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Atraumatic Restorative Treatment In Paediatric Dentistry

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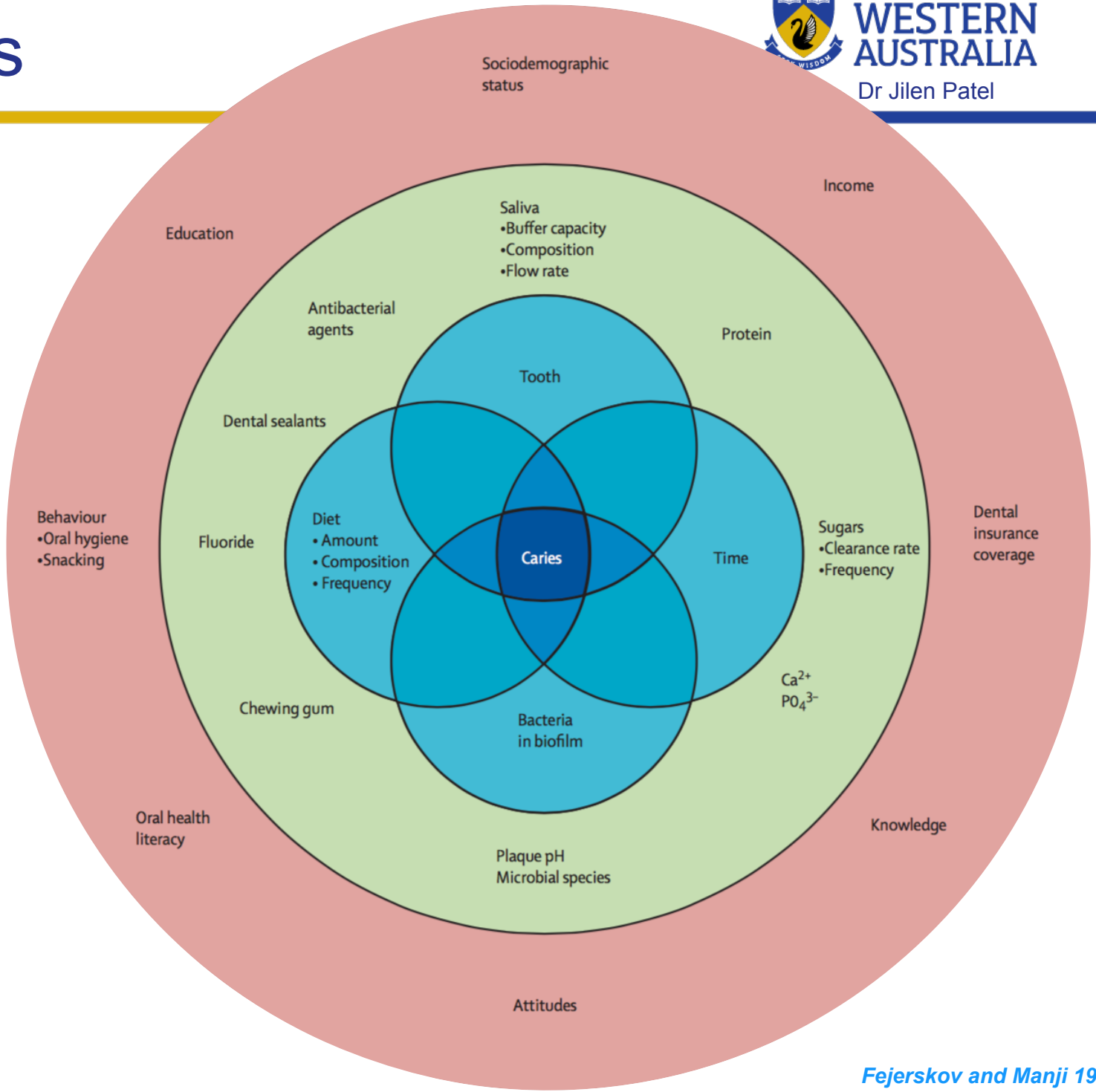
Overview

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- Restorative management of dental caries
- What is ART
- Rationale for ART
- Indications and Contraindications
- ART in the primary dentition: clinical considerations
- ART vs ITR

Dental Caries

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Fejerskov and Manji 1990

Key Definitions

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- What is dental caries?

