic way, interfering in the disease development process reducing the enamel solubility through a dynamic action of the oral fluid and the dental plaque, keeping the saliva over-saturated, resulting in a specific protection measure against the caries disease, what contributes with the health promotion [13,14].

This way, the professional can opt for the weekly topical application of fluoride in the varnish form on the teeth which present specific signs of the caries disease [24]. Realizing weekly application, for a four week period, the results achieved are effective concerning the demineralization control of the

white spot lesion, changing the clinical aspect to the lesion paralyzation. The topical application of fluoride solutions in the gel form all over the mouth, using trays, or even the prescription of topical solutions for home mouthrinse, as a routine, is not recommended, because is an over treatment for the teeth that don't need this fluoride, besides the patient is likely to swallow a certain quantity of the product, which in addition to other fluoride sources, increases the possibility of developing fluorosis, especially in lower degrees [13].

Patients which don't present dental plaque accrual and/or occlusal white spot lesion, and also feel motivated to the self-control or the professional periodical control is possible, they receive fluoride in a high frequency regim and at low concentration what is accomplished with the use of fluoridated dentifrice and the ingestion of fluoridated water, once Carvalho et al., in 1991 [4] and 1992 [5] demonstrated that the daily exposition to fluorides in dentifrices as well as in the water supply is able to interfere in the des-remineralization phenomena, promoting the paralyzation of the caries lesions progression.

The abovementioned arguments are in line with minimum intervention dentistry principles which uses cares risk assessment, and focus on the early prevention based on maximum intervention with minimal invasive treatments. This modern medical approach is based on recognition, reduction, regeneration and repair of carious lesions (Figure 1). In this context, to help in the diagnosis of incipiente lesions some tools such as ICDAS represent a new and good option [25].

## CONCLUSION

Dentistry had meaningful changes relating to the knowledge on the caries disease etiopathogenesis. These changes associated with the confirmation that the non-aggressive therapies can and must be used to control the occlusal caries re-structured old paradigms. For the effective and definite treatment of the disease it's necessary a more comprehensive approach to the simple limitation of the damage caused by the restoration. Just because the restoration of the caries disease clinical sign, when it's done in an isolated way, doesn't offer conditions for the patient to return to a situation of health. Preventive actions like the dental

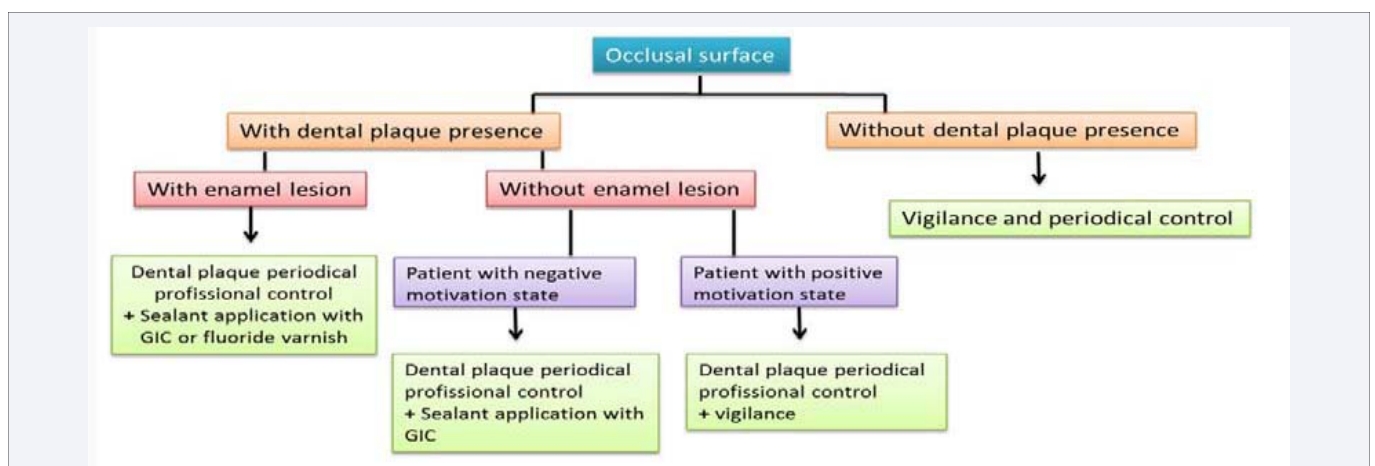


Figure 1 Clinical management of the occlusal surface.

plaque control, the ingestion of a balanced diet, the aware fluoride utilization that helps the enamel remineralization, as well as the possible use of fissures and fossas sealants, in association with a constant professional monitoring through the observation and effective control make the basis of this new paradigm of health promotion.

This way, the simple diagnosis of a caries lesion shouldn't be a parameter to the intervention through an aggressive treatment. The professional can, in some occasions, associate with the restorative treatment the observation and lesion control and/or the sealing of the occlusal surfaces with glass ionomer cement together with the control of the disease etiologic factors.

So, the professional must found on scientific basis to the application of non-aggressive measures to control the caries, without being so prompt to results and mechanicist, avoiding the unnecessary invasion, while analyzing the respectable number of factors involved to establish a plan of reasonable treatment for

each patient and, above all, to decide for the best treatment, at the suitable time, for the right patient, using more simple and less burdensome alternatives.

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