

Nonrestorative Treatment Options for Carious Lesions

Literature review by Lillian Han

Introduction

- Dental caries is a chronic noncommunicable disease that affects people of all ages worldwide.
- Although the overall caries prevalence has been constant, these rates remain high for specific subgroups such as low socioeconomic groups.
- Caries is caused by acid, which is produced from the metabolism of dietary carbohydrates as well as from acid-producing organisms. This acid leads to loss of tooth minerals.
- Preventing the onset of caries is the primary goal of caries management. However once caries start, clinicians are faced with the challenge of deciding the appropriate approach to stop the cariogenic process at the patient level and at the lesion level.
- Patient level intervention include, but are not limited to, diet counselling (reducing sugar consumption) and oral hygiene instructions and reinforcement (tooth brushing, flossing, fluoride tooth paste use).
- Lesion level interventions include non-restorative (to arrest or reverse carious lesions and minimize the loss of tooth structure), restorative and invasive treatments.
- The purpose of this clinical practice guideline from the American Dental Association is to help clinicians decide which types of non-restorative treatments could be used to arrest or reverse noncavitated and cavitated carious lesions in adults and children.

Question 1. To arrest cavitated coronal carious lesions on primary permanent teeth, should we recommend silver diamine fluoride (SDF), silver nitrate, or sealants?

Recommendations

- Primary teeth: the expert panel recommends clinicians to use 38% SDF solution (biannual application) over 5% NaF varnish (application once/week for 3 weeks). Strong recommendation.
- Permanent teeth: the expert panel recommends clinicians to use 38% SDF (biannual application) over 5% NaF varnish (application once/week for 3 weeks). Conditional recommendation.

Remarks

- All investigated studies assessed the effectiveness of SDF in children with primary teeth. There is no direct evidence available informing the effectiveness of any concentration of SDF in permanent teeth.
- SDF could be used when local or general anaesthesia is not preferred, when a patient cannot cooperate with treatment or when it is necessary to offer a less costly or less invasive alternative.
- Data suggest that SDF may be more effective on anterior teeth than on posterior teeth. Possible explanations include anterior teeth being easier to maintain a dry field.
- Hardness of tooth surfaces on probing is an indication that a lesion is arrested. The colour of the lesion (black) is not an acceptable method to judge arrest of a lesion.
- An adverse effect with SDF is black staining, which may not be acceptable to patients, parents, or caregivers. They should be properly informed.

Question 2. To arrest or reverse noncavitated coronal carious lesions on primary and permanent teeth, should we recommend NaF, stannous fluoride, acidulated phosphate fluoride (APF), difloursilane, ammonium fluoride, polyols, chlorhexidine, calcium phosphate, amorphous calcium phosphate (ACP), casein phosphopeptide (CPP) - ACP, nano-

hydroxyapatite, tricalcium phosphate, or prebiotics with or without 1.5% arginine, probiotics, SDF, silver nitrate, lasers, resin infiltration, sealants, sodium bicarbonate, calcium hydroxide, or carbamide peroxide?

Noncavitated Lesions on Occlusal Surfaces

Recommendations

- Primary teeth: the expert panel recommends clinicians to use sealants plus 5% NaF varnish (application every 3-6 months) or sealants alone over 5% NaF varnish alone, 1.23% APF gel (application every 3-6 months), resin infiltration plus 5% NaF varnish (application every 3-6 months), or 0.2% NaF mouthrinse (once per week). Strong recommendation.
- Permanent teeth: the expert panel recommends clinicians to use sealants plus 5% NaF varnish (application every 3-6 months) or sealants alone over 5% NaF varnish alone (application every 3-6 months), 1.23% APF gel (application every 3-6 months), or 0.2% NaF mouthrinse (once per week). Strong recommendation

Remarks

- All the studies examined were only conducted in primary teeth, but the panel had no reason to believe these treatments would have a different effect when applied to permanent teeth.
- Recommended sealants include a mixture of resin-based, glass ionomer cement, and resin-modified glass ionomer sealants. Maintaining a dry field and using proper technique are essential for sealant effectiveness and retention. If such is not possible, glass ionomer cement may be preferred over resin-based material.
- Enamel removal is unnecessary before sealant application.
- To avoid the risk of ingesting high doses of fluoride, 0.2% NaF mouthrinse is not acceptable for children who cannot control swallowing.

Noncavitated lesions on approximal surfaces

Recommendations

- To arrest or reverse the lesions, the expert panel suggests clinicians use 5% NaF varnish (application every 3-6 months), resin infiltration alone, resin infiltration plus 5% NaF varnish or sealants alone. Conditional recommendation.

