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The clinical performance of the occlusal minimally invasive restorations in primary molars

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Authors:
Anca Maria Raducanu, PhD, Associate Professor, Ion Victor Feraru, PhD candidate, Teaching Assistent, Cristea Irina, Teaching Assistant,
Paediatric Dentistry Department, U.M.F. "Carol Davila", Faculty of Dental Medicine, Bucharest, Romania
Claudiu Herteliu, Lecturer,
Department of Statistics and Econometrics, University of Economics, Bucharest, Romania

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Introduction

Techniques used to restore carious primary molars have changed over the past decade as new adhesive materials have been developed [1]. Adhesive dental materials make it possible to conserve tooth structure using minimally invasive cavity preparations [2, 3].
Although Fuks (2002) considers that generally, for small occlusal lesions, a conservative preventive resin restoration, using composite or compomer in conjunction with sealant, would be more appropriate than the classic Class I amalgam preparation [4], amalgam remains the filling material of first choice for Class I cavities in primary molars in Eastern Europe [5] because of its durability (MST=52.8 months, Ferranti and Day, 2006) [6].

Aims

- To assess the durability of the class I minimally invasive restorations compared to class I classic amalgam restorations in primary molars in accordance with gender and age, over a period of 6 years,
- To assess the proportion and causes of failure of the restorations in both treatment methods.

Material and Methods

Material
Initial sample: 336 restorations placed in 185 children.
Study sample: 258 direct class I restorations in primary molars applied in 144 patients (mean age = 5y, 5m) resulted after applying the exclusion criteria: partially/totally uncooperative children according to Frankl's scale, mentally disabled patients or under age of 2 years, restorations on teeth with pulp involvement.

Methods
Data were obtained from the patients' observation charts. Restorations were evaluated according to the USPHS criteria and codes [7] (Table 1, 2). The restorations sample was subdivided in two groups:
- 134 composite resin restorations placed in minimally invasive cavities (MI)
- 124 amalgam restorations placed in conventional classic cavities (C).

Criteria/Code Rating*** %	A	B	C	D
Marginal integrity	107 (86.3%)	9 (7.3%)	3 (2.4%)	5 (4%)
Secondary caries	117 (94.4%)	n.a.	7 (5.6%)	n.a.
Anatomical form	124 (100%)	-	-	n.a.
Sensitivity	118 (95.2%)	-	6 (4.8%)	n.a.
Surface texture	122 (98.4%)	-	2 (1.6%)	n.a.

* Ag= amalgam (Katalloy Nonzinc + Hg Degussa)
** Unites States Public Health Service
*** Codes=Alfa (A) clinically ideal; Bravo (B) clinically acceptable; Charlie (C) unacceptable; Delta (D) missing partially/totally
n.a. = not applicable

Tab 1: Clinical results of evaluation data for class I classical restorations Ag* (according to USPHS** criteria and codes***)

Criteria/Code Rating*** %	A	B	C	D
Marginal discoloration	126 (94.1%)	5 (3.7%)	3 (2.2%)	n.a.

Marginal integrity	125 (93.3%)	3 (2.2%)	2 (1.5%)	4 (3%)
Secondary caries	127 (94.8%)	n.a.	7 (5.2%)	n.a.
Anatomical form	128 (95.6%)	3 (2.2%)	3 (2.2%)	n.a.
Sensitivity	129 (96.3%)	1 (0.7%)	4 (3%)	n.a.
Surface texture	124 (92.5%)	8 (6%)	2 (1.5%)	n.a.

* RC= self cure resin composite (Charisma Heraeus Kultzer)
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*** Codes=Alfa (A) clinically ideal; Bravo (B) clinically acceptable; Charlie (C) unacceptable; Delta (D) missing partially/totally
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Tab 2: Clinical results of evaluation data for class I minimally invasive restorations RC* (according to USPHS** criteria and codes***)

The durability of the restorations was evaluated in relation with: the restoration technique, patient's sex and age. The survival function was constructed by two methods Kaplan-Meier (KM) and survival table (ST), using a 95% statistical probability. The statistical analysis was performed using SPSS 15.0 [8, 9].

Results

- The study sample of patients according to gender: 52.8% girls (n=76) and 47.2% boys (n=68) and the study sample of molars according to gender: 53.1% in girls (n=137) and 46.9% in boys (n=121).
- The study sample of molars according to the treatment method was: 48.1% classic restorations (n=124) and 51.9% minimally invasive restorations (n=134).
- The survival functions according to the treatment method(C/MI) calculated by both statistic method (KM/ST), are presented in Fig. 1a,b.
- The median survival times according to the treatment method and gender, calculated by both statistic methods are presented in Table 3.

