Fracture Resistance of Reinforced Provisional Crown & Bridge Restoration Materials

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Objectives:

Resistance to functional loads and removal forces are mechanical factors that must be considered when choosing a provisional restorative material for clinical use. The aim of this study was to compare the fracture strength of three-unit bridges of two steel wire-reinforced and two unreinforced provisional crown & bridge materials.

Materials and Methods:

Identical alloy dies (Biosil F, DeguDent, G) were fixed in resin at a distance of 10 mm simulating a posterior gap. An artificial periodontium was provided with polyether impression material (Impregum, 3M ESPE, USA). All bridges were bonded with RelyX Temp NE (3M ESPE, USA).

n = 20 | n = 20 | n = 20 | n = 20

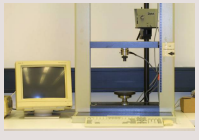
- **Radica (Dentsply, USA)**
- **Radica Wire-Reinforced (Dentsply, USA)**
- **Jet (Lang Dental, USA)**
- **Jet Wire-Reinforced (Lang Dental, USA)**

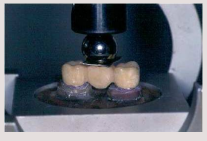
Group A: 10 FPDs of each material were stored for 24 hours in distilled water as a control group

Group B: 10 FPDs of each material: Thermal cycling (1200x5°C/55°C, 2 mins each) and mechanical loading (480.000x50N)

Artificial oral environment

All FPDs were loaded to fracture at the center of the pontic (Universal testing machine Zwick 1446, G; v=1mm/min) with a steel ball, 12.5 mm in diameter.



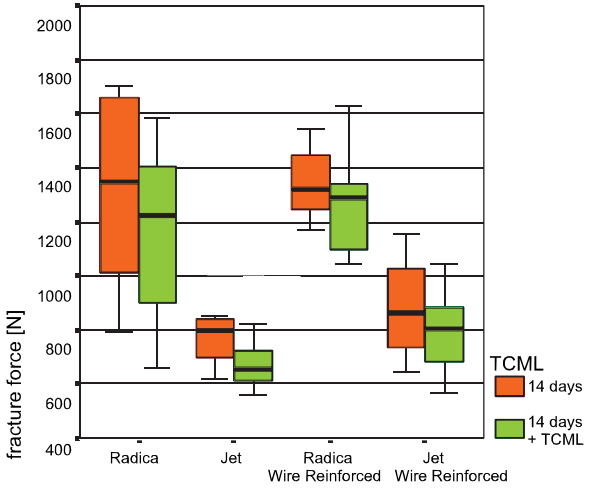


Statistical Analysis: Median and percentiles (25%/75%) were calculated and the Mann-Whitney *U* test was performed (level of significance α=0.05).

Results:

	Radica	Radica Wire Reinforced	Jet	Jet Wire Reinforced
A) 14 days	1344 (1069/1626)	1320 (1248/1443)	801 (706/839)	865 (767/1028)
B) 14 days + TCML	1224 (961/1368)	1290 (1115/1334)	654 (618/718)	803 (686/879)

Tab. 1: Fracture force (N): Median (25%/75%)



14 days:
- significant higher fracture resistance for Radica and Radica Wire Reinforced (WR) compared to Jet and Jet WR.
- no significant differences between the fracture resistance of Radica and Radica WR and between Jet and Jet WR.

14 days + TCML:
- significant higher fracture resistance for Radica and Radica WR compared to Jet and Jet WR.
- no significant difference between the fracture resistance of Radica and Radica WR and between Jet and Jet WR.

There was a maximum reduction of the fracture resistance of about 150N due to TCML for the un-reinforced materials. The reinforced materials showed a maximum decrease of the fracture resistance caused by TCML of about 62N. There were no significant differences between the values after 14 days storage in water and 14 days storage in water + TCML for all tested materials.

Conclusion: All investigated temporary bridges made of Radica showed significantly higher fracture resistance than bridges made of Jet. The steel wire-reinforcement did not have a significant effect on the fracture resistance of both materials. TCML only showed a minor reduction of the fracture resistance of the bridges.

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Spectrophotometrical and Subjective Analysis of Home-Bleaching versus In-Office Bleaching

T. Plein*, M. Rosentritt, G. Handel
(Department of Prosthetic Dentistry, University of Regensburg, Germany)

0238

Objectives: The influence of bleaching materials on human teeth is of major concern in the clinical application. In this in-vitro study the bleaching effect was determined in the L*a*b*-color space and compared to a subjective evaluation.

