

PENGARUH JENIS BAHAN IRIGASI AKHIR DAN TEKNIK IRIGASI TERHADAP KEKUATAN PELEKATAN PUSH-OUT SILER SALURAN AKAR

INTISARI

Irigasi akhir saluran akar memiliki fungsi utama menghilangkan *smear layer*, sehingga dapat meningkatkan kekuatan pelekatan *push-out*. *Chelating agent* dapat digunakan untuk menghilangkan *smear layer*. Teknik irigasi juga diketahui dapat meningkatkan kemampuan menghilangkan *smear layer*. Penelitian dilakukan untuk membandingkan pengaruh irigasi akhir menggunakan EDTA 17%, *Ultra clean*, dan kitosan nanopartikel 0,2% dengan teknik irigasi manual, agitasi sonik, dan agitasi ultrasonik terhadap kekuatan pelekatan *push-out* siler saluran akar.

Empat puluh lima gigi premolar mandibula dipreparasi kemudian dibagi tiga kelompok secara acak (n=15). Kelompok 1 dilakukan irigasi akhir menggunakan EDTA 17%, kelompok 2 *Ultra clean*, dan kelompok 3 kitosan nanopartikel 0,2%. Tiap kelompok dibagi tiga sub kelompok (n=5) dengan sub kelompok A menggunakan teknik irigasi manual, sub kelompok B agitasi sonik, dan sub kelompok C agitasi ultrasonik. Gigi dilakukan obturasi dengan teknik *single cone* dan menggunakan siler biokeramik, lalu diinkubasi selama 7 hari. Gigi dipotong horizontal pada sepertiga apikal dengan ketebalan 2 mm, kemudian dilakukan uji *push-out* menggunakan *Universal Testing Machine*. Sampel dilakukan pengamatan tipe kegagalan pelekatan material obturasi menggunakan mikroskop stereo (perbesaran 40x).

Hasil uji ANAVA dua jalur menunjukkan terdapat perbedaan yang signifikan pada bahan irigasi akhir, teknik irigasi, serta interaksi bahan dan teknik irigasi terhadap kekuatan pelekatan *push-out* siler saluran akar ($p < 0,05$). Kesimpulan penelitian ini adalah terdapat pengaruh bahan irigasi akhir, teknik irigasi, serta interaksi bahan dan teknik irigasi terhadap kekuatan pelekatan *push-out* siler saluran akar. Kombinasi bahan irigasi akhir kitosan nanopartikel 0,2% dan teknik agitasi sonik menghasilkan kekuatan pelekatan *push-out* siler biokeramik yang paling tinggi pada dinding dentin saluran akar.

Kata kunci: kekuatan pelekatan *push-out*, bahan irigasi akhir, teknik irigasi, siler biokeramik.

THE EFFECT OF FINAL IRRIGATION MATERIAL TYPE AND IRRIGATION TECHNIQUE ON THE ADHESION STRENGTH OF ROOT CANAL PUSH-OUT SEALERS

ABSTRACT

Final irrigation of the root canal has the main function of removing the smear layer, thereby increasing the push-out bond strength. Chelating agents can be used to remove the smear layer. Irrigation techniques are also known to increase the ability to remove the smear layer. The study was conducted to compare the effect of final irrigation using 17% EDTA, Ultra clean, and 0.2% chitosan nanoparticles with manual irrigation techniques, sonic agitation, and ultrasonic agitation on the push-out bond strength of root canal sealers.

Forty-five mandibular premolar teeth were prepared and then randomly divided into three groups (n=15). Group 1 underwent final irrigation using 17% EDTA, group 2 Ultra clean, and group 3 0.2% chitosan nanoparticles. Each group was divided into three subgroups (n=5) with subgroup A using manual irrigation technique, subgroup B sonic agitation, and subgroup C ultrasonic agitation. The teeth were obturated using a single cone technique and using a bioceramic sealer, then incubated for 7 days. The teeth were cut horizontally at the apical third with a thickness of 2 mm, then a push-out test was performed using a Universal Testing Machine. The samples were observed for the type of obturation material attachment failure using a stereo microscope (40x magnification).

The results of the two-way ANOVA test showed that there were significant differences in the final irrigation material, irrigation technique, and the interaction of irrigation materials and techniques on the push-out adhesion strength of root canal sealers ($p < 0.05$). The conclusion of this study is that there is an effect of the final irrigation material, irrigation technique, and the interaction of irrigation materials and techniques on the push-out adhesion strength of root canal sealers. The combination of 0.2% chitosan nanoparticle final irrigation material and sonic agitation technique produced the highest push-out adhesion strength of bioceramic sealers on the dentin walls of the root canal.

Keywords: push-out bond strength, final irrigation material, irrigation technique, bioceramic sealer.