

The effect of ozone on surface hardness of restorative materials.

Ozone is now being routinely used to treat primary carious lesions but to date there has been no research carried out as to any residual effect of ozone upon the surface hardness of various restorative materials that may be adjacent to a carious lesion that is being ozonated.

Therefore the following research was carried out to determine if there was any significant difference between pre-ozone hardness and post-ozone hardness of a number of restorative materials.

AIM

To investigate the effect of ozone treatment on the surface hardness of a range of commonly used restorative materials.

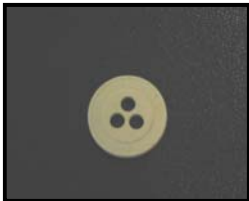
METHOD

Seven types of restorative materials were chosen for testing:

1. Amalgam (disperalloy)
2. Fuji II LC (reinforced glass-ionomer)
3. Dyract AP (compomer)
4. Spectrum (hybrid composite)
5. Revolution (flowable composite)
6. Point 4 (composite)
7. Chemflex (glass-ionomer)

Each material was loaded into prefabricated hardness testing discs (photograph 1).

Photograph 1:



The materials were packed against a glass slab to help produce a flat, smooth surface, for the hardness testing to be carried out upon. A cellulose strip was placed on the upper surface of those materials that needed light curing, which were then subsequently cured from both sides, for the time recommended on the manufacturer's instructions.

The hardness discs, plus materials which they now contained, were placed in a buffer solution of pH 7 to prevent desiccation and stored for a recorded length of time.

The materials were then subjected to Micro Vickers Hardness Testing (Mitutoyo), (photograph 2) applying a load of 1kg for 10 seconds and the results recorded.

Photograph 2:



Ozone was then applied to each specimen for 10 seconds and the surface hardness test was repeated immediately after treatment with ozone therapy.

RESULTS

Thirty Vickers numbers were obtained for each material both before and after ozone treatment.

Table 1: The mean surface hardness \pm standard deviation before and after ozone treatment.

Material Tested	Pre-Ozone	Post-Ozone
Amalgam	135.39 \pm 22.23	127.21 \pm 17.90
Fuji II LC (Reinforced GI)	31.16 \pm 8.59	25.75 \pm 5.72
Dyract AP (Compomer)	51.23 \pm 5.31	46.54 \pm 2.72
Spectrum (Composite)	54.68 \pm 2.51	51.10 \pm 1.96
Revolution (Flowable Composite)	21.06 \pm 0.92	19.62 \pm 2.42
Point 4 (composite)	52.71 \pm 2.03	50.90 \pm 2.10
Chemflex (GI)	34.36 \pm 7.72	37.99 \pm 14.39

The results were analyzed statistically using T-Tests. This revealed statistically that there was a significant reduction in hardness of all materials after ozone, except Chemflex GI, which showed an increase in surface hardness.

CONCLUSIONS

1. The application of ozone for 10 seconds causes a statistically significant reduction of the surface hardness of all materials tested except Chemflex glass-ionomer.
2. The statistically significant reduction of surface hardness may not mean any clinically significant reduction in hardness of these materials, although further research is required.