

# Restorative Choices

When to use glass ionomer cement or composite to restore teeth after SDF treatment



**Fig. 1:** Silver diamine fluoride “sealants” don’t require a restoration after placement.



**Fig. 2:** A cavitated lesion on the buccal surface of #31 treated with SDF only (no restoration required).



BY DRs. ROOPWANT KAUR AND LUIS G. SENSI

Silver diamine fluoride (SDF) has emerged as a revolutionary approach in the management of dental caries. It has been particularly popular in the pediatric, geriatric, special needs, hospitalized and underserved populations, but clinicians should realize its benefits for patients of all ages and backgrounds.

SDF can be especially useful in a general practice setting as part of the standard restorative process. Its ability to arrest caries effectively has been well documented, but the subsequent step of choosing an appropriate restorative material necessitates a deeper understanding of the interaction between these materials and the treated tooth structure.

Glass ionomers and composites represent two viable options, each with unique attributes. This article examines the comparative advantages and challenges of glass ionomer cements (GICs) and composite resins as restorative options after SDF application.

The justification for treating lesions with SDF and subsequent restoration encompasses several factors, including but not limited to the removal of food entrapment areas to enhance oral hygiene, the reinstatement of the tooth’s shape and functionality, and aesthetic improvement. The selection of a restorative method is influenced by scientific evidence, the clinician’s expertise and the preferences of the patient.

### **Dispelling the myths: The necessity of restoration after SDF treatment**

Even though many incipient or cavitated carious lesions can be treated and arrested by only the application of SDF (Figs. 1 and 2), evidence supports the recommendation of restoration after SDF treatment. A 2019 study by Zhi et al.<sup>1</sup> emphasized that while SDF effectively arrests caries progression, restoration is essential for functional and aesthetic reasons, ensuring the long-term stability of the tooth.

Achieving a successful restoration after application of SDF involves effectively sealing the margins to prevent nutrient access to bacteria in deeper regions, halting further demineralization. This can be achieved with both glass ionomer and composite materials. Regardless of the restorative material option, emphasizing conservative cavity preparation designs, selectively removing infected or affected tissue, and further arresting and treating it by the application of SDF not only ensures the cleanliness and integrity of the external walls from enamel edges to the dentinoenamel junction but also allows the pulp to heal and maintain its vitality over time.

### **Pros and cons of glass ionomer cements**

#### *Pros*

- **Fluoride release.** One of the hallmark benefits of GIC is its ability to release fluoride ions over an extended period. This property



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is particularly advantageous in caries prevention and management because fluoride plays a critical role in remineralizing enamel and dentin. The fluoride release can also be recharged by external sources such as fluoride toothpaste, which sustains its preventive benefits over time.

- **Moisture tolerance.** GICs exhibit excellent moisture tolerance, making them suitable for use in environments where complete dryness cannot be achieved, such as subgingival restorations or areas with high saliva flow. This property ensures adequate adhesion and longevity of the restoration in challenging conditions.
- **Biocompatibility and chemical adhesion.** GICs are known for their biocompatibility, causing minimal irritation to the pulp and surrounding tissues. They chemically bond to the tooth structure without the need for a bonding agent, reducing the risk of microleakage and secondary caries.
- **Antibacterial properties.** The acidic nature of GIC and its fluoride release contribute to

an antibacterial environment, further protecting the tooth from carious lesions.

### Cons

- **Aesthetic limitations.** While modern GICs have improved in terms of aesthetics, they still cannot match the superior aesthetic qualities of composite resins, especially in terms of color matching and surface finish.
- **Mechanical properties.** GICs generally have lower tensile and compressive strength compared with composite resins, making them less suitable for restorations in high-stress areas such as posterior teeth.
- **Wear resistance.** GIC restorations exhibit higher wear rates than composite resins, potentially leading to faster degradation and the need for replacement.

### Pros and cons of composite resins

#### Pros

- **Superior aesthetics.** Composite resins offer exceptional aesthetic qualities, including a wide range of shades and the ability to mimic

the natural translucency and texture of tooth enamel. This makes them the material of choice for restorations in visible areas.

- **Mechanical properties.** Composites possess high tensile and compressive strength, making them suitable for restorations that require durability, especially in areas subjected to high masticatory forces.
- **Versatility and conservative preparation.** Composite resins allow for minimally invasive preparations and are versatile in their application, suitable for both anterior and posterior restorations. They bond mechanically to the tooth structure, facilitating conservation of tooth material.

#### Cons

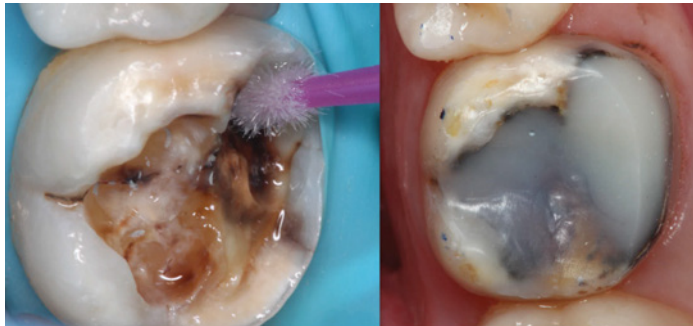
- **No fluoride release.** Unlike GICs, composite resins do not release fluoride, which means they do not contribute to remineralization or offer additional protection against caries after restoration.
- **Technique sensitivity.** The placement of composite resins is more technique-sensitive, requiring meticulous isolation and layering techniques to prevent contamination and ensure optimal bonding.
- **Polymerization shrinkage.** Composite resins undergo polymerization shrinkage, which can lead to gap formation at the margins, potentially resulting in microleakage and secondary caries.
- **Cost and time.** Generally, composite resin restorations are more time-consuming and costly than GIC restorations, primarily

because of the labor-intensive placement technique and the material cost.

