

Value of enameloplasty as diagnosis and treatment method of stained occlusal fissures in the first permanent molar

Anca Maria Răducanu¹, Irina Cristea², Mihai Andrei Răducanu³,
Victor Feraru²

Bucharest, Romania

Summary

Introduction. Enameloplasty is a new, simple, minimal invasive method of diagnosis and treatment, an "excisional biopsy of the enamel", indicated in cases of stained fissures suspected to hide dentinary caries, in molars and premolars, when the patient has high caries risk.

Objectives. The main objective of this paper is to establish the efficiency of enameloplasty as a diagnosis and treatment method in cases of stained occlusal fissures in the first permanent molar.

Material and method. The study was carried out on 137 patients (64 girls and 73 boys) and on 213 first permanent molars with suspected stained fissures in which enameloplasty and then different types of restorations (sealant restorations; preventive resin restorations) were performed.

Results. 51 (23.95%) of the first permanent molars treated by enameloplasty revealed dentinar caries and were subsequently restored by preventive resin restorations, while in the 162 (76.05%) other molars, caries stopped in enamel and teeth were restored by sealant restorations.

Conclusions. Enameloplasty and sealant restorations have proved their efficiency offering a new approach to the management of the stained occlusal fissures bringing selective and conservative solutions to the varying clinical presentations of occlusal caries.

Keywords: enameloplasty, stained fissures, first permanent molar, preventive resin restoration, sealant restoration.

Introduction

The six-year molar is considered the permanent tooth with the earliest development and emergence in the oral cavity [1,2,3].

This molar often carries the dystrophic brand of birth disturbances as its mineralization begins in the perinatal period and takes place over a long and difficult period of time [1,2,3].

Enamel posteruptive immaturity, the distal position in the oral cavity, the complex occlusal morphology and the frequent

structural defects render the first permanent molar very sensitive to the disturbances of the oral medium. It is the first "victim" of food imbalance and of the lack of oral hygiene, and it is very vulnerable to dental decay [1,2,3,4].

Statistics show that the first permanent molars are the teeth most frequently reached by decay, restored, devitalized, carrying prosthetic buildings and, finally, extracted [2].

Therefore, the 6-year molar is the main objective of the preventive and curative

¹ DMD, PhD, Associate Professor, Department of Pediatric Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

² DMD, Assistant Professor, Department of Pediatric Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

³ Student, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest

therapy in children [2,4].

Over the last two decades, the prevalence of the dental caries on the smooth surfaces has declined but an increase of the proportion of caries on the occlusal surfaces has been found. So, the occlusal surface of the first permanent molar is the dental area the most vulnerable to caries [4].

The six-year molar has been the top priority of preventive actions in children and teenagers. The fluoride prevention has had a delaying effect on the onset of the fissural caries and has contributed to the change of dental decay pattern and clinical behavior. Consequently, the caries lesions are smaller, especially in children, making their diagnosis more difficult [2,4,5,6].

Stained fissures occupy an important place within the occlusal lesions. Stained fissures are considered small precavitated lesions in pits and fissures and are about twice as frequent as cavitated occlusal lesions [4].

A stained fissure is discoloured, brown or black, white or opaque (enamel normal translucency is lost but there is no evidence of surface cavitation) [2].

The management of the first permanent molar stained surfaces represents a challenge for any paedodontist because these coloured areas often shelter hidden dentinary caries, which "escape" the clinical and radiographic examination [7].

Therefore, more and more paedodontists are now focusing their attention on the early diagnosis in precavitated caries as a guarantee of the successful implementation of the minimal invasive therapy [7].

Minimal invasive therapy is a new concept in paediatric dentistry, which combines early diagnosis with the ultraconservative preparations [3,4,5,7,8,9,10,11,12,13].

Diagnosis

Diagnosis of precavitory lesions of occlusal surfaces is difficult. Several classic methods

(visual examination, probe, bitewing radiographs) and new methods of diagnosis (magnification, digital radiographs, electronic, fibre-optic transillumination, CO₂ laser, ultrasound imaging) have been proposed both alone and in combination [4,6,11].

