

# MARGINAL QUALITY OF ADHESIVE MIXED CLASS V RESTORATIONS AFTER PREPARATION AND FINISHING WITH A HANDPIECE INTEGRATED ER:YAG LASER

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## Objectives:

To find the most appropriate parameters for mixed class V cavity preparation for a new type of Er:YAG laser, integrated in the handpiece.

## Materials and Methods:

In 4 groups A-D, eight saucer-shaped mixed Class V cavities per group were prepared with an Erbium:YAG hard laser (Lite Touch, Syneron Medical Ltd., Dental Division, Yokneam, Israël) in near contact mode with a conical 800 µm sapphire tip under continuous water spray set at 5 (scale 1 - 8) and restored under the simulation of dentinal fluid with Clearfil SE Bond (Primer: Lot 775AA, Bond: Lot 1124AA, Kuraray, Japan) and Clearfil APX PLT composite (Lot 0255A, Shade A2, Kuraray Medical, Kurashiki, Japan) applied in two layers and polymerized by using a LED light curing device (LEDemetron, Serial No 71020906, Kerr Corp, USA). Marginal adaptation in enamel and dentin was quantified before and after simultaneous thermal (5-50-5°C, 2 min each) and mechanical (max. 49N; 1,200,000 cycles) stresses by using the replica technique in a SEM (XL20, Philips, Eindhoven, The Netherlands) under 200x magnification. The groups were:

Group	Cavity Prep.	Finishing 1	Finishing 2	Pulse Duration Finishing
A	300 mJ 25 Hz	100 mJ 35 Hz	no	short pulse = 160 µsec
B	300 mJ 25 Hz	100 mJ 35 Hz	no	long pulse = 275 µsec
C	300 mJ 25 Hz	100 mJ 35 Hz	50 mJ 50 Hz	short pulse = 160 µsec
D	300 mJ 25 Hz	100 mJ 35 Hz	50 mJ 50 Hz	long pulse = 275 µsec

Pulse duration during cavity preparation was set at 250 µsec (short pulse) for all groups.

## Results: Expressed as % of "Continuous Margin" (Mean ± SD)

Group	Enamel				Dentin				Total			
	before	SD	after	SD	before	SD	after	SD	before	SD	after	SD
A	89.5	6.2	72.4	9.1	98.5	4.3	97.6	5.9	93.6	3.3	83.9	6.8
B	87.4	15.6	60.2	14.2	93.0	15.0	96.1	8.5	90.6	14.7	79.0	7.4
C	75.2	9.0	49.0	18.4	100.0	0.0	99.4	1.1	88.5	3.9	74.9	9.6
D	86.3	12.1	49.5	19.9	97.2	4.5	98.7	3.7	92.4	5.9	74.4	9.7

## Conclusions:

The used finishing parameters had a significant influence on marginal adaptation in enamel of adhesive mixed Class V restorations (ANOVA,  $p < 0.05$ ). More open margins were found after finishing with long pulse durations. The best results were found for the group with a single finishing on dentin and enamel with 100 mJ at a repetition rate of 35 Hz, with short pulse durations of 160 µsec. A second finishing with an energy setting at 50 mJ and 50 Hz led to less than 50% continuous margins. The main differences were found in enamel, whereas in dentin no significant difference was detected (ANOVA,  $p < 0.05$ ). Further investigations should determine if an adjustment of the repetition rate and/or of the water spray settings may further optimize marginal adaptation.