

showed a straight fracture path involving the ceramic and the polymer without deflecting at the interface.

Conclusions: The improvement in fracture toughness of Enamic over Vitablocs MarkII is attributed to the elastic-plastic behavior of the polymer.

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21

Antibacterial activity of endodontic sealer modified with nanoparticles



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Purpose/aim: The aim of this study was to evaluate the antibacterial activity of a commercial endodontic sealer modified with montmorillonite nanoparticles carrying to different drugs: chlorhexidine (CHX) and metronidazole (MET).

Materials and methods: The sealer used was AH Plus sealer, and 5% in weight was added of the nanoparticles carrying one of the drugs CHX or MET. Cylindrical specimens were made with 5 mm diameter and 1 mm thick ($n=5$). The antibacterial activity was evaluated by the inhibition halo test. This method was conducted according to Clinical Standard Laboratory Institute M2-A8 protocol, with some modifications (CLSI, 2003). The bacteria selected were the *E. Fecallis* which is the most frequently bacteria found in recidivate apical infection. Discs specimens were positioned over the agar and plates were incubated in the appropriate conditions for 48 h. After this period, inhibition zones were measured using a calliper rule. A group with no modification by the nanoparticle was added as a control. The data was analyzed using Mann-Whitney ($\alpha=5\%$).

Results: Results are presented in Table 1. For the control group no inhibition zone was formed, so the statistical analyze was performed only between the experimental groups.

Table 1 – Means (SD) for inhibition halo (mm). No statistical difference was presented between the drugs.

Drug	Inhibition halo (mm)
Control	0
CHX	4.8 (1.4) A
MET	4.0 (1.6) A

Conclusions: Within the limitations of this study it can be concluded that the addition of the nanoparticle carrying both drugs added an antibacterial activity that was not found in the commercial sealer.

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22

Longitudinal effect of Er:YAG laser on dentin micromorphology and bonding



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Purpose/aim: Er:YAG laser with controlled pulse duration can interact with dentin with less thermo mechanical damage for pulp and surrounding tissues. Analyzing the long term of both micro morphological features and bond strength of Er:YAG irradiated dentin is fundamental to determine the stability of composite restorations. This study investigated the longitudinal effect of laser pulse duration on micro morphology and bond strength of a composite bonded to irradiated dentin.

Materials and methods: Sixty caries-free human molars were cut to obtain middle flat dentin discs, polished to obtain standard smear layer. Samples were randomly divided into 4 groups according to dentin pre-treatment ($n=12$): G1 (without laser); G2 (80 mJ-2 Hz-50 μ s); G3 (80 mJ-2 Hz-300 μ s) and G4 (80 mJ-2 Hz-600 μ s). The laser wavelength was 2.94 μ m, working in focused distance and cooling of 21 ml/s. Subsequently, self-etch adhesive system (Scotchbond Universal-3M/ESPE) was applied and 8 cylinders of composite (Z350-3M/ESPE) were built and tested in micro shear bond strength (SBS) after 12 months of storage in artificial saliva. Moreover, 3 dentin discs per group were prepared to perform the analysis of collagen fibrils by second harmonic generation (SHG) (Maitai Deep See microscopy, at 380 nm excitation) and the morphology of the hybrid layer using confocal laser (at 800 nm excitation). For both analyses, fluorochrome Rhodamine-B was compounded into the adhesive (0.0016 g/ml).

Results: One-way ANOVA and post-hoc Tukey's test ($\alpha=0.05$) did not detect statistical difference for the factor dentin pre treatment ($p=0.000$). After 12 months of saliva storage, experimental groups presented similar bond strength, irrespective of dentin pre-treatment (Group 1: $24.97 \pm 4.7A$; Group 2: $22.85 \pm 2.94A$; Group 3: $22.13 \pm 2.98A$; Group 4: $23.01 \pm 2.94A$). The micro morphology images revealed a thin hybrid layer and sparsely resin tags for G1, while irradiated groups showed longer resin tags. For SHG, G1 and G2 showed no alterations of collagen fibrils and organic matrix, while G3 and G4 showed a permanent modification of the organic matrix below the irradiated surface.

Conclusions: Although hybrid layer/resin tags were present in all experimental groups and Er:YAG laser pretreatment did not impair bond strength to dentin, organic matrix changes were observed in groups with higher pulse durations (300 and 600 μ s). Thus, a pulse width of 50 μ s is the best irradiation protocol to pre treat dentin before bonding procedures, preserving the integrity of collagen fibrils.

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