A minimum set of investigations should consist of the use of visual inspection, tactile inspection and bitewing radiography. It is essential that the tooth be dried thoroughly to permit the study of the colour and translucency of the enamel [4,6,11,12].

When diagnosis is well defined, treatment decisions are easy to make. I.e. if a tooth is newly erupted and the fissure system is unstained but considered at risk for caries, fissure sealing is recommended. When there is occlusal cavitation that is synonymous with an extensive lesion, a restorative approach is recommended [4].

However, if a tooth presents a precavitory lesion (stained fissures), of which depth is difficult to specify, than what is the recommended treatment?

In case of a doubtful lesion in a patient with high caries risk, the treatment decision is an "excisional biopsy of the enamel" named **fissurotomy or enameloplasty** which is a simple, minimal invasive, method of diagnosis and treatment. [4,10]

This method provides the best diagnosis and the most conservative technique with the maximal preservation of healthy dental structure and the removal of the whole decay [5].

The procedure may be accomplished with a minimum of discomfort for the patient (without anaesthesia) being often finished very fast (3-5 minutes), the child acceptance being great [5].

The bur remodels the fissure anatomy, relieving the access, then follows the etching of the preparation and the application of the sealant [5].

Enameloplasty is indicated in the questionable lesions from the pit and fissures

surfaces of the primary and permanent molars and premolars when the patient has high risk of caries [10].

The suspect areas of the fissural system are explored either with a small round bur at slow rotation or with special fissurotomy burs at high rotation. The shape and size of the fissurotomy bur are specifically designed for pit and fissure lesions treatment. Its head length is 2.5 mm, allowing the dentist to control the bur tip to cut just below the dentin-enamel junction and no further [4,5].

Stained enamel is removed and it is established if the caries enter the dentin or not. Consequently, enameloplasty allows the dentist to classify the extension of the lesion and then a restorative treatment method is chosen [3,4].

Clinical situations:

After fissurotomy, there are many clinical situations:

1) The decay ends in the enamel; fissure sealant is recommended to all of the adjacent fissures (**sealant restoration**) [3,4,6,12,14].

2) The decay progresses into the dentine but has minimal lateral spreading; **preventive resin restoration (PRR)** is recommended [4,7,9,14].

a) superficial dentinal caries; it is recommended: liner/varnish, flowable composite resin restoration and fissure sealant (**PRR type 1**).

b) medium dentinal caries; it is recommended: glass-ionomer cement (GIC) base, posterior resin restoration/com-pomer restoration and fissure sealant (**PRR type 2**).

c) deep dentinal caries; it is recommended: indirect capping with calcium hydroxide, GIC base, posterior resin restoration and fissure sealant (**PRR type 3**).

The tooth is periodically followed up

(at 4-6 months) for checking up the integrity of the sealant.

d) caries with significant lateral spread into dentine (few fissures remaining surrounding the cavity); it is recommended: classic **amalgam or posterior resin restorations** [10].

Clinical study

Type of the study: transverse study

Location of the study: The “Carol Davila” University of Medicine and Pharmacy, Bucharest, Faculty of Dental Medicine, Department of Paediatric Dentistry

Period: 2000-2005

Objective: The main objective of this paper is to estimate the value of enameloplasty as a diagnosis and treatment method of the occlusal “suspect” stained fissures of the first permanent molar.

Material

The research was carried out on two study samples:

1) **Study sample of patients with enameloplasty (137)** in the 6-year molars with suspect stained occlusal fissures.

This sample of patients (137) was selected out of 443 patients (**first sample of patients**) who presented occlusal stained fissures in the first permanent molar and which were selected from 866 patients (initial sample of patients) with 6-year molars present, examined and treated during 2000-2005.

2) **Study sample of first permanent molars with enameloplasty (213)** with suspect stained occlusal fissures.

This sample of molars (213) was selected out of 748 first permanent molars (**first sample of molars**) with occlusal stained fissures which were selected out of an initial sample of 3310 molars (initial sample of molars) present on the dental arches.