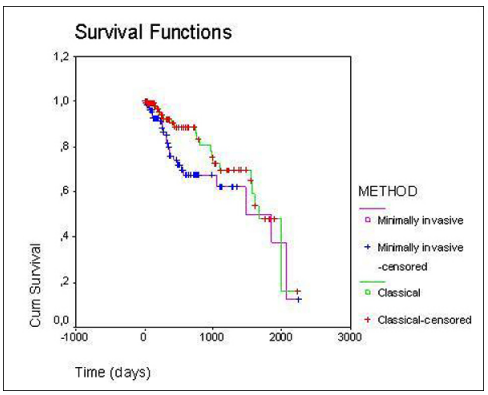

Fig. 1a: The survival function by the treatment method KM method Breslow: p=0.0235; Tarone Ware: p=0.0305

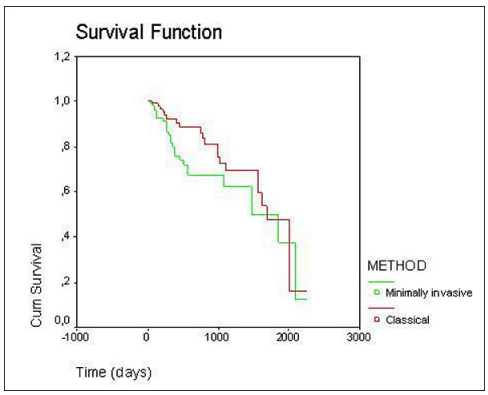

Fig. 1b: The survival function by the treatment method ST method

Statistic method	MST*/CI**	Classic			Minimally invasive		
		Global	F	M	Global	F	M
KM method	MST	4.55	5.5	4.2	4.02	5.1	4.01
	CI	4.51	n.c.	n.c.	1.8-6.2	3.3-6.9	n.c.
ST method	MST	4.55	5.4	4.23	4.02	5.08	4

*MST = median survival time
**CI = confidence interval
n.c. = not calculable

Tab 3: Results of the survival analysis according to the treatment method and gender by both statistic methods (years)

- The confidence interval of the probability of the 4 years survival of the resto-rations according to the treatment method and globally are presented in Table 4.

	Classic			Minimally invasive		
	Global	F	M	Global	F	M
Confidence interval*	56.0%-83.6%	74.4%-100%	34.2%-74.6%	24.9%-74.6%	44.1%-80.8%	n.c.

* constructed using the normated quantile of the normal repartition corresponding to a 95% probability
n.c. = not calculable

Tab 4: The confidence interval of the probability of the 4 years survival of the restorations

- The restorations in girls survive better in both treatment methods but this survival was statistically proven only for the classic treatment method ($p<0.05$); the median survival time was superior in girls (MST=5.5 years) when compared to boys (MST =4.2 years) Table 3.
- The survival functions for the classic method according to gender are presented in Fig. 2 a, b.
- The survival function showed no significant difference concerning the durability of the restorations in accordance with the patients' age regardless to the treatment method ($p>0.5$).
- Global proportion of failure = 18.2% (n=47):19.4% (n=26) in minimally invasive restorations, 16.9% (n=21) in the classic restorations.
- The main causes of failure: global - loss of marginal integrity (5.4%, n=14), secondary caries (5.4%, n=14);minimally invasive restorations - secondary caries (5.2%, n=7); classic restorations - loss of marginal integrity (6.4%, n=8).

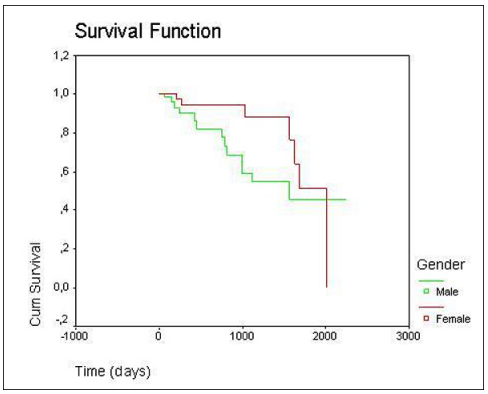

Fig. 2a: Survival curves classic method (ST)

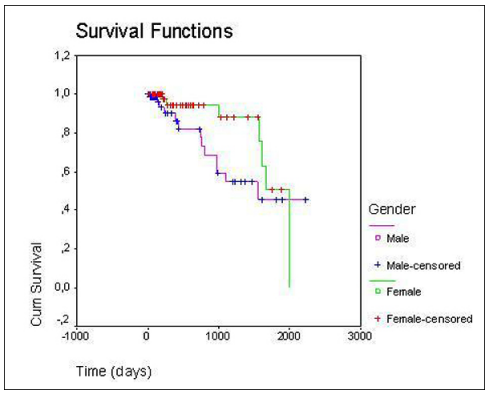

Fig. 2b: Survival curves classic method (KM)1

Conclusions

The restorations realised by the classic method have a higher longevity (MST 4.55 years) than those realised by the minimally invasive method (MST 4.02 years).These results are supported by both the statistical methods. The superior durability of amalgam restorations is not a great enough advantage to justify the pointless sacrifice of hard dental tissue during the cavity preparation in small occlusal carious lesions, where the use of adhesive materials would be more appropriate.