Remarks

- The panel emphasizes that approximal lesions that appear limited to the enamel and outer one-third of the dentin on radiograph are most likely noncavitated and clinicians should prioritize the use of non-restorative interventions.
- The use of sealants on approximal surfaces requires temporary tooth separation for a few days and is technique sensitive.
- The evidence supporting the recommendation for sealants on approximal surfaces evaluated resin-based and glass ionomer cement sealants. Sealant retention for approximal surfaces was never studied.

Noncavitated Lesions on Facial or Lingual Surfaces

Recommendations

- The expert panel suggests clinicians use 1.23% APF gel (application every 3-6 months) or 5% NaF varnish (application every 3-6 months). Conditional recommendation

Remarks

- 1.23% APF gel requires suction to minimize swallowing, especially when used in uncooperative children.

Noncavitated Lesions on Any Coronal Tooth Surface

Recommendations

- The expert panel suggests clinicians to not use 10% CPP-ACP if other fluoride interventions, sealants, or resin infiltration is accessible. Conditional recommendation.

Remarks

- The panel emphasizes that 10% CPP-ACP should not be used as a substitute for fluoride products.
- They found no evidence on the effect of stannous fluoride, difluorsilane, ammonium fluoride, calcium phosphate, ACP, nano-hydroxyapatite, tricalcium phosphate, or prebiotics with or without 1.5% arginine, SDF, silver nitrate, lasers, sodium bicarbonate, calcium hydroxide, or carbamide peroxide for noncavitated lesions on any coronal tooth surface.

Question 3. To arrest cavitated root carious lesions or arrest or reverse noncavitated root carious lesions on permanent teeth, should we recommend NaF, stannous fluoride, APF, difluorsilane, ammonium fluoride, polyols, chlorhexidine, calcium phosphate, ACP, CPP-ACP, nano-hydroxyapatite, tricalcium phosphate, or prebiotics with or without 1.5% arginine, probiotics, SDF, silver nitrate, lasers, resin infiltration, sealants, sodium bicarbonate, calcium hydroxide, or carbamide peroxide?

Recommendation

- The expert panel suggests clinicians to use 5,000 ppm fluoride (1.1% NaF) toothpaste or gel (at least once per day) over 5% NaF varnish (application every 3-6 months), 38% SDF plus potassium iodide solution (annual application), 38% SDF solution (annual application), or 1% chlorhexidine plus 1% thymol varnish (application every 3-6 months). Low-certainty evidence.

Remarks

- Considering that noncavitated and cavitated root lesions are difficult to distinguish clinically, the panel did not provide separate recommendations for these 2 types of lesions.
- All investigated studies were conducted in adult or older adult patients, who are predominantly affected by root caries.
- The use of 5,000 ppm fluoride (1.1% NaF) toothpaste or gel requires patient compliance, which requires filling prescriptions and daily use at home. This intervention may not be feasible for populations in nursing homes and those with special needs.

Discussion

Implications for practice

- It is very important to actively monitor noncavitated and cavitated lesions during the course of nonrestorative treatment to ensure the success of the management plan.
- Clinicians should observe signs of hardness on gentle probing or radiographic evidence of arrest or reversal over time. If there is no sign of improvement, they should implement additional or alternative treatment options.
- Nonrestorative treatments should be accompanied by a diet low in sugar.

Implications for research

- Need RCT about effect on noncavitated lesions on approximal surfaces.

Conclusions/Take Home Message

- Arresting the cariogenic process should be at combination of patient and lesion level management.
- Patient level intervention: diet counselling (reducing sugar consumption) and oral hygiene instructions and reinforcement (tooth brushing, flossing, fluoride tooth paste use).
- Lesion level nonrestorative management
 - o To arrest advanced cavitated carious lesions on coronal surfaces of primary or permanent teeth, it is recommended to use 38% SDF solution binannually. This may be more relevant if access to care is limited such as uncooperative patients.
 - o To arrest or reverse noncavitated carious lesions in both primary and permanent teeth, it is recommended to use sealants plus 5% NaF varnish on occlusal surfaces, 5% NaF varnish on approximal surfaces, and 1.23% APF gel or 5% NaF varnish alone on facial or lingual surfaces.
 - o To arrest or reverse noncavitated and cavitated lesions on root surfaces of permanent teeth, it is recommended to use 5,000 ppm flouride (1.1% NaF) toothpaste or gel.

Summary Charts:



