Clinical Protocol for the Use of Silver Diamine Fluoride (SDF): Standard Operating Procedure (SOP)

Scope: This SOP relates to the use of Silver Diamine Fluoride (SDF) (Riva Star, SDI) for the arrest of caries in the primary and permanent dentitions and for treatment of tooth sensitivity in children. All dentally qualified staff should be familiar and trained in the use of SDF and the information contained within this SOP prior to use. This SOP has been produced in the context of the recovery phase from COVID-19, where SDF has been suggested for caries management in primary and specialty care SOPS. Guidance states avoiding aerosol generating procedures wherever possible, as such the clinical technique described is adapted to being a non-aerosol generating procedure. It will be updated as and when guidance related to aerosol generating procedures changes.

Objective: To ensure Silver Diamine Fluoride is used safely and effectively for children during the recovery phase of COVID-19.

Frequency: This SOP should be followed for every application of SDF.

Background Information

Silver Diamine Fluoride (SDF) contains silver and fluoride, stabilised in ammonia. It is used topically to arrest dental caries and relieve dentinal sensitivity. Riva Star is the manufacturer of the Silver Diamine Fluoride available in the UK. It is CE marked for use as a desensitizing agent, any other use is off-label. It is supplied in capsules which are single use. The silver capsules contain Silver Diamine Fluoride (38% with 44,800ppm fluoride), the green capsules contain potassium iodide which aims to reduce staining.

SDF reduces sensitivity by occluding dentinal tubules. Silver and fluoride work synergistically for caries arrest. The silver is bactericidal disrupting the cariogenic biofilm. Fluoride promotes remineralisation. SDF also inhibits collagen degradation.

SDF permanently discolours caries black. It also may temporarily stain soft tissues brown for 1-3 weeks. Rarely, it can cause a chemical burn to the gingiva.

Potassium iodide (solution in green capsule) is used to reduce the effect of staining. Results from research are mixed, with some evidence showing staining persists and that the efficacy of SDF is reduced. It should therefore be used with caution and the specific risks and benefits fully discussed with the parent and child.

Multiple systematic reviews have shown SDF arrests caries in the primary dentition.

SDF may be placed under a GIC restoration as part of the atraumatic restorative technique. This is named the Silver Modified Atraumatic Restorative Technique: SMART technique.

Indications and Contra-indications

Indications:

* Children whose age, dental anxiety or behavioural or medical conditions exclude other treatment options
* Children for whom there is need to delay treatment with sedation or general anaesthesia
* Children in families who are compliant with preventative advice
* Asymptomatic cleansable cavitated carious lesions into dentine where other restorative options are not possible
* Limited or no capacity for patient cooperation
* As part of acclimatisation prior to carrying out further treatment
* Arrest of caries whilst awaiting further treatment such as GA or sedation
* In conjunction with the atraumatic restorative technique as the SMART technique

Contraindications:

* Signs/symptoms of irreversible pulpitis, or dental abscess or sinus
* Radiographic peri-radicular radiolucency or signs of pulpal involvement
* Infection/pain from pulpal origin or food packing
* Allergy to any ingredient inclusive of silver and other heavy metals
* Active ulceration, mucositis or stomatitis
* Pregnant or breastfeeding
* Patients undergoing thyroid gland therapy or on thyroid medication (if potassium iodide used)

Clinical Procedure

*Pre-operative*

1. Check the patients ID and medical history
2. Obtain valid informed consent from the patient and/or parent/carer with parental responsibility
3. Ensure personal protective equipment (PPE) is worn by the operator, dental nurse and patient
4. Take pre-operative photographs and radiographs where indicated to allow monitoring of caries progression
5. Riva Star SDF must be kept in the fridge when not in use as per manufacturer instructions
6. Handle with care and change gloves as required to minimise accidental spillage and staining

*Clinical procedure*

1. Apply petroleum jelly to the soft tissues including the lips if possible
2. Protect the gingiva using petroleum jelly and cotton wool rolls or Riva Star gingival barrier
3. Ensure teeth are clean and free of debris
4. Dry teeth using a cotton wool roll or gauze (use a 3-in-1 syringe if using in a manner described in the OCDO SOP as not requiring enhanced PPE)
5. Use the silver brush or another micro-brush to pierce the silver capsule
6. Carefully apply the solution from the silver capsule (silver diamine fluoride) to the treatment site with the silver brush, a micro brush or other single use applicator. Each capsule is for use on one patient only. A maximum of one silver capsule should be used per visit. This should be left to dry for at least 1 minute, ideally 3 minutes.
7. If a decision has been made with the family to use potassium iodide (green capsule) follow steps 7a and 7b.

7a) pierce the foil of the green capsule

7b) apply solution from green capsule (potassium iodide) to treatment site, with the green brush, a micro brush or other single use applicator. Continue application until the creamy white solution present on the lesion turns clear

1. Blot teeth dry using a cotton wool roll, gauze or fresh single use micro-brush
2. For the SMART technique follow steps 9a and 9b

9a) ask the patient to rinse their mouth with water

9b) dry lesion and apply GIC restoration

1. Remove gingival barrier if used

Follow Up

The patient may be followed up 2-4 weeks after first application to assess caries arrest; reapplication should be carried out if indicated. Caries arrest is demonstrated by a hard, darkened lesion.

Further SDF can be applied 6-monthly for caries arrest. Alternatively, the teeth can subsequently be restored.

Clinical and radiographic follow up should be followed as per the patient’s caries risk and national guidance.

Acknowledgements: Thank you to Laura Timms for compiling this SOP, based on those provided by the teams at the University of Dundee, Glasgow Dental Hospital and School and Sheffield University and Teaching Hospitals.

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