- *dental caries is a continuum of disease states of increasing severity and tooth destruction that ranges from sub-clinical sub-surface changes at the molecular level to lesions with dentinal involvement, either with an intact surface or obvious cavitation*

Selwitz et al. 2007

Key Definitions

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Caries Res. 2020;54(1):7-14. doi: 10.1159/000503309. Epub 2019 Oct 7.

Terminology of Dental Caries and Dental Caries Management: Consensus Report of a Workshop Organized by ORCA and Cariology Research Group of IADR.

Machiulskiene V[1], Campus G[2,3], Carvalho JC[4], Dige I[5], Ekstrand KR[6], Jablonski-Momeni A[7], Maltz M[8], Manton DJ[9], Martignon S[10,11], Martinez-Mier EA[12], Pitts NB[10], Schulte AG[13], Splieth CH[14], Tenuta LMA[15], Ferreira Zandona A[16], Nyvad B[5].

Dental Caries (100%)

Dental caries is a biofilm-mediated, diet modulated, multifactorial, non-communicable, dynamic disease resulting in net mineral loss of dental hard tissues [Fejerskov 1997; Pitts et al., 2017]. It is determined by biological, behavioral, psychosocial, and environmental factors. As a consequence of this process, a caries lesion develops.

Key Definitions

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Caries Lesion (88%)

Caries lesion is the clinical sign of caries. Caries lesions can be categorized according to their anatomical location on the tooth (coronal or root/cementum surface), their severity (e.g., non-cavitated, cavitated), depth of penetration into the tissue (e.g., enamel, dentin, pulp), and their activity status (active, inactive).

What is ART?

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- minimally invasive care approach in preventing dental caries and stopping its further progression

Frencken et al. 2012

a main concept)

- sealing caries prone pits and fissures
- restoring cavitated lesions with sealant-restorations

Frencken and Holmgren 1999

Atraumatic Restorative Treatment (88%)

Atraumatic restorative treatment is the tissue-saving caries management approach that uses hand instruments for opening caries cavities and removing decomposed carious dentine, followed by restoration with a high-viscosity glass ionomer. The technique does not require access to electrically driven equipment and running water [Frencken et al., 1996].

What is ART?

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Frencken et al. 2012

- sealing caries prone pits and fissures
- restoring cavitated lesions with sealant-restorations

Frencken and Holmgren 1999

Preventive Sealant/Sealing (94%)

Preventive sealant/sealing is the application of a thin physical barrier over a clinically sound caries predilection site, in order to prevent the initiation of a caries lesion. These can be applied to pits, fissures, and fossae using resin composite or glass ionomer cement.

What is ART?

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- minimally invasive care approach in preventing dental caries and stopping its further progression

Frencken et al. 2012

- sealing caries prone pits and fissures
- restoring cavitated lesions with sealant-restorations

Frencken and Holmgren 1999

Therapeutic Sealant/Sealing (75%)

Therapeutic sealant/sealing is the application of a thin physical barrier over a caries lesion in order to prevent its progression. These can be applied to pits, fissures, fossae, and smooth surfaces [Martignon et al., 2006; Alkizy et al., 2009] using resin composite or glass ionomer cement.

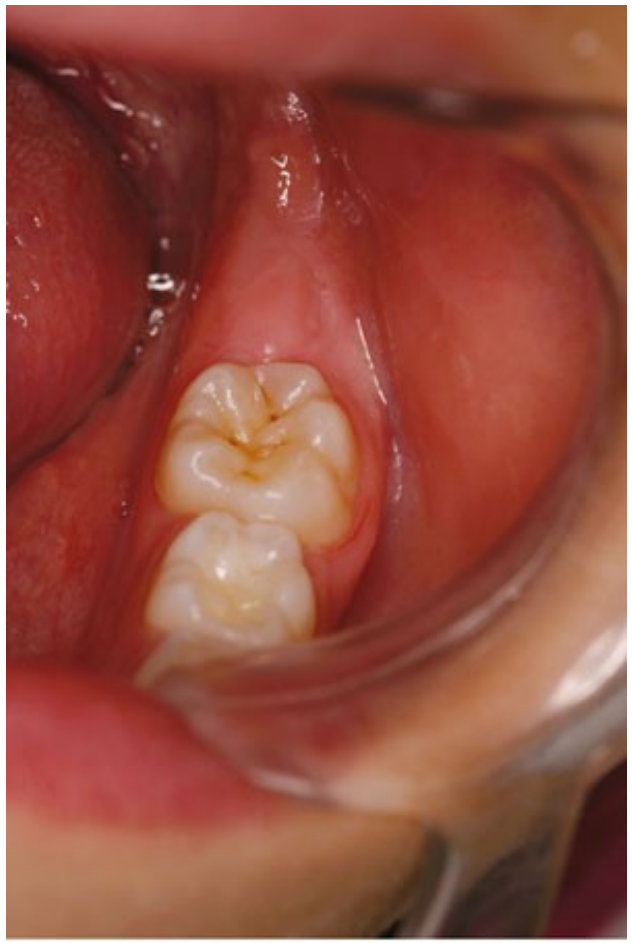
What is ART?

