International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2002, Vol 4 No 3, Poster 135

Microleakage of class I composites with different base materials

Language: English

Authors: PD Dr. Thomas Pioch[1], Daniel Kraft[1], Prof. Dr. Franklin Garcia-Godoy[2], Dr. Ulrich Koke[3], Prof. Dr. Dr. Hans Jörg Staehle[1], PD Dr. Christof Dörfer[1]
[1]Universitätsklinikum Heidelberg, Poliklinik für Zahnerhaltungskunde
[2]Tufts University at Boston
[3]Poliklinik für Zahnärztliche Prothetik, Heidelberg

Date/Event/Venue:
07.09.2001
IADR-CED
Rome/Italy

Purpose

To test the effect of different base materials on marginal quality of composite restorations after load cycling in vitro.

Materials and Methods

Standardized Class I cavities were prepared in 110 extracted human molars. The teeth were randomly assigned to 10 groups (n=11 in each group). Cavities of 8 groups were filled with composite (Tetric ceram) using different base materials or cotton as negative control. Restorations of three more groups were restored without base materials using a composite, a compomer or an ormocer, respectively. All specimens were subjected to a thermomechanical cycling process of 1000 stress cycles (0/100N) and 1000 temperature cycles (5 °C / 55 °C). After dye penetration with rhodamin, the teeth were embedded, sectioned and examined by conventional stereomicroscopy (SMi) and by confocal laser scanning microscopy (CLSM).

Grading of the dye penetration:
0: max 0.1 mm
1: max to enamel-dentin junction
2: max to bottom of cavity
3: including bottom of cavity

Results

With both microscopic methods used, significant differences between the experimental groups were found (Kruskal-Wallis-Test: SMi p=0.02, CLSM p=0.001). Comparing the two microscopical methods it can be stated, that CLSM is more sensitive than SMi. Highest penetration values were detected at the negative control (group J, mean rank: SMi 139, CLSM 161). Under SMi lowest values were found for the all compomer restoration (group F, mean rank: 83) and for one restoration with a glasionomer used as base material (group E, mean rank: 95). With CLSM lowest values were found for the combination of glasionomer and composite (group C, mean rank: 84) and for the all ormocer restorations (group I, mean rank: 93).

Group	*Restorations*			*Mean rank of penetration (Kruskal-Wallis-Test)*	
	Base materials	**Restoration materials**	**Bonding agents**	**Stereomicroscope**	**Confocal Laser Scanning Microscope**
A	Harvard Cement	Tetric Ceram	Excite	92	108
B	Ketac-Bond	Tetric Ceram	Excite	99	95
C	GC Fuji IX GP	Tetric Ceram	Excite	124	84
D	Ketac-Molar	Tetric Ceram	Excite	125	124
E	Compoglass	Tetric Ceram	Excite	95	99
F	Dyract AP		P&NT	83	95
G	Tetric Ceram		Excite	126	125
H	Tetric Flow	Tetric Ceram	Excite	103	122
I	Admira		Admira Bond	118	93
J	Cotton	Tetric Ceram	Excite	139	161
				p = 0,020	p = 0,001

Table 1: Test groups and their mean ranks of penetration.

Conclusion

It is concluded that variations of individual base materials might influence the marginal characteristics of Class I composite restorations.

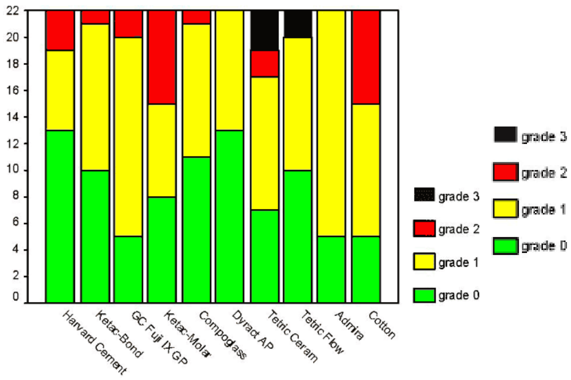


Fig. 1a: Frequency of dye penetration depths (stereomicroscopy)

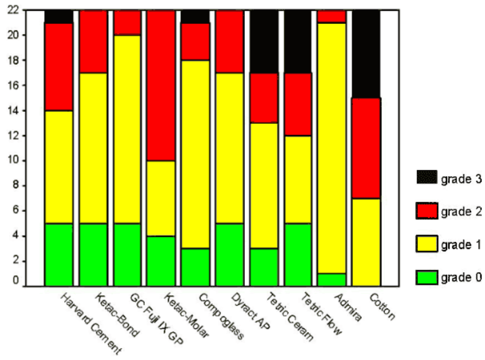


Fig. 1b: Frequency of dye penetration depths (confocal laser scanning microscopy)