Method

a. Data collection

The necessary data to perform this study have been collected from the clinical records of each patient consulted and treated during the 2000-2005 period. The following data were selected:

- patient's sex and age
- the initial diagnosis of the occlusal lesions in the first permanent molar: occlusal stained fissures (located only in enamel), occlusal stained fissures suspected to hide dentinary caries and occlusal cavitary caries. The initial clinical diagnosis was performed using visual examination with magnification and with the dental probe.
- the types of restorations applied on the suspect stained occlusal fissures of the first permanent molars, after performing the enameloplasty, were: sealant restorations and preventive resin restorations.

b. Processing the data

Statistical processing of the data was performed using the Epi Info™ version 3.3.2 system.

The data were processed using many classification criteria, alone or in combination:

- sex: female, male;
- 13 groups of age from 5 to 17 years;
- types of restoration: sealant restoration or preventive resin restoration;
- dental arches: upper and lower.

Results

1. The study sample of patients (137) was composed of 64 (46.7%) girls and 73 (53.3%) boys, as shown in *Figure 1*. *Figure 2* contains the distribution of the patients by age and sex.

2. Study sample of molars with enameloplasty (213) was analysed in terms of distribution by sex and restoration type (*Figure 3*) and of distribution by age and restoration type (*Figure 4*). For both of the restoration types, most molars belonged to the 8-9 years age group, regardless of sex (*Figures 5, 6*). The distribution of enameloplasty by dental arch and types of restorations is shown in *Figure 7*. In both of the dental arches most of the examined molars belonged to the 8-9 years age group (*Figures 8, 9*).