9:15 - 9:30
p/f scaling

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Therapeutic Sealant/Sealing (75%)

Therapeutic sealant/sealing is the application of a thin physical barrier over a caries lesion in order to prevent its progression. These can be applied to pits, fissures, fossae, and smooth surfaces [Martignon et al., 2006; Alkizy et al., 2009] using resin composite or glass ionomer cement.







Do therapeutic sealant with caution!

Potential Issues:

- Staining perceived as recurrent caries..
- Inadequate seal/contamination..

2: ICDAS 3/4 → 9:40

11 mins is ICDAS 3/4 inp/



case 5: 13:50 → enamel hatchet)

Rationale

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* No dif between ART & nrml

Comparison	Age	Operator background	Variable measured	Conclusion
ART vs rotary instruments	6-year-old children	Dental students and dentists	Discomfort: -Heart rate and modified Venham index (observations)	ART caused less discomfort
ART vs rotary instruments	6–16 years old	Dentists	Pain: -Questions: did you feel any pain during treatment?	ART caused less pain
ART vs rotary instruments	4–7 years old	Pedodontist specialist	Pain: -Wong–Baker FACES Pain Rating Scale	ART caused less pain
ART vs rotary instruments vs ultraconservative treatment	6–7 years old	Pedodontist specialist	Pain: -Wong–Baker FACES Pain Rating Scale	-No difference in levels of pain among treatments -Local anaesthesia was more frequent given in the rotary instrument group
-ART vs rotary instruments -ART vs ART with Carisolv	6–7 years old	Pedodontist specialist	Anxiety: -Venham Picture Test	No difference in levels of anxiety between treatments
ART vs rotary instruments	Children and adults	Dentists and dental therapists	Anxiety: -Children's fear survey schedule -Corah's dental anxiety scale	Both children and adults treated with the ART were less dental-anxious
ART vs rotary instruments vs ultraconservative treatment	6–7 years old	Pedodontist specialist	Anxiety: -Facial Image Scale	No difference in levels of anxiety among treatments

Frencken et al. 2012

ART: Advantages

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- relatively inexpensive → GIC
- simple
- minimal need for specialist equipment
- conservative approach
- fluoride leaching: potential to reduce secondary caries
- chemical adhesion of glass-ionomer cement
- no need for local anaesthetic
- reduced anxiety useful for young children

Frencken et al. 1996

ART Abuse!

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ART: Longevity

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- two year survival rates: single surface ART restorations
  - primary teeth 93%
  - permanent teeth 85%

De Amorim et al. 2012

ART: Longevity

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- two year survival rates: single surface ART restorations
  - primary teeth 93%
  - permanent teeth 85%

De Amorim et al. 2012

- two year survival rates: multi surface ART restorations
  - primary teeth 12% - 60%
  - permanent teeth 30%

Luo et al. 1999, van Gemert-Schriks et al. 2007

ART: Longevity

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conclusions from a 25-year review of ART

- ✓ high viscosity GIC can be used for single surface cavities in primary and permanent posterior teeth
- ✓ ART sealants have a high caries preventive effect
- ✗ ART using high viscosity GIC **cannot** be used for multi-surface cavities in primary teeth

