

HOW TO TREAT DENTINE CARIOUS LESIONS IN PRIMARY TEETH?

SUMMARY OF EVIDENCE-BASED APPROACHES

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Dental caries is well recognised as a controllable chronic disease that can be identified, diagnosed, and minimally-invasive treated. In the last decades a better disease understanding has resulted in novel concepts and essentially less-invasive approaches to treat carious teeth [Machiulskiene et al., 2019; Innes et al., 2016; Schwendicke et al., 2016; Kidd, 2011]. Current caries management concepts are guided by the following principles: Preservation of the tooth structure; maintenance of pulpal health and avoidance of pulp exposure; emphasis in lesions control/inactivation using less-invasive therapies, avoiding initiation of the cycle of restoration; and maintenance of the tooth for as long as possible [Schwendicke et al., 2016; Kidd, 2011].

For an ORCA/EFCD consensus [Splieth et al., 2020], a systematic review [Santamaría et al., 2020] assessed the available evidence regarding interventions performed and materials used to manage dentin carious lesions in primary teeth. Main conclusions reached regarding interventions and materials were:

Interventions used to treat/control dentine carious lesions in primary teeth

- The Hall technique (HT) involving no carious tissue removal (Fig 1a-b) showed lower restoration failure for multisurface cavities, when compared to complete caries removal (CCR) and restoration for treatment of asymptomatic moderate to deep lesions.



Fig 1a-b. A maxillary first primary molar (tooth 54) (a) before and (b) immediately after a preformed metal crown was fitted using the Hall technique. Photos: © Dr. Santamaría.

- Non-restorative Cavity control (NRCC) showed comparable results with CCR and fillings for management of asymptomatic moderate to deep dentin lesions. However, treatment success was superior when daily toothbrushing with fluoridated toothpaste and biofilm removal was supervised. However, the evidence on this method is still limited.

- Considering arrestment of the lesions, there is limited evidence (and low in terms of quality) regarding interventions endorsing the similarity between sealing dentin carious lesions with resin materials without carious tissue removal and interventions involving caries tissue removal (selective to firm/leathery dentin or CCR).
- Concerning treatment of deep carious lesions (lesions extending into the inner third or quarter of dentin), selective caries removal (SCR), one-step and stepwise caries removal showed reduction in the incidence of pulp exposure in asymptomatic, vital, carious deciduous teeth over CCR. However, the superiority of one over the other in terms of pulp symptoms could not be confirmed.
- There is extremely limited evidence (and low in terms of quality) for no treatment or extraction of teeth with dentin carious lesions, and so far, these approaches cannot be recommended.

Materials used to treat/control dentine carious lesions in primary teeth

- Restoration success rates vary widely depending on the lesion extent, material and operative technique used.
- Performed metal crowns (PMCs; regardless of the technique used standard or HT), showed to have the highest success rates compared to other filling materials and were less likely to fail than fillings.
- Regarding filling materials, the risk of failure was ranked from lowest to highest: resin modified glass ionomer cement (RMGIC), composite (CR), compomer (CP), amalgam (AMG) and conventional GIC. The results of the included systematic reviews were similar; however, certain clinical heterogeneity with regard to caries risk, isolation technique used, assessment criteria for restoration assessment, different material manufacturers, etc. was observed. This implies a degree of bias that could compromise the ranking and thus the interpretation of the results.
- In comparison to other filler materials (e.g., CP, RMGIC, AMG and CR), conventional GIC generally showed a higher risk of failure.
- Regarding the type of carious lesion (occlusal or approximal), no significant relationship was reported between Class I-GIC restorations and the risk of restoration failure. However, there was a significant relationship between restoration failure and Class II-GIC restorations.
- For multi-surface cavities, ART/HVGIC may increase the risk of restoration failure. In contrast, ART/HVGIC proved to be a proper restorative option for treatment of single-surface carious lesions in primary teeth.
- For aesthetic PMCs used to restore carious anterior teeth, there is still insufficient evidence to suggest their use over other techniques (i.e., strip crowns), mainly due to the limited follow-up (< 12 months) of available studies. For primary molars, there is also limited evidence showing that zirconia crowns might be comparable to PMCs for the restoration of primary molars.
- Silver diamine fluoride (SDF) proved to be more effective in arresting carious lesions than other treatments (fluoride varnish application and GIC restorations) or placebo for treating active caries lesions of different depths (Fig 2a-b).



Fig. 2a-b: (a) Active carious lesions in the maxillary deciduous molars in a 4-year-old child without any reported pain prior to application of SDF (Riva-Star®). (b) One week later, these carious lesions are clearly inactivated, but also darkly discoloured as foreseen. Photos: © Dr. Santamaría.

In conclusion, there is as yet no single approach for caries management in terms of disease control or restoration longevity. However, less invasive caries approaches involving selective or no caries removal seem advantageous in comparison with complete caries removal for patients presenting with vital, symptomless, carious dentin lesions in primary teeth. In addition, there is evidence in favour of PMCs for restoring multisurface carious lesions in primary molars.

Whilst the technique and material per se are important for treatment success, an accurate diagnosis of the carious lesion and pulpal status are decisive for treatment success. Overall, clinicians should consider the advantages and disadvantages of the different caries management options individually on patients and at the tooth level, as well as caries risk and expected time to tooth physiological exfoliation, and then select individually from the extended treatment spectrum.

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