Figure 1

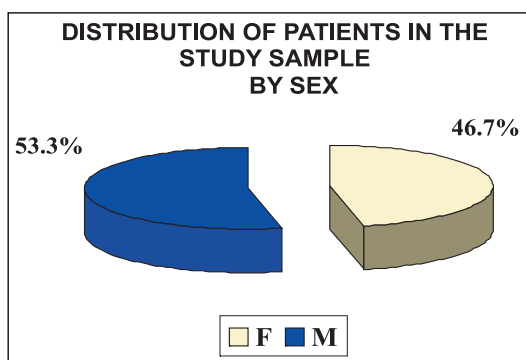


Figure 2

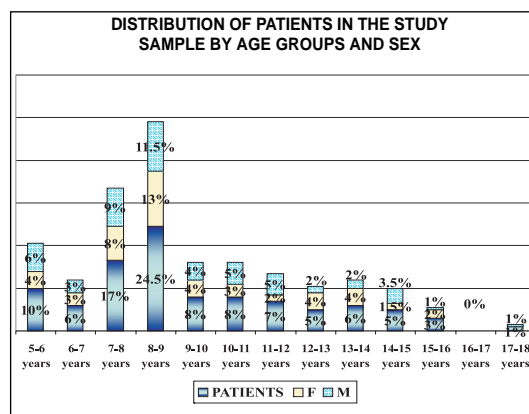


Figure 3

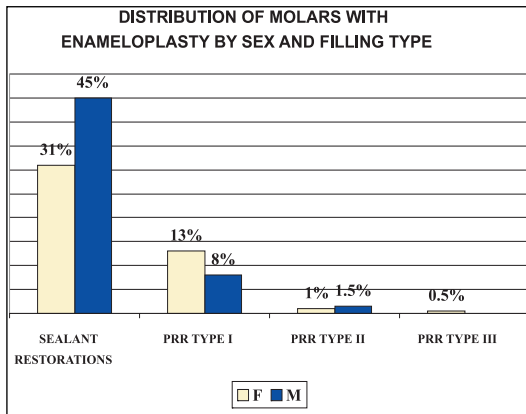


Figure 4

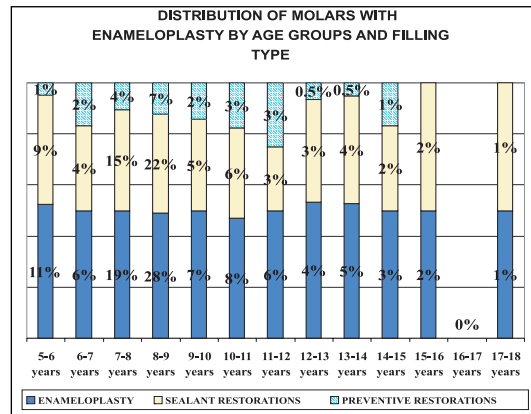


Figure 5

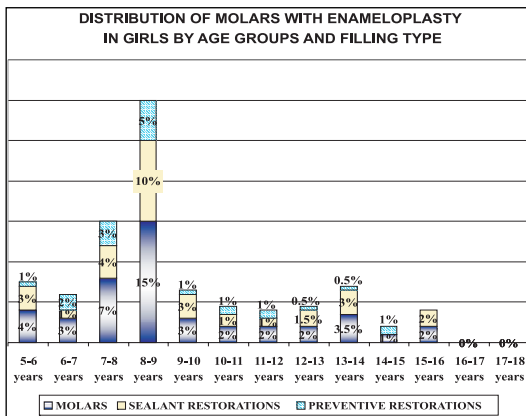


Figure 6

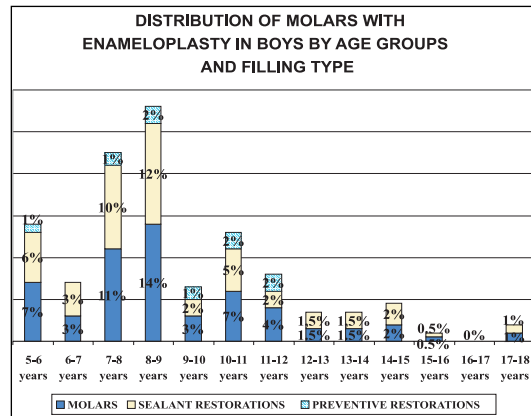


Figure 7

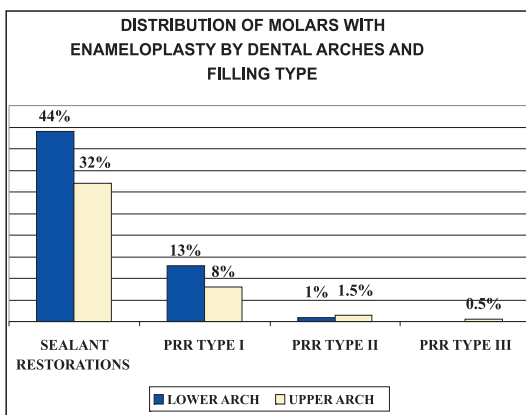
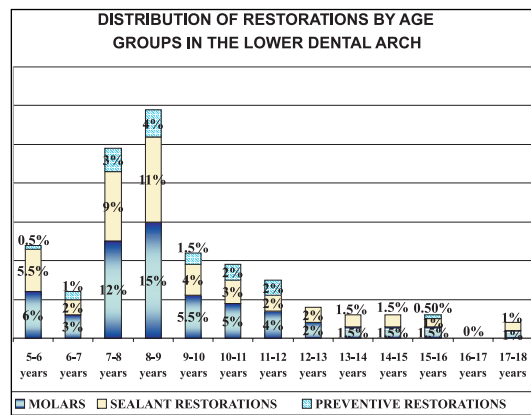


Figure 8



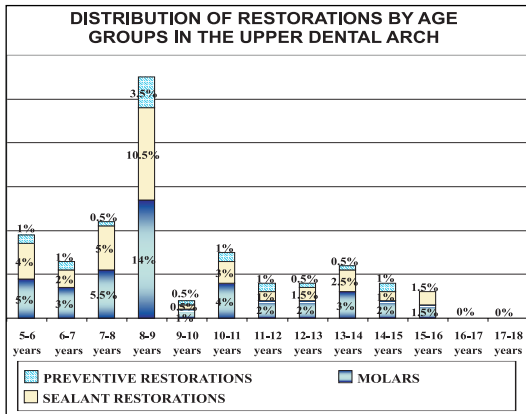
Discussion and conclusions

Considering the suboptimal results obtained in the current clinical practice using the hid-

den occlusal lesions diagnosis techniques, new conservative treatment approaches, like enameloplasty, have appeared [8].

The suspicious fissures management

Figure 9



has been simplified, with the introduction of the enameloplasty of stained enamel and the sealant restorations/preventive resin restorations.

This diagnosis and treatment method is indicated in cases of questionable occlusal lesions when the patient has high risk to caries.

Enameloplasty and Sealant restorations/Preventive resin restorations provide a

new approach to this problem by bringing selective, conservative solutions to the various clinical presentations of occlusal caries.

Properly applied and coupled with treatment and prevention of dental caries as an infectious disease, this approach can result in appropriate conservative dental care for our patients [8].

In this study, the initial diagnosis of the treated first permanent molars has been invalidated by enameloplasty, which has discovered dentinary caries in $\frac{1}{4}$ of the treated molars.

The age group 8-9 years has been more affected by dentinary caries in both upper and lower arches, in females and males alike.

Enameloplasty has thus proved its efficiency, offering a new approach to the management of the stained occlusal fissures and bringing selective and conservative solutions to the various clinical presentations of occlusal caries.

References

1. Chafaie A, Portier R. Restauration de la dent de six ans et solutions. *Les cahiers de l'ADF* 1999; 1-er Trimestre (4): 24-35.
2. Druo J-P. La dent de six ans, carrefour de tous les dangers. 1998; www.adf.asso.fr/cfm/site/thesaurus/detail_conference.cfm?rubrique_origine=47&conference=45/1998
3. Welbury R, Raadal M, Lygidakis NA. EAPD guidelines for the use of pit and fissure sealants. *European Journal of Paediatric Dentistry* 2004; (3): 179-184.
4. Smallridge J. Management of the stained fissure in the first permanent molar. *International Journal of Paediatric Dentistry* 2000; (10): 79-83.
5. Freedman G, Goldstep F, Seif T, Pakroo J. Ultra-Conservative Dental Technique. Fissurotomy Resin Restorations: Combating Hidden Decay with Early Detection. *Journal of Canadian Dental Association* 1999; **65**: 579-581.
6. McComb D, Tam LE. Diagnosis of Occlusal Caries: Part I Conventional Methods. *Journal of the Canadian Dental Association*, 2001; **67**(8): 454-457.

7. Hassall DC, Mellor AC. The sealant restoration: indications, success and clinical technique. *British Dental Journal* 2001; **191**(7): 358-362.

8. Boston DW. A novel approach for treating fissure caries. *Dental news magazine*, 2006,

9. Cameron AC. et al. Dental caries and restorative. *Handbook of Paediatric Dentistry*, Ch.3, pp. 58-59, 2nd ed, Mosby, Sydney, 2003.

10. Gordon G. Fissure sealant or sealant restoration? To claim or not to claim... that is the question. *Dental Profile* 2000; **28**(August): 10-12.

11. Lobo MM, Pecharki GD, Gushi LL, Silva DD, Cypriano S, Meneghim M, Pereira AC. Occlusal caries diagnosis and treatment. *Brazilian Journal Oral Science*, 2003; **2**(6): 239-244.

12. Murdoch-Kinch CA, Mclean ME. Minimally invasive dentistry. *Journal of the American Dental Association* 2003; **134**: 87-95.

13. Tam LE, McComb D. Diagnosis of Occlusal Caries: Part II. Recent Diagnostic Technologies. *Journal of the Canadian Dental Association* 2001; **67**(8): 459-463.

14. Luca R. Metode locale de prevenire a cariei în șanțuri și fosete. *Ed. Cerma*, 1998, București, p. 32.

Correspondence to: Dr. Victor Feraru, Department of Pediatric Dentistry, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest. Address: Str. Făinari, No. 8, Bl. 71, Ap. 1, Postal Code 021223, Bucharest, Romania. E-mail: victor.feraru@gmail.com