Evaluating Color Stability of Different Restorative Approaches Masking of SDF

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Introduction:

Dental caries remains one of the most prevalent chronic diseases in the world, affecting populations at all ages of life (1, 2). From behaviorally complex children to bed-ridden patients, treatment for dental caries is a persistent challenge. A child may be too young or may not weigh enough to undergo general anesthesia, while an older bed bound patient may not have access to a dental unit. Use of SDF can be a good treatment option for patients who are unable to cooperate or be seen in a dental office setting because it is painless, fast, and relatively inexpensive (2). There is a steady increase in the support for the efficacy of SDF in arresting coronal caries in primary teeth as well as arresting and preventing root caries in adults (3). An ideal masking technique with respect to color stability is critical to the prospective usage of SDF in clinical practice. The present study aims To evaluate the color stability of different restorative modalities for masking silver diamine fluoride (SDF) after thermal aging.

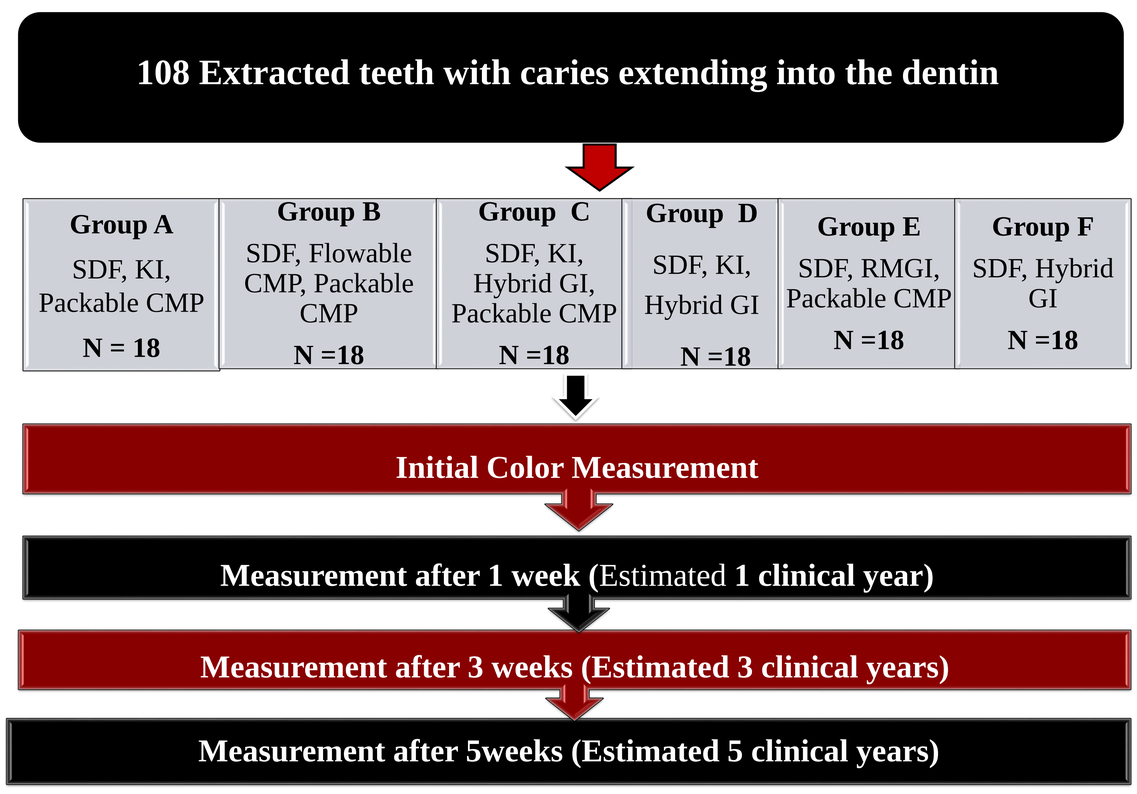

Figure 1: Experimental Design

Methods:

A sample size of 108 teeth were recently collected in the emergency dental clinic at the UNLV. The teeth had caries to the dentin and were clinically unrestorable. Six test groups were randomly assigned 18 teeth, as seen in (Figure 1). After the teeth were collected, they were sterilized and stored in artificial saliva (Pickering Laboratories). A small excavating spoon was used to remove the infected dentin and loose enamel. One drop of SDF (Riva Star, SDI) was applied to all specimens for 1 min. The teeth were then restored using the materials of their respective group according to the manufactures recommendations. Color changes were recorded by a spectrophotometer [VITA Easyshade, Vita] (Figure 2B) CIELAB values L*, a*, and b* were measured for each restoration (4).

Figure 2. A:Thermocycling machine; B: VITA Easyshade V

All specimen margins were subjected to thermocycling. The thermocycler water baths were set to 5°C and 55°C with 20 seconds at each temperature [Thermocycler, SD Mechatronik] (Figure 2A). Readings to calculate the Δ E and photographs were taken at 10,000 thermocycles (1 estimated clinical year), 30,000 thermocycles (3 estimated clinical years), and 50,000 thermocycles (5 estimated clinical years).

Results:

There was noticeable and immediate black staining on the specimen that were treated with SDF only and then subsequently light cured (Figure 3). The application of KI reduced the immediate darkening that could be visualized with the unaided eye, brought on by the curing light. In addition, the initial masking of the dark staining was also improved in the groups where a curing was not used, i.e. Hybrid GI only. However, after the aging process of 5 years, groups restored with Hybrid GI demonstrated the greatest color changes Δ E= 11 for group C, Δ E = 14 for group D and Δ E= 24 group F. The groups that showed the greatest color stability of the materials after 5 years of aging were groups A, B, and E with Δ E values of 7.02, 8.01, and 6.31, respectively.