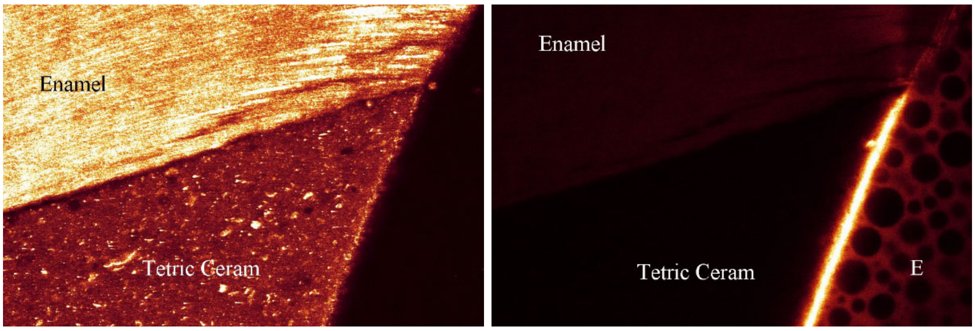


Fig. 2: CLSM image in reflection (left) and reflection (right) mode from a specimen of group C. A dye penetration between restorative material and enamel did not occur (here grade 0). E = embedding resin.

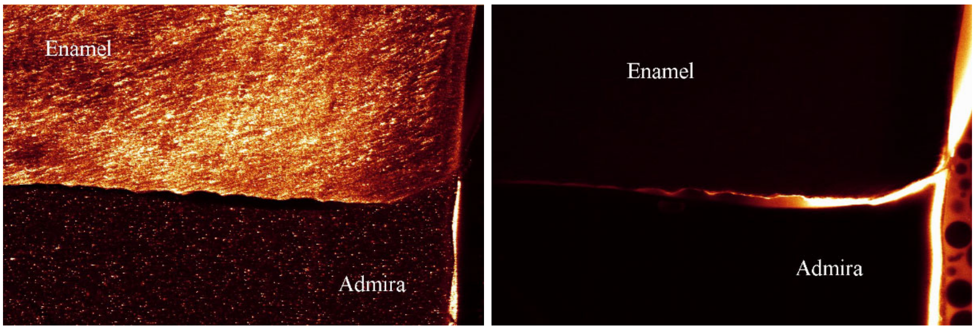


Fig. 3: CLSM image in reflection (left) and reflection (right) mode from a specimen of group J. A dye penetration (arrows) between restorative material and enamel occurred (here grade 1).

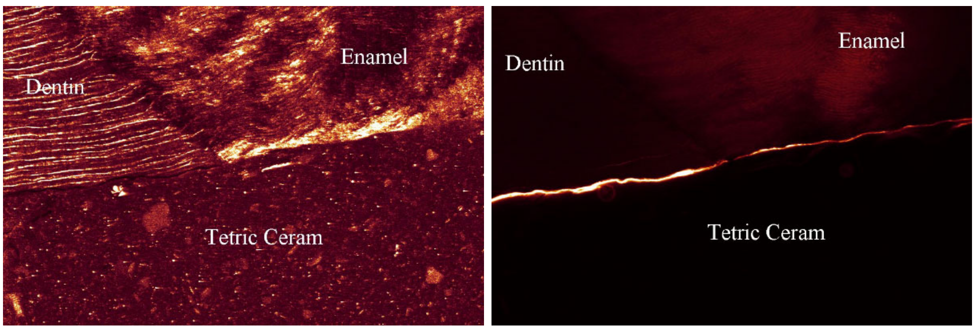
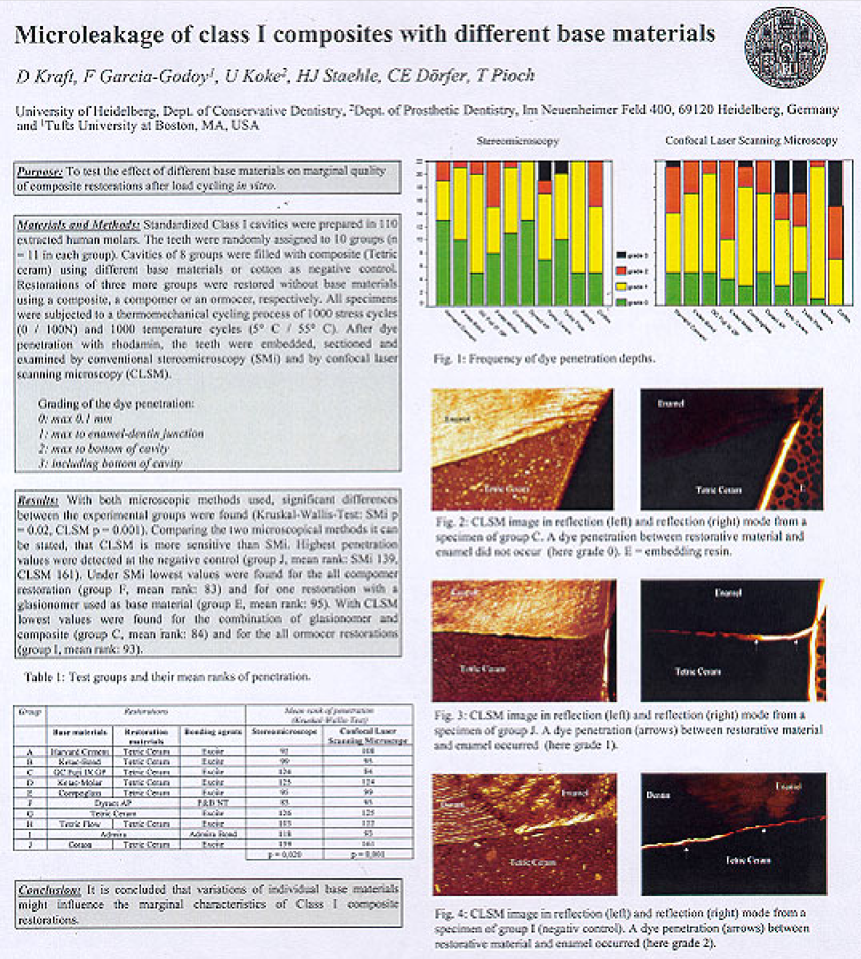


