



## *Effect of Silver Diammine Fluoride/Potassium Iodide Caries Arresting Agent On Bonding of Glass Ionomer Cement to Radicular Dentin: In-Vitro Study*



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### **Abstract:**

**Objectives:** To evaluate the effect of SDF/KI pretreatment on microshear bond strength of 3 different types of GIC to radicular dentin. Also to investigate both micromorphological and elemental analysis of restorations-tooth interfaces

**Materials and methods:** For  $\mu$ SBST, a total of 30 mandibular first molars were vertically splitted. The resulted 60 intact single roots were prepared and embedded into acrylic blocks. Then, they were randomly divided into 3 main groups(n=20) according to restorative material. Group A; Conventional GIC (Riva self cure, SDI Ltd, Australia), group B; CPP-ACP modified GIC (Fuji VII-EP, GC corp., Japan) and group C; RMGIC (Riva light cure, SDI Ltd., Australia). All the 60 samples were conditioned first with 25% PAA (RIVA Conditioner SDI Ltd, Australia). Then, each group was further divided into 2 subgroups (n=10) according to application of SDF/KI (Riva Star, SDI Ltd, Australia), control subgroup (I) without SDF/KI and tested subgroup (II) pretreated with SDF/KI. Then, tygon tube with diameter of 1.2mm and 3mm height was used in GIC application on root surface. After GICs application, there were 60 specimens with 60 material microcylinders bonded to its surface. The specimens were stored in distilled water for 24hrs prior to  $\mu$ SBST. Then, each one was mounted to universal testing machine individually for  $\mu$ SBST. Afterwards, failure mode of all debonded specimens were analyzed by stereomicroscope and SEM. For micromorphological analysis and following the same study design, additional 6 molars were restored with GIC at their bifurcation area as one for each subgroup. They were vertically sectioned to expose restoration-tooth interfaces. Every half was prepared as one for normal and the other for acid base challenge techniques. All the normally prepared halves were subjected to EDX for elemental analysis first then all halves were sputter coated with gold prior to be scanned using SEM. The collected data from  $\mu$ SBS test were tabulated, coded and statistically analyzed using IBM-SPSS software (version 26.0, IBM, NY, USA). One-way ANOVA followed by Tukey post-hoc test was used for multiple comparisons. The level of significance was set at ( $p < 0.05$ ).

**Results:** The results of One-way ANOVA test revealed that there was no significant difference between the control subgroups and SDF/KI treated subgroups of both conventional and CPP-ACP modified GICs ( $p > 0.05$ ). But on the contrary, in RMGIC group, the mean of SDF/KI treated subgroup showed statistically significant increase in  $\mu$ SBS than that of the control subgroup ( $p < 0.05$ ). Micromorphological analysis showed that the application of SDF/KI and washing the precipitate had no adverse effect adhesion and adaptation of GICs to underlying radicular dentin. Tiny amounts of silver ions were detected in EDX analysis of GICs-radicular dentin interfaces of all SDF/KI treated subgroups.

**Conclusion:** Based on the results of the current study, the benefits of both SDF/KI agent as caries esting agent and GIC as material of choice in management of cavitated root lesions could be obtained without fears about impairing the bond strength of GIC to radicular dentin especially when RMGIC would be used. Furthermore, SDF/KI application with washing the precipitate and gentle drying would help to preserve bond strength of GICs to radicular dentin.

Root caries was stated to be one of the common dental issues in geriatric dentistry. It is reported as one of the major causes of tooth loss in elderly patients.<sup>1</sup> Annual root caries increments of 0.47–1. surfaces per yearper adult with a prevalence rate of ~45% suggests that the prevention of root caries in adults should be a high national oral health priority.<sup>2</sup> The emerging problems of root caries can be treated with remineralization strategies, recontouring techniques and restorations of a variety of established and recently introduced materials.<sup>3</sup> SDF/KI agent has been recommended and confirmed for preventing and arresting root caries.<sup>4</sup> So, for cavitated root lesions management, a combination of intial remineralization by SDF/KI application followed by surgical intervention and GIC restoration is highly suggested to enhance conservative concept and survival of restoration.<sup>5</sup> Even so, the impact of this step on the adhesion of GICs to root dentin surface is still questionable. As well, it may be affected by both anatomical and histological characteristics of the root canal. Many studies had already investigated the impact of SDF/KI agent on bonding of different types of composites and GICs only to coronal dentin.<sup>6,7,8,9,10</sup> However, there were few or even no similar studies were conducted utilizing radicular dentin which is considered one of the SDF/KI agent's main areas of action.

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