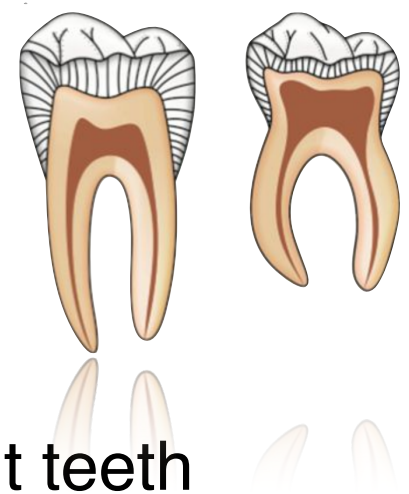
Frencken et al. 2012

- ✗ GIC **cannot** be recommended for Class II cavities in primary molars

Chadwick and Evans 2007

Class II Cavity Preparations…

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Primary tooth anatomy: *coronal morphology*

- thinner enamel and dentine
  - thickness approximately half that of permanent teeth
- direction of the enamel rods in the cervical area is angled towards the occlusal surface
  - in the permanent teeth they are towards and apical direction

Class II Cavity Preparations…

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Primary tooth anatomy: *pulp and root canal system*



- size of the pulp relative to the crown is larger
- pulp horns are higher and closer to the DEJ and to the outer surface of the crown
- mesial pulp horns are higher than the distal pulp horns

Class II Cavity Preparations…

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Int J Paediatr Dent. 2009 Jan;19(1):26-33. doi: 10.1111/j.1365-263X.2008.00962.x.

Histological comparison of pulpal inflammation in primary teeth with occlusal or proximal caries.

Kassa D[1], Day P, High A, Duggal M.

Author information

1 Department of Paediatric Dentistry, Leeds Dental Institute, Leeds, UK.

Abstract

