Poster: R077

Effect of one-year storage in phospate-buffered saline on microhardness of mineral trioxide aggregate modified by addition of short glass fibers

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Aim

To evaluate microhardness of mineral trioxide aggregate (MTA) modified by addition of short glass fibers (SGF) after one-year storage in phospate-buffered saline (PBS).

Methodology

Three groups were prepared (n=20 per group). For control group, encapsulated MM-MTA (MicroMega, Besacon, France) was used (Figure 1). In two experimental groups, MTA powder was modified by SGF (Central Glass Co., Tokyo, Japan), (Figure 2). Five wt% and 10 wt% of MTA powder was replaced with 5 wt% SGF (MM-MTA+5%SGF) and 10 wt% SGF (MM-MTA+10%SGF), respectively (Figure 3). After mixing the materials according to the manufacturer' s instructions, the materials were placed in custom made teflon molds (6mmx4mm), (Figures 4 and 5). Vickers micorhardness testing machine (KB Prüftechnik GmbH, Hochdorf-Assenheim, Germany) was used to measure microhardness of samples in triplicates after seven days, baseline, and after one year of storage in PBS. A pyramid shaped diamond peak was used to apply pressure of 200 g during 10 seconds (Figure 6). The mean Vickers hardness value of the three measurements was calculated for each sample and expressed in HV. For statistical analysis, Kolmogorov-Smirnov normality test, ANOVA and post-hoc Scheffe test were used, with level of significance set at 5%.

Figure 1. Encapsulated MM MTA

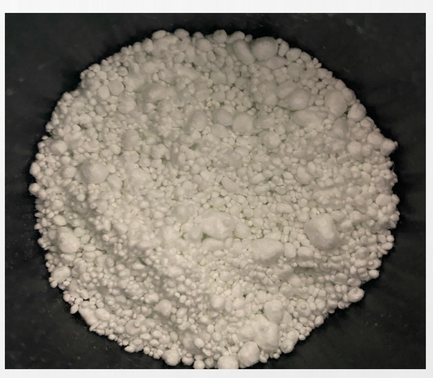

Figure 2. SGF

Figure 3. SGF added to MM MTA

Figure 4. Placing modified MM MTA in teflon mold

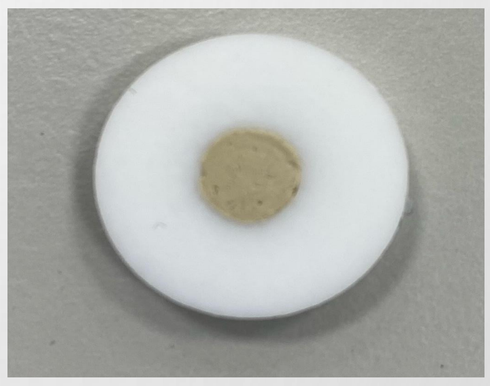

Figure 5. Sample in teflon mold

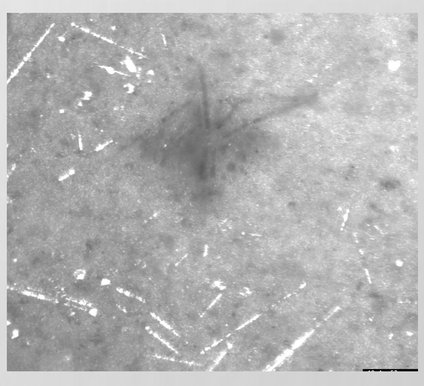

Figure 6. Measuring Vickers microhardness

Results

After one year storage in PBS, the highest microhardness value was measured for MM-MTA+10%SGF (22.93±5.62) with statistically significant difference in comparison to microhardness of other two groups measured both at baseline and after one year ($p<0.05$). Microhardness of MM-MTA+10%SGF after one-year storage in PBS statistically significanly increased in comparison to its baseline microhardness (14.73±3.09), ($p<0.05$). There was no statistically significant difference in microhardness of MM-MTA or MM-MTA+5%SGF measured at baseline (7.76±3.09 and 12.1±2.44, respectively) and after one year storage in PBS (7.86±1.54 and 12.49±2.57, respectively), ($p>0.05$).

Conclusion

One-year storage in PBS contributed to enhanced microhardness of only MM-MTA with addition of 10%SGF.

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