Tufts UNIVERSITY | School of Dental Medicine

Use of Silver Diamine Fluoride in Predoctoral Clinics

Department of Comprehensive Care

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What is Silver Diamine Fluoride (SDF)?

- SDF is topical antimicrobial medicament.
- Chemical formula: AgF (NH3)2
- Contains: 25% silver (which inhibits microbial reproduction), 8 % ammonia in solvent, 5% fluoride (for re-mineralization)
- Cleared for sale in 2014 by the U.S. FDA as a Class II medical device for the treatment of dentinal hypersensitivity
- Used "off label" to treat dental caries.
- Granted breakthrough therapy designation by FDA to arrest dental caries (2016).

What is SDF used for?

1) For treating tooth sensitivity
2) For arresting carious lesions that may not be treatable with conventional methods
3) For preventing carious lesions

How SDF functions and Considerations:

- SDF reacts with hydroxyapatite to produce calcium fluoride and silver phosphate
- SDF prevents demineralization and increases dentinal hardness
- SDF partially plugs dentinal tubules which helps with hypersensitivity
- The silver in SDF affects the biofilm formation
- As the caries lesion arrests, expect a COLOR CHANGE TO EITHER BROWN OR BLACK within approximately 1 weeks' time. Exposure to light will cause an immediate darkening and it is NOT recommended. It is crucial to explain this to the patient when having them sign the consent form!
- It is important to avoid gingiva and tissues due to staining and possible irritation. If tissue is contacted a SDF tattoo will form but will disappear within approximately 2 weeks' time. Potential exposures can be prevented by applying a layer of surgical lubricant (Surgilube® Rougera) and using universal precautions. However, if clothing or equipment surfaces are contacted the staining will be permanent.
- SDF will require at least 2 applications per year for effectiveness.
- Maximum dose: 1 drop=25 uL/10 kg weight of patient per treatment visit
- 1 drop will treat approximately 5 teeth
- Available SDF products in the U.S.:

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- Advantage Silver Arrest™ (38% SDF, purified water) from Elevate Oral Care, LLC (West Palm Beach, Florida). SDF is applied onto exposed carious or hypersensitive dental surfaces with a microbrush and goes on as a COLORLESS/BLUE LIQUID. (*Only this product will be available in TUSDM predoctoral clinics)
- Riva Star (38% SDF and KI) from SDI Limited (Australia). SDF is applied onto exposed carious or hypersensitive dental surfaces with a microbrush, immediately followed by the application of potassium iodide, which will turn the clear solution in to creamy white. (Available in the TUSDM Pediatric Dentistry Clinics)

Indications for SDF Application:

1) Extreme caries risk (hypo-salivation or Severe Early Childhood Caries)
2) Patients with behavioral or medical management challenges. (Eg. Patients with a history of radiation therapy, bisphosphonate use, with an intellectual, developmental or acquired disability)
3) Patients with carious lesions that may not all be treated in one visit. (eg. Caries Control/pediatric patients awaiting OR treatment)
4) Difficult to treat dental carious lesions. (eg. Root caries in inaccessible surfaces)
5) Patients without access or long term monitoring to dental care. Since SDF does not stain sound tooth structure it can be used in such preventative situations for sealants.
6) Possibly for alternate treatment plans where patients have financial considerations. (Eg. Caries cervical to a crown margin)

Contraindications for SDF Application:

1) If patient has an allergy to silver/ sulfa drugs.
2) If patient has had a history of ulcerative gingivitis, oral ulcerations, open wounds, or stomatitis
3) Do not use SDF in the place of preventative full mouth fluoride varnish applications! Due to SDF staining patients will not be happy with multiple areas of stained teeth.
4) SDF is not meant to be used on carious lesions and on teeth if conventional dentistry (surgical intervention using a hand piece and a direct/indirect restoration) can be performed.

Protocol for SDF Application:

1. Patient/Legal Guardian must sign and accept treatment plan for SDF application.
2. Patient/Legal Guardian must sign and accept SDF application consent form.
3. Prophylaxis should be performed ahead of SDF procedure to remove plaque and debris. Note that gross debris removal from cavitation allows for better contact of SDF application to denatured dentin. This can be accomplished with the use of a micro brush.
4. Ensure that standard personal protective equipment (PPE) is being utilized by staff and clinician.
5. There should always be a chairside assistant when working with SDF to avoid spillage and for ease of use of material.
6. Provide plastic lined bib/drape for the patient to cover their exposed neck and clothing. Ensure that all exposed operatory surfaces and floor are lined with plastic to prevent SDF staining.
7. Ensure excellent isolation of teeth. Suction saliva and dry the area completely, which has been purported for effectiveness of SDF application. If at all possible use rubber dam isolation. If RDI cannot be used then isolate tongue with a 2x2 gauze pack and cheek with dry angles and cotton rolls.

8. If the lesion is located in the vicinity of the gingiva and RDI cannot be utilized apply cocoa butter or surgical lubricant and carefully place cotton rolls onto the surrounding gingiva and tissues to prevent SDF staining.
9. Carefully break the seal on the unidose of the SDF. Each unidose contains 0.1ml (1 drop). Do not use more than 1 drop per 10 kg weight of patient dental visit due to safety concerns!).
10. Carefully immerse microbrush into SDF, and remove excess onto side of unidose container.
11. Using microbrush apply directly onto the affected tooth surface.
12. Allow SDF to soak into the affected area for 3 minutes if possible for optimum success, then blot excess from the affected area with a piece of gauze or cotton roll.
13. Dry with a gentle flow of air.
14. Carefully, remove isolation materials (RDI/dry angles/gauze/cotton rolls) and place all remaining materials into plastic waste bags.
15. Several clinical trials suggest no eating/drinking for 30 minutes to 1 hour.
16. Clinical evidence supports the need for multiple applications to successfully arrest caries. Most research recommends approximately 2-3 applications per year for effectiveness until the tooth exfoliates or is restored. It is possible to apply SDF indefinitely in some cases.
17. A Glass Ionomer restoration may be placed on top of the SDF application but should be done at a subsequent visit and not at same visit as SDF application.

References:

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