### Managing SDF-stained margins

When using light-cured GIC or composite resins after applying SDF, residual silver ions may lead to marginal discoloration, affecting the appearance of the restored margins because light-curing in the presence of free silver may darken the restoration or margin. This residual marginal staining might not be relevant when working on posterior teeth but can compromise the aesthetic outcome when working on anterior teeth (Fig. 3).

**Fig. 3:** A protective glass ionomer restoration completed after treatment of infected reminescent tissues with SDF. The marginal staining is evident but not a concern for this patient because of the location on the posterior dentition.



It is acceptable to leave stained but arrested areas on axial and pulpal walls untouched by mechanical preparation, because SDF-treated dentin remains compatible with resin-bonding adhesives. Developing

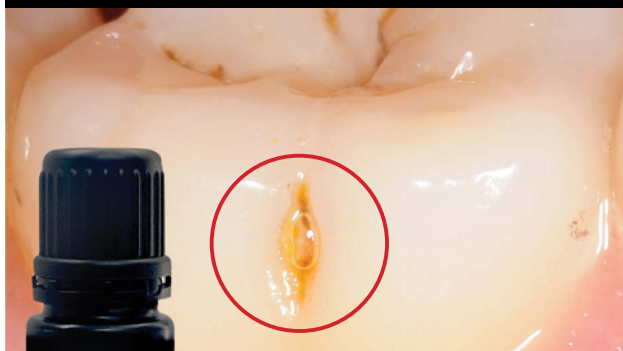
clean margins after SDF application by lightly prepping the cavo-surface margins confines the SDF to the cavity interior, thus reducing discoloration at the tooth-restoration interface.

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**Figs. 4 and 5:** Clinical aspect of the reminescent affected tissues before and after treatment with SDF.



A possibility to avoid or minimize stained margins when opting for a glass ionomer restoration would be to use a chemically cured glass ionomer instead of a light-cured one.

There are two primary strategies for combining SDF treatment with resin composite restoration:

- **Multiple-appointment approach.** This involves waiting two to four weeks after the final SDF application before proceeding with resin composite restoration. To mask the darkened dentin in aesthetically sensitive areas, an opaque restorative material such as traditional GIC can be used either for the entire restoration or as a base layer in a sandwich technique. An opaque resin-modified glass ionomer liner is another option to cover dark axial or pulpal dentin before applying a more translucent resin composite.
- **Same-day SDF-resin approach.** In this scenario, SDF treatment and resin composite restoration occur in the same appointment. It's crucial to rinse off the SDF before proceeding with bonding to prevent silver staining,

especially near the margins. Employing a short burst (1–2 seconds) of a “tac”-style curing light after SDF application and rinsing can help reveal and then selectively and conservatively remove residual silver-stained areas at the enamel margins while keeping the internally stained arrested dentin on axial/pulpal walls. This step may need to be repeated to eliminate visible silver staining at the preparation's margins before proceeding with opaque layering and restoration as described (Figs. 4 and 5). A 2018 study by Mei et al.<sup>2</sup> investigated the discoloration of dental hard tissues and restorative materials after SDF application. The research highlighted the importance of clean margins in preventing discoloration, supporting the proposed strategy.

When choosing resin composite as the restorative material on an aesthetic display area, it's generally recommended to arrest caries with SDF first and restore in a subsequent appointment for optimal results. For immediate restorations after SDF application, a chemically cured GIC might be preferred because of its

compatibility and the aesthetic considerations detailed earlier.

## Concluding remarks

When deciding between GIC and composite restorations after SDF treatment, it's crucial to approach the process with a comprehensive understanding of the clinical scenario. This entails a thorough assessment that considers several key factors, ultimately guiding us toward the most appropriate choice for optimal patient outcomes. The evaluation should consider the restoration's location within the oral cavity, the aesthetic requirements desired, the patient's specific caries risk profile and the functional demands placed on the restoration. Each element plays a pivotal role in determining the most suitable material for the restoration.

GICs present advantages in scenarios where moisture control poses challenges, particularly in patients at high risk for caries development. Additionally, their fluoride-release properties and biocompatibility make them advantageous for non-load-bearing areas, contributing to preventive efforts and promoting a healthy oral environment.

Conversely, composite resins shine in anterior restorations or areas where aesthetics is paramount. Their superior mechanical properties and durability make them well-suited for load-bearing regions, ensuring long-term success and patient satisfaction.

In the end, when choosing between restorative materials like GIC and composite restorations, the focus should be on their preventive benefits, their longevity and how well they support oral health. By thoroughly evaluating these aspects and synchronizing them with the specific needs of each patient, we can attain the best results and enhance their long-term oral health and overall well-being. **DT**

## References

1. Zhi et al. (2019). "Restoration necessity after successful SDF treatment." *Journal of Dental Research*, 46(2), 89-104.
2. Mei et al. (2018). "Discoloration of restorative materials post-SDF application." *Journal of Dental Materials*, 35(4), 210-225.



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