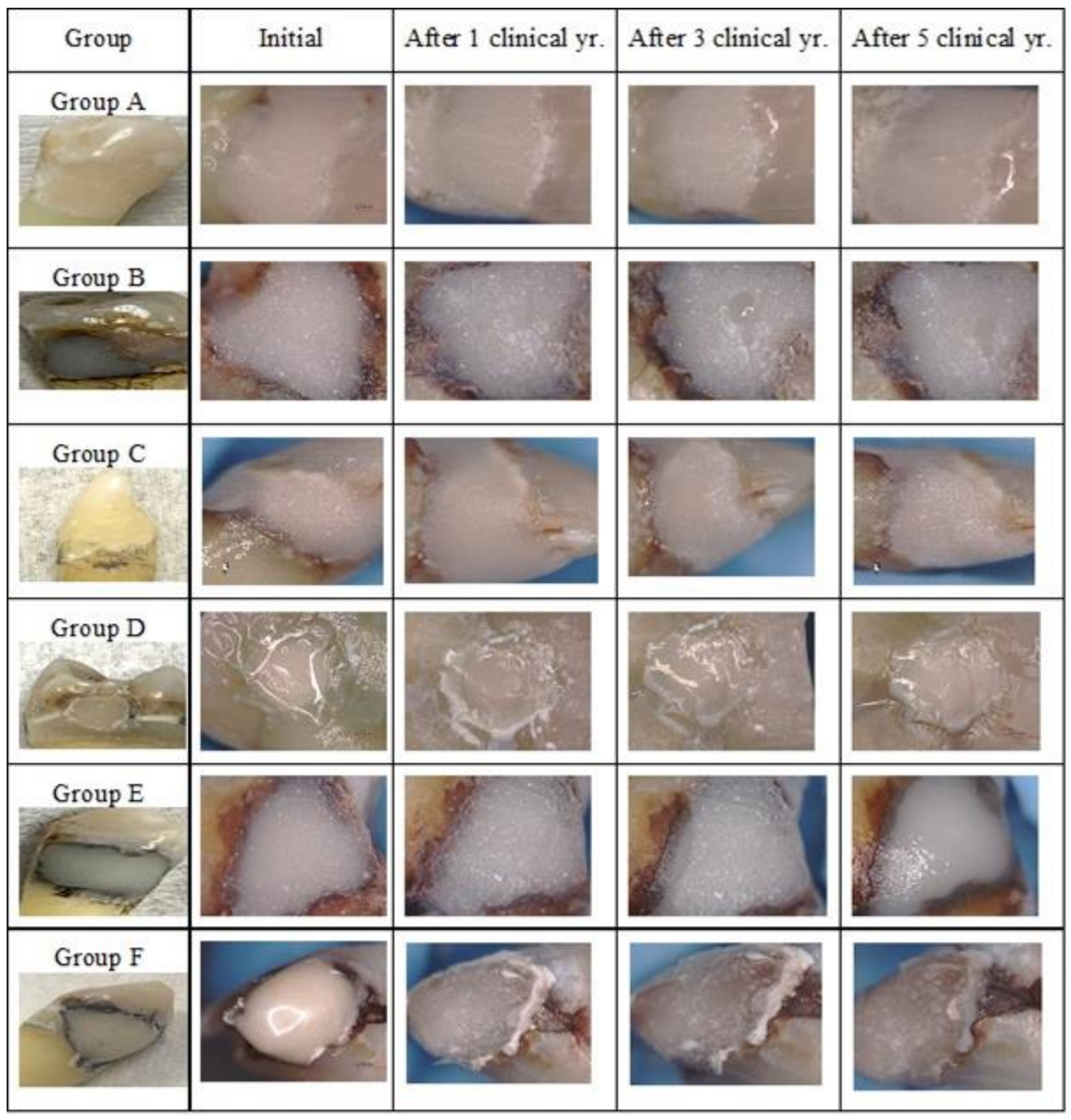

Figure 3: Clinical Photographs of Restorations

The ANOVA revealed there was a significant influence of the material on shade stability ($p<0.001$). The greatest amount of color change was observed during the first clinical year for all groups and stabilized for most groups. However, group F continued to change color with each interval (Table 1).

Pairwise Comparisons

Dependent Variable		(I) Group	(J) Group	Mean Difference (I–J)	Std. Error	P value	95% Confidence Interval for Difference	
							Lower Bound	Upper Bound
E Week 1		Group F	Group A	9.406	2.590	.000	4.270	14.543
			Group B	7.257	2.590	.006	2.120	12.393
			Group C	9.109	2.590	.001	3.973	14.246
			Group D	5.663	2.590	.031	.527	10.800
			Group E	10.239	2.590	.000	5.103	15.376
E Week 3		Group F	Group A	11.347	2.777	.000	5.839	16.855
			Group B	10.697	2.777	.000	5.189	16.206
			Group C	9.531	2.777	.001	4.023	15.039
			Group D	2.986	2.777	.285	-2.522	8.494
			Group E	11.491	2.777	.000	5.983	16.999
E Week 5	*	Group F	Group A	17.429	3.687	*.000	10.117	24.742
			Group B	16.442	3.687	*.000	9.129	23.755
			Group C	12.557	3.687	*.001	5.245	19.870
			Group D	9.846	3.687	*.009	2.533	17.158
			Group E	18.147	3.687	*.000	10.835	25.460

Table 1: Statistical comparison between the examined groups

Conclusion:

Within the limitations of this study we can draw the following conclusions:

1. KI is effective at reducing SDF staining.
2. CMP provides a long term color stable restoration.
3. Aging had the greatest effect on Hybrid GI restorations.

References:

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