Fig. 4: CLSM image in reflection (left) and reflection (right) mode from a specimen of group I (negativ control). A dye penetration (arrows) between restorative material and enamel occurred (here grade 2).

This poster was submitted by PD Dr. Thomas Pioch.

Correspondence address:
PD Dr. Thomas Pioch
Universitätsklinikum Heidelberg
Poliklinik für Zahnerhaltungskunde
Im Neuenheimer Feld 400
D-69120 Heidelberg

Poster Faksimile:



Microleakage of class I composites with different base materials

D Kraft, F Garcia-Godoy[1], U Koke[2], HJ Staehle, CE Dörfer, T Pioch

University of Heidelberg, Dept. of Conservative Dentistry, [2]Dept. of Prosthetic Dentistry, Im Neuenheimer Feld 400, 69120 Heidelberg, Germany and [1]Tufts University at Boston, MA, USA

Purpose: To test the effect of different base materials on marginal quality of composite restorations after load cycling *in vitro.*

Materials and Methods: Standardized Class I cavities were prepared in 110 extracted human molars. The teeth were randomly assigned to 10 groups (n = 11 in each group). Cavities of 8 groups were filled with composite (Tetric ceram) using different base materials or cotton as negative control. Restorations of three more groups were restored without base materials using a composite, a compomer or an ormocer, respectively. All specimens were subjected to a thermomechanical cycling process of 1000 stress cycles (0 / 100N) and 1000 temperature cycles (5° C / 55° C). After dye penetration with rhodamin, the teeth were embedded, sectioned and examined by conventional stereomicroscopy (SMi) and by confocal laser scanning microscopy (CLSM).

Grading of the dye penetration:
0: max 0.1 mm
1: max to enamel-dentin junction
2: max to bottom of cavity
3: including bottom of cavity

Results: With both microscopic methods used, significant differences between the experimental groups were found (Kruskal-Wallis-Test: SMi p = 0.02, CLSM p = 0.001). Comparing the two microscopical methods it can be stated, that CLSM is more sensitive than SMi. Highest penetration values were detected at the negative control (group J, mean rank: SMi 139, CLSM 161). Under SMi lowest values were found for the all compomer restoration (group F, mean rank: 83) and for one restoration with a glasionomer used as base material (group E, mean rank: 95). With CLSM lowest values were found for the combination of glasionomer and composite (group C, mean rank: 84) and for the all ormocer restorations (group I, mean rank: 93).

Table 1: Test groups and their mean ranks of penetration.

Group	*Restorations*			*Mean rank of penetration (Kruskal-Wallis-Test)*	
	Base materials	Restoration materials	Bonding agents	Stereomicroscope	Confocal Laser Scanning Microscope
A	Harvard Cement	Tetric Ceram	Excite	92	108
B	Ketac-Bond	Tetric Ceram	Excite	99	95
C	GC Fuji IX GP	Tetric Ceram	Excite	126	84
D	Ketac-Molar	Tetric Ceram	Excite	125	124
E	Compoglass	Tetric Ceram	Excite	95	99
F	Dyract AP		F&B NT	83	95
G	Tetric Ceram		Excite	126	125
H	Tetric Flow	Tetric Ceram	Excite	103	122
I	Admira		Admira Bond	118	93
J	Cotton	Tetric Ceram	Excite	139	161
				p = 0,020	p = 0,001

Conclusion: It is concluded that variations of individual base materials might influence the marginal characteristics of Class I composite restorations.

Stereomicroscopy | Confocal Laser Scanning Microscopy

Fig. 1: Frequency of dye penetration depths.

Fig. 2: CLSM image in reflection (left) and reflection (right) mode from a specimen of group C. A dye penetration between restorative material and enamel did not occur (here grade 0). E = embedding resin.

Fig. 3: CLSM image in reflection (left) and reflection (right) mode from a specimen of group J. A dye penetration (arrows) between restorative material and enamel occurred (here grade 1).

Fig. 4: CLSM image in reflection (left) and reflection (right) mode from a specimen of group I (negativ control). A dye penetration (arrows) between restorative material and enamel occurred (here grade 2).