Materials and Methods: 35 freshly extracted upper anterior incisors were divided in 5 groups. They were bleached with the *Home-Bleaching* and *In-Office-Bleaching* products (Table 1). The bleaching materials were applied (Table 2) and in the meantime humidly stored at 37°C.

I. Spectrophotometrical Analysis: L*a*b*-values were measured using a reflection spectrophotometer (CM 3500d, aperture 3mm, Minolta, G) and mean discoloration Δ-E was calculated.

II. Subjective Analysis: Subjective analysis was performed, where 5 dentists determined, independent of each other, the individual color shade on the basis of the Vita shade guide (Vita, G) (Table 2). Statistics were performed using Student-T-test.

Materials	Manufacturer	Concentration		Application		Treatment
			Evaluation time (after ... days)	*daily*	*days overall*	*treatment*
Visalys	Kettenbach, G	7,5% H_2O_2	0, 1, 3, 7, 10, 12, 14	2 x 30 min.	14	Home
Visalys	Kettenbach, G	13,5% H_2O_2	0, 1, 2, 3, 4	1 x 30 min.	4	In-Office
Opalescence boost	Ultradent, USA	Ca. 30% Carbamide peroxide ~app. 15% H_2O_2	0, 1, 2, 3, 4	1 x 30 min.	4	In-Office
White Strips	blend-a-med, GB	not known	0, 1, 3, 7, 10, 12, 14	2 x 30 min.	14	Home
paint on	Ivoclar, FL	not known	0, 1, 3, 7, 10, 12, 14	2 x 30 min.	14	Home

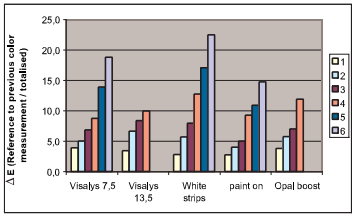
Table 1: Materials, manufacturer, concentrations, Time of evaluation, time and form of application

Shade	C4	A4	C3	B4	A3,5	B3	D3	A3	D4	C2	C1	A2	D2	B2	A1	B1
Value	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Table 2 Color assignment to Vita shade guide

Results: The examined bleaching agents showed clear bleaching effects from Vita color A3,5 and/or D3 up to D2, B2 and A1. The largest mean bleaching effect by all materials was assessed after the first use. The largest colour change in the reference to the Vita shade guide showed Visalys 7.5, followed by Opalescence boost and White strips. More slightly values were found for Paint on and Visalys 13.5. Table 3 illustrates the mean bleaching effect of each substance per application. Visalys 13.5 and Opalescence boost showed a Δ-E change of app. 10-12 units after four-time use. For the homebleaching stronger Δ-E-changes of max. app. 23 units were to be assessed. The bleaching effect for White strips was most considerable, followed by Visalys 7.5, and Paint on.

I. Spectrophotometrical Analysis

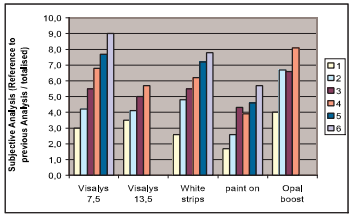


Graph 1: Δ-E-Change

ΔE		VisueII
3,1	**Visalys 7,5**	1,5
2,5	**Visalys 13,5**	1
2,5	**White strips**	1,3
3,7	**paint on**	1,4
3	**Opalescence boost**	2

Table 3: Average change of Δ-E/ color shade per application

II. Subjective Analysis



Graph 2: Change of values according to Vita shade guide

	Color Change			
	range from	to	Maximum change	Application
Visalys 7,5	A 3,5	B2 (14,1)	A3 (3,0)	1
Visalys 13,5	D3	D2 (12,9)	C1 (3,5)	1
White strips	D3	A1 (14,7)	D4 (2,6)	1
paint on	D3	D2 (13,0)	D4 (1,7)	1
Opalescence boost	A 3,5	D2 (13,4)	D4 (4,0)	1

Table 4: Range of color change

Conclusions: All systems showed a time dependent effective bleaching up to a Vita color shade of D2, B2 or A1. Both in-office and all home-bleaching systems showed comparable good results. Only limited correlation between L*a*b*-values and subjective analysis was found.

CED, Amsterdam 2005

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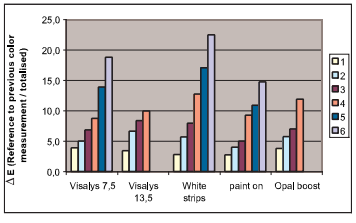

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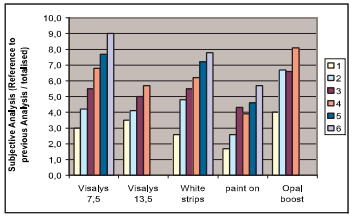

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