INTERNATIONAL JOURNAL OF PAEDIATRIC DENTISTRY

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Editor-in-Chief
Göran Dahllöf

Abstracts of the 22nd Congress of the
International Association of Paediatric Dentistry
Munich, Germany, 17–20 June 2009

Volume 19 – Suppl. 1
June 2009

WILEY-BLACKWELL

The official journal of
The International Association of Paediatric Dentistry
The British Society of Paediatric Dentistry

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Oral Session O04 – Cariology 4

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Oral Session O04/Cariology 4

O04–24

Influence of application time on caries infiltration in primary teeth

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Introduction: Caries infiltration with low-viscosity light curing resins (infiltrants) might be a micro-invasive approach to arrest early caries lesions even under cariogenic conditions. Infiltration depth is positively correlated with application time, but particularly in pediatric dentistry treatment should be as short as possible. Therefore, the aim of this study was to assess the influence of application time on infiltrant penetration into natural enamel caries in primary teeth.
Materials and methods: Uncavitated approximal white spot lesions (ICDAS code: 2) in extracted and exfoliated primary molars (n = 91) were etched using 15% HCl gel (DMG, Hamburg, Germany) for 120 s and subsequently flushed with air-water-spray. After air-drying a pre-product infiltrant (DMG) was applied on the lesions for either 30 s, 60 s, 180 s or 300 s and subsequently light cured. Lesion depths as well as penetration depths of the infiltrant were analysed using dual fluorescence confocal microscopy. To minimize the limiting influence of lesion depth further analysis was performed only with lesions deeper than 400 μm (n = 7–9/group).
Results: Median lesion depth (Q1; Q3) for all groups was 506 (460; 584) μm. Maximum penetration depths after 300 s application [509 (451; 683) μm] were slightly higher compared with 180 s [444 (376; 522) μm] ($P > 0.05$; Mann–Whitney) and significantly higher compared with 60 s [370 (133; 501) μm] and 30 s application [288 (83; 345) μm] ($P < 0.05$).
Conclusion: It can be concluded that the infiltrant should be applied for at least 3 min to achieve sufficient infiltration of enamel caries lesions. Supported by the Deutsche Forschungsgemeinschaft (PA 1508/1–1).

O04–25

Influence of Operator/assistant-experience on the survival rate of proximal ART restorations

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Introduction: Good survival rates (SR) for single-surface ART restorations have been reported while multi-surface ART restorations have not shown similar results. The aim of this two-year study was to determine the influence of the experience of the operator and assistant on the SR of proximal ART restorations.
Patients and methods: After receiving ethical approval and parental consent, 804 proximal cavities were restored in primary molars of 6–8 year-olds by 'experienced/inexperienced' operators randomly paired with 'experienced/inexperienced' assistants. They restored those using two isolation-methods and three brands of glass ionomer cements randomly selected. Trained and calibrated evaluators examined the filings and sealants soon after placement, 1 week, 1 month, 6 months, 1 year, 1½ years and 2 years. SPSS 14.0 was used to determine the restorations' SR and relate it to the operator/assistant experience.
Results: After 2 years, the SR of the sealants and restorations was 10.9% and 30.8%% respectively. Although there were no statistical significant differences in SR of the restorations made by the 'experienced' and 'inexperienced' operators, the most 'experienced' operator had the highest SR of the fillings. However, the experience did have a significant influence on the SR of the sealants, in favour of 'inexperienced' operators. The 'experienced' assistants were significantly associated with higher SR of sealants as well as the fillings at all evaluation-moments.
Conclusion: The experience of the operator was important in producing proximal fillings with high survival rate, with the best results obtained when paired with experienced assistant.

O04–26

Atraumatic restorative treatment in children up to 3 years: three-year study

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Introduction: Operative treatment of early childhood caries (ECC) is a difficult problem because of behaviour peculiarities of little children along with certain limitations of application of general anaesthesia. Thus the investigation of effectiveness of atraumatic restorative treatment (ART) of dental caries in little children is relevant.
Patients and methods: Sixty randomly selected children with ECC aged up to 3 years were treated using the ART technique. Before the beginning of investigation the permission of ethical committee of the University was obtained. All parents gave a written informed consent. Children were examined using standardized methodology recommended by WHO. The restorations were evaluated by calibrated examiners at 7, 30, 180 days, 1, 2, and 3 years after application.
Results: The average baseline age was 29 months; mean dmft-value was 6.5. In 352 teeth (172 incisors, 10 canines, and 170 molars) manual excavation of caries lesions was performed with following restoration with glass ionomer cement (Ketac™ Molar Easymix, 3M ESPE). After 1 year, the survival rate of restoration was 82.72%, after 2 and 3 years: 72.24% and 55.52% respectively. The highest survival was found in class I restorations of molars (70.33%), the survival rate of class V restorations of incisors and canines was lower (47.0%). Restorations of circular and approximal cavities were lost the most often, while survival rate depended on dimensions of lesions.
Conclusion: ART is acceptable and effective to treat caries decay in children up to 3 years.