OBJECTIVE: A number of clinical and histological studies have investigated caries-related changes in the primary tooth pulp, but the effect of caries site, as a clinical variable, has not been previously considered. This study sought to compare inflammatory changes within the pulp of primary molars according to the location of the caries lesion (occlusal or proximal).

METHODS: Eighty-three primary molars were extracted under general anaesthesia for caries and/or orthodontic reasons, and were split immediately after removal and fixed in 10% formalin. Teeth were then decalcified, sectioned, and stained with haematoxylin and eosin for histological examination using light microscopy. Caries depth was measured using a graticle, and the site of the caries lesion noted as occlusal or proximal. Samples were further classified into one of five subgroups according to the observed degree of pulpal inflammation.

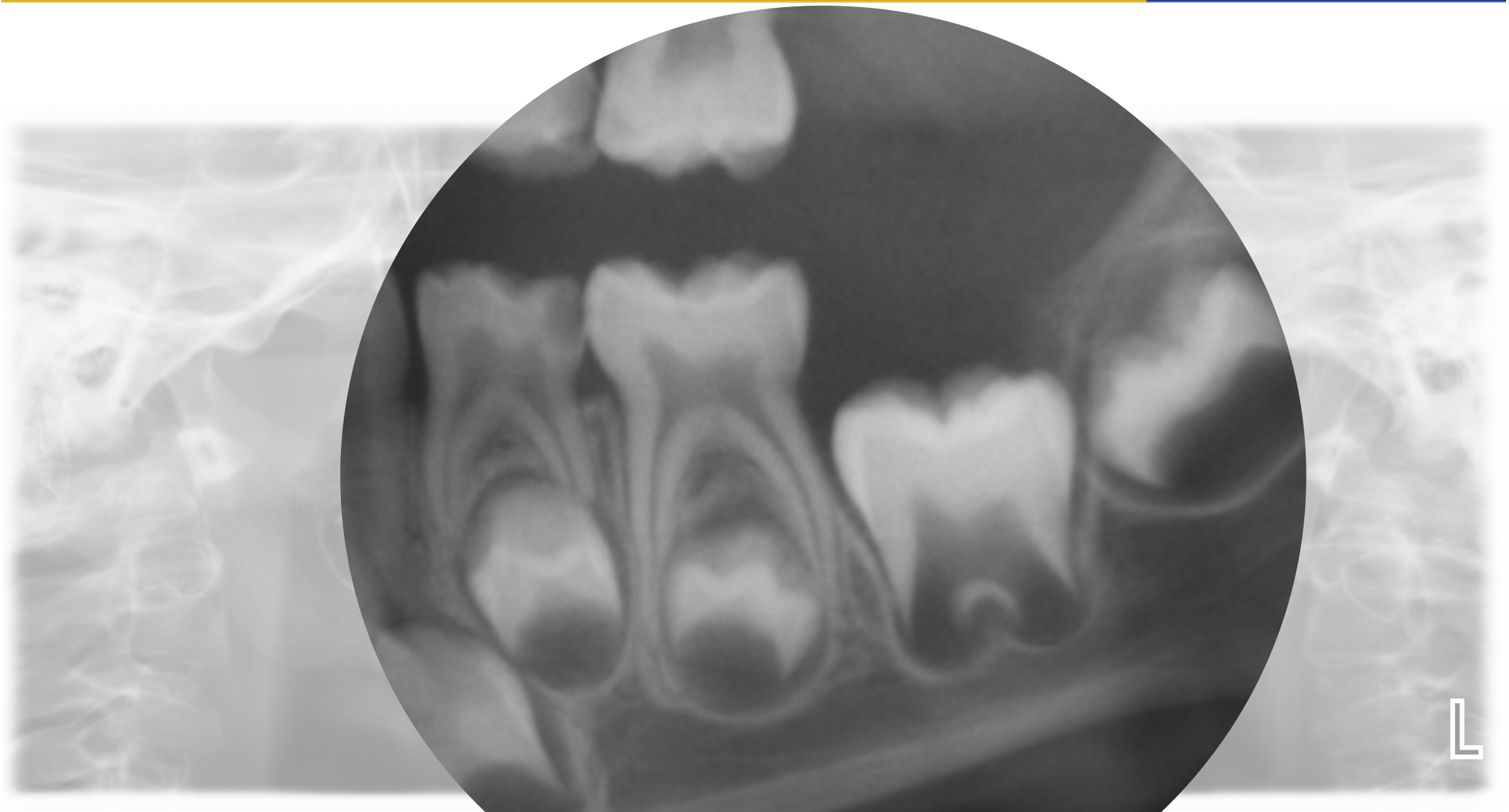
RESULTS: Key findings were that where caries depth was less than 50% of the total dentine thickness, there were no significant differences in inflammatory status according to caries site. In contrast, marked inflammatory changes were significantly more likely throughout the coronal pulp of teeth with proximal caries compared to teeth with occlusal caries where caries depth was equal to, or greater than, 50% of the total dentine thickness (P = 0.017, Fisher's exact test).

