Introduction

Dental caries is a severe and prevalent childhood disease. Clinical practitioners are progressively utilizing patient-specific individually tailored strategies for arresting, preventing, or alleviating disease process in the infant and child population based on caries risk assessment [1].

Incipient caries are managed by a combination of early therapeutic interventions like topical fluoride and non-surgical restorative techniques such as sealants and resin infiltration. The antimicrobial and remineralizing properties of these methods arrest active carious lesions and obviate conventional acute disease treatment including cavity preparation and mechanical tooth restoration. The current policies, guidelines with recommendations illustrate the use of these early therapeutic interventions for caries control in clinical practice tailored to the specific needs of a child.

Abstract

Minimal intervention dentistry is a patient care concept based on etiological factors contributing to the onset of disease and its subsequent prevention. It assimilates concepts of preventing, controlling and treating oral disease hence is centered on biological solutions. Early carious lesions exhibit effects of a disease and require less invasive therapeutic strategies. This article provides an overview of the current non-surgical therapeutic interventions for incipient carious lesions like topical fluoride (toothpastes, gels and varnish), silver diamine fluoride, ITR, sealants and resin infiltration. Topical and therapeutic sealing along with restorative care effectively preserves sound dental tissue. This review article is an overview of the alternative caries management approaches in children. It aims to inform the dental practitioners about minimal intervention dentistry for facilitating the application of modern therapeutic concepts into everyday clinical practice tailored to the specific needs of a child.

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[20]. Discoloration of demineralized or cavitated tooth surface. SDF however arrests caries more effectively than fluoride varnish and retains 2-3 times more fluoride than stannous fluoride, acidulated phosphate fluoride or sodium fluoride. It poses slight toxicity or risk of fluorosis in children and adults [21].

**Xylitol**

Xylitol is a five-carbon alcohol derived from forest and agricultural materials [22]. It is used in infusion therapy for post-operative shock, burns, diabetes and as a product sweetener for oral health because it is a non-cariogenic sugar substitute which is not metabolized by oral bacteria [23]. It is available as mints, gums, lozenges, chewable tablets, toothpastes, cough mixtures, mouthwashes, nutraceutical products and oral wipes [24]. It shows varying results in incidence of caries reduction mutans streptococci in children and mutants streptococci transmission from a mother to a child [25-27]. Xylitol studies employ a very large dose at a high frequency (4-5 times a day) and an intake ranging from 4-15 g/day for 3-7 times which is unlikely in clinical practice [28,29]. Symptoms of xylitol ingestion include abdominal distress and osmotic diarrhea [30].

**Interim Therapeutic Restoration**

An interim therapeutic restoration is instituted for caries control prior to definitive restorations; when restoration needs to be postponed for arresting, restoring or preventing caries progression in young or special needs or uncooperative patients not amenable to conventional cavity preparation and/or placement of tooth restorations, when isolation for definitive restoration is suboptimal in the erupting molars, for step-wise excavation in multiple open carious lesions prior to definitive restorations, active caries lesion control prior to dental treatment under general anesthesia and for oral health care in the dental home [32,33]. Levels of oral cariogenic bacteria drop subsequent to ITR placement but may revert to pretreatment counts over a period of six months if it is not replaced by an alternative treatment [34-36].

Dental caries is removed from the peripheral lesion by a hand or rotary instrument without creating a pulp exposure and is followed by an adhesive restorative material like glass ionomer cement or a resin modified glass ionomer cement to prevent marginal leakage around a restoration [37]. Maximum success with ITR restorations is demonstrated with a single surface or two small surfaces whereas failure of an ITR restoration is due to inadequate cavity preparation leading to lack of retention and bulk deficiency [38,39]. Outcome of treatment improves in people with a high caries-risk, glass ionomer cement with a fluoride recharging/releasing property, follow-up care with oral hygiene instructions and topical fluorides [40].

**Pits and Fissure Sealants**

Pit-and-fissure sealant is a low-filled resin-based material for sealing the occlusal surfaces of primary and permanent molars. It isolates a lesion from dietary sugars in the biofilm to prevent caries formation [41].

Dental caries ensues following a loss of balance between enamel demineralization and remineralization. The temporal exposure to fermentable carbohydrates initiates a biological change in the organization of bacterial flora and their action in the biofilm. A non-cavitated caries lesion develops as an initial lesion as a change in surface gloss, color or structure via enamel demineralization before macroscopic breakdown and cavitation in the tooth surface [42]. Caries may be prevented by deterring the onset and managing with interventions which halt the progression from early stage demineralization to eventual cavitation [43].

The occlusal surface grooves or pits and fissures trap food debris to allow bacterial biofilm formation thereby increasing caries risk. Primary prevention involves occlusal surface sealing with a pit and fissure sealant for precluding initial caries [44]. Secondary prevention inhibits the progression of non cavitated carious lesions. It is therefore important for the clinician to determine an appropriate intervention for carious lesions in the initial stage [45].

Different sealant placement techniques are based on the type and brand of manufacturer. Resin-based sealants contain UDMA (urethane dimethacrylate) or bisGMA (bisphenol A-glycidyl methacrylate) monomers. They may be filled, opaque, tooth colored or white materials. Alternatively they may be unfilled, tinted or colorless transparent materials. Sealants polymerize via a light of specific wavelength and intensity or by a chemical activator and initiator. GI sealants are cements with an acid base reaction between fluoroaluminosilicate glass powder and a polyacrylic acid solution in conjunction with fluoride-releasing properties. Compomers or Polyacid-modified resin sealants are a combination of traditional resin-based material with the fluoride-releasing and adhesive GI sealant properties. Resin-modified GI sealants comprise of GI sealants with resin components having a longer working time, less sensitivity to water and fluoride release properties. BPA in some sealants may have estrogen like effects however there is scanty evidence to support this [46-48].

**Conclusion**

Child oral health is an indicator for ascertaining broader general health and social care. The current paradigm shift in dental caries management is from the traditional ‘drill and fill’ operative methods to less invasive reparative methods rendering it as a biofilm disease. The reperative options in conjunction with prevention and reorientation of lifestyle ensure optimum caries reduction.

Treatment plan for managing carious lesions include preventive plan secondary to identifying etiological disease factors (diet investigation, brushing habits, possible effects of other comorbidities such as reduced saliva flow, cognitive difficulties and so on). A program involves behavior change for improving oral hygiene (tooth brushing), reducing intake of dietary sugars, fluoride toothpaste and fluoride varnish application. Treatment of incipient caries usually involves non-surgical early therapeutic interventions such as fluoride in the form of topical fluoride, toothpastes, gels, varnish; silver diamine fluoride; ITR; sealants and resin infiltration. These therapeutic modalities encompass two approaches. The topical approach clears biofilm by tooth brushing or altering the biofilm ecology via medicaments as fluoride varnish and silver diamine fluoride or by reducing fermentable sugar intake. The sealing approach isolates biofilm from dietary foodstuffs via restorative materials.

Hence child-friendly dental techniques ensure optimum caries reduction in children and simultaneously instill a positive attitude towards their oral health and help modify their future approach as adults who manage their dental health without dental anxiety.
References

7. CDC (2011) HHS and EPA announce new scientific assessments and actions on fluoride. Department of Health and Human Services, USA.