Literature

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This Poster was submitted by Prof. Dr. Anca Maria Raducanu.

Correspondence address:
Prof. Dr. Anca Maria Raducanu
U.M.F. Carol Davila
Clinica de Pedodontie
Str. Ionel Perlea Nr. 12
Bucuresti, Romania

Poster Faksimile:

The clinical performance of the occlusal minimally invasive restorations in primary molars

RĂDUCANU A.M.[1], HERTELIU C.[2], FERARU I.V.[1] and CRISTEA I.[1]

1-Departmeut of Paediatric Dentistry, U.M.F. "Carol Davila", Faculty of Dental Medicine, Bucharest, Romania

2-Departmeut of Statistics and Econometrics, University of Economics, Bucharest, Romania

INTRODUCTION

Techniques used to restore carious primary molars have changed over the past decade as new adhesive materials have been developed [1]. Adhesive dental materials make it possible to conserve tooth structure using minimally invasive cavity preparations [2, 3].

Although Fuks (2002) considers that generally, for small occlusal lesions, a conservative preventive resin restoration, using composite or compomer in conjunction with sealant, would be more appropriate than the classic Class I amalgam preparation [4]. amalgam remains the filling material of first choice for Class I cavities in primary molars in Eastern Europe [5] because of its durability (MST=52.8 months, Ferranti and Day, 2006) [6].

AIMS

- To assess the durability of the class I minimally invasive restorations compared to class I classic amalgam restorations in primary molars in accordance with gender and age, over a period of 6 years.
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MATERIAL

Initial sample: 336 restorations placed in 185 children.

Study sample: 258 direct class I restorations in primary molars applied in 144 patients (mean age = 5y, 5m) resulted after applying the exclusion criteria: partially/totally uncooperative children according to Frankl's scale, mentally disabled patients or under age of 2 years, restorations on teeth with pulp involvement.

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Data were obtained from the patients' observation charts. Restorations were evaluated according to the USPHS criteria and codes [7] (Table 1, 2). The restorations sample was subdivided in two groups:
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Anatomical form	124 (100%)	-	-	n.a.
Sensitivity	118 (95.2%)	-	6 (4.8%)	n.a.
Surface texture	122 (98.4%)	-	2 (1.6%)	n.a.

Table 2. Clinical results of evaluation data for class I minimally invasive restorations RC* (according to USPHS** criteria and codes***)

Criteria/Code	Rating*** %			
	A	B	C	D
Marginal discoloration	126(94.1%)	6(4.5%)	2(1.5%)	n.a.
Marginal integrity	129(95.5%)	5(3.8%)	1(0.8%)	0(0%)
Secondary caries	127(94.8%)	n.a.	7(5.2%)	n.a.
Anatomical form	128(95.6%)	5(3.8%)	1(0.8%)	n.a.
Sensitivity	129(96.3%)	4(3.7%)	0(0%)	n.a.
Surface texture	124(92.5%)	8(6%)	2(1.5%)	n.a.

The durability of the restoration was evaluated in relation with: the restoration technique, patient's sex and age. The survival function was constructed by two methods Kaplan-Meier (KM) and survival table (ST), using a 95% statistical probability. The statistical analysis was performed using SPSS 15.0 [8, 9].

RESULTS

- The study sample of patients according to gender: 52.8% girls (n=76) and 47.2% boys (n=68) and the study sample of molars according to gender: 53.1% in girls (n=137) and 46.9% in boys (n=121).
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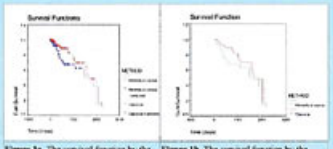

Figure 1a. The survival function by the treatment method KM method

Figure 1b. The survival function by the treatment method ST method

Breslow: p=0.0255, Tarone Ware: p=0.0365

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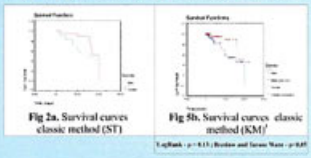

Fig 2a. Survival curves classic method (ST)

Fig 5b. Survival curves classic method (KM)

Log Rank : p=0.13 ; Breslow and Tarone Ware : p=0.05

- The survival function showed no significant difference concerning the durability of the restorations in accordance with the patients' age regardless to the treatment method ($p>0.5$).
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Correspondence to: Assoc. Prof. Dr. Anca Maria Răducanu, raducanu2000@yahoo.com