CONCLUSION: Primary teeth with proximal carious lesions extending more than 50% through the dentine thickness appear to have more extensive inflammatory pulpal changes than teeth with occlusal caries of a similar depth. This finding has clinical implications and may help inform treatment decisions in the management of primary teeth with deep carious lesions.

(i.e. pulpotomy) instead?

Class II Cavity Preparations…

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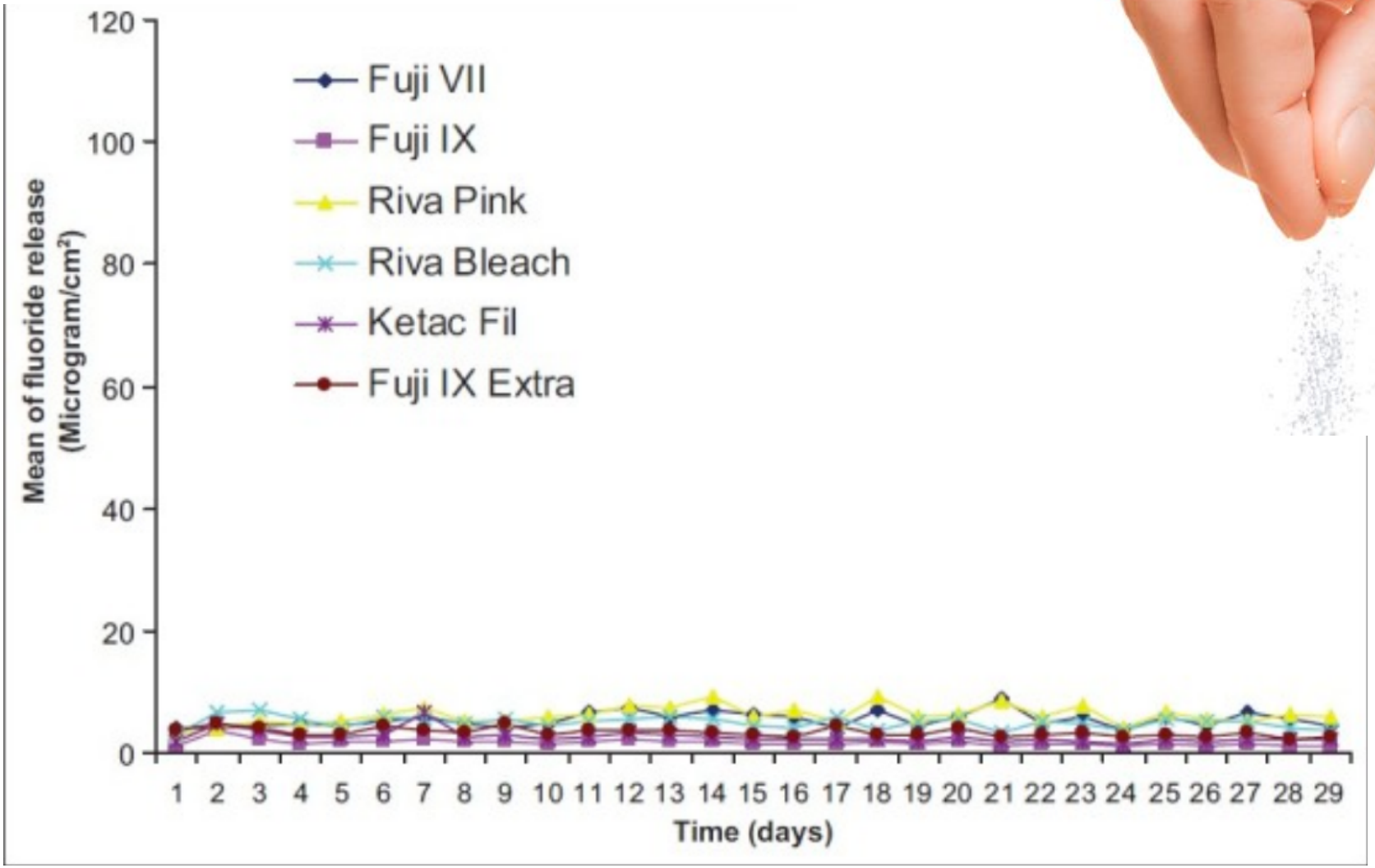


28:15 : how old

GICs and Fluoride…

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Cariostatic potential of GIC…

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Quintessence Int. 1996 Mar;27(3):171-4.

Glass-ionomer cement restorations and secondary caries: a preliminary report.

Mjör IA[1].

Author information

Abstract

This preliminary report is based on a survey of the reasons for inserting 790 glass-ionomer cement, 2,609 resin composite, and 898 amalgam restorations in adults in general practice. Glass-ionomer materials were used about equally for the treatment of primary caries and for replacement of failed restorations, unlike resin composite and amalgam, which were most often used to replace failed restorations. Almost half of the 412 replaced glass-ionomer cement restorations were removed because of the clinical diagnosis of secondary (recurrent) caries, which was by far the most common reason for replacement of all three materials.

Soln. GIC fails due to recurrent caries

ART

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- *opening the cavity with rotating instruments, followed by cleaning it with hand instruments and restoring it with an adhesive restorative material, is not considered ART nor can calling it modified ART be justified*

Frencken and Leal 2010



Rotary => pulp chamber & margin cleanup

Interim Therapeutic Restoration (ITR)

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- ITR utilises similar techniques but has different therapeutic goals to ART
- ITR may be used to restore, arrest or prevent the progression of carious lesions in young patients, uncooperative patients, or patients with special health care needs or when traditional cavity preparation and/or placement of traditional dental restorations are not feasible and need to be postponed

AAPD 2017

ITR: Technique

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- removal of caries using hand or rotary instruments with caution not to expose the pulp
- leakage of the restoration can be minimised with maximum caries removal from the periphery of the lesion
- following preparation, the tooth is restored with an adhesive restorative material such as glass ionomer or resin-modified glass ionomer cement

AAPD 2017

ITR: Technique

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- high risk of failures in multi-surface cavities
- *increased need for follow-up and review
- INTERIM…vs DEFINITIVE
  - The use of ITR has been shown to reduce the levels of cariogenic oral bacteria immediately following placement BUT levels are likely to return to pretreatment counts after six month if no other treatment is provided

AAPD 2017

Conclusions

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- contemporary practice necessitates the need to differentiate between management of a carious lesion and caries the disease
- ART and ITR are both valuable tools in paediatric dentistry when used in the correct contexts
- their simplicity however predisposes them to clinical abuse
- multi-surface restorations in the primary dentition should be placed with caution and carry a high risk of failure