O04–27

Antimicrobial efficacy of a newly developed 'Caries Removing Agent'

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Introduction: The chemo-mechanical method of caries removal was developed primarily to reduce patient discomfort. To overcome the limitations of earlier developed chemo-mechanical products, a Caries Removing Agent was indigenously prepared from a plant/fruit extract. The aim of the study was to evaluate the antimicrobial efficacy of this newly developed 'Caries Removing Agent'. Permission and ethical clearance to conduct the study was obtained from the institutional ethical committee. Prior to the study written informed consent was obtained from the parents/caretakers of the children.
Patients and methods: Twenty healthy children, aged 4–8 years, with broad occlusal cavitated lesions were selected. Only those lesions confined to the outer dentinal layer, as radiographically determined were included. Treatment was done under rubber dam isolation. Prior to caries removal a dentin sample was taken. The 'Caries Removing Agent' was applied and all soft caries was removed using a spoon excavator. A second dentin sample was then taken. The samples were processed; suitable dilutions were made and cultured using Schaedler agar for Total Viable count and MRS agar for lactobacilli. After incubation at 35°C for 3 days, the Total Viable Count and Lactobacilli Count were determined. The data obtained was statistically analysed using student t test.
Results: Results showed a reduction of 92.4% in the Total Viable count and 94.2% reduction in the Lactobacilli Count, which was statistically significant. ($P < 0.001$)
Conclusion: This indigenously prepared natural agent was effective in reducing microbial count, and was found to be economical, with a huge potential for use in clinical pediatric dentistry.

O04–28

The effect of ozone on inhibition of demineralisation of enamel and dentine in situ

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Introduction: The aim of this study was to investigate the effect of Ozone, on inhibiting mineral loss from human enamel and dentine under a cariogenic challenge in-situ.
Materials and methods: A single-blind, randomised, three legs, cross-over study design was used. Ethical approval and informed consent was obtained. Fifteen volunteers were provided with a lower removable appliance carrying one enamel and one dentine slabs after measuring their hardness at baseline. The study involved 14 days of dipping the appliance in 10% sucrose solution 5 times/day and the subjects were randomly assigned to one of the study groups:
(i) Ozone group + Reductant + Patient Kit group (O + R + K)
(ii) Reductant + Patient Kit group (R + K)
(iii) Fluoride free toothpaste (Control) In the O + R + K group ozone and reductant and for R + K group only reductant was applied at day 1and day 8 on the slabs. The reductant is a remineralising solution and the patient kit contained an F toothpaste (2/day) and a F containing oral rinse (3/day). After 14 days the slabs were collected, the microhardness measured and the differences from the baselines were calculated.
Results: There was a significantly ($P < 0.001$) greater demineralisation for both enamel and dentin in the control (257 ± 47.2, 44.8 ± 6.6) compared with the two test groups; O + R + K (16.9 ± 8.2, 2.65 ± 1.38) and R + K (25.0 ± 10.49, 3.42 ± 1.37). However, no statistical significant difference was found in the mean changes in enamel and dentine hardness between O + R + K and R + K only.
Conclusions: It appears from this study that ozone has no additional effect on the inhibition of enamel and dentine demineralisation and the beneficial effect observed is likely due to the accompanying use of reductant and patient kits which contain high concentrations of fluoride.

O04–29

Biocompatibility testing of a novel anti-caries peptide (StN21)

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Introduction: Statherin is a naturally occurring salivary protein which has effects on biomineralisation. A 21 amino acid peptide based on the N terminus (StN21) has been shown to reduce the rate of demineralisation *in vitro* and has potential as an anti-caries agent. Prior to use in clinical trials, agents need to undergo biocompatibility testing. To have potential as a therapeutic agent for enamel homeostasis, StN21 should have no effect on epithelial health. The aim of this study was to investigate the effect of StN21 on a cultured oral mucosal model.
Materials and methods: The surface of 14 day buccal mucosal cultures were treated with PBS (negative control), 0.5% sodium lauryl sulphate (SLS, positive control), StN21 (500 and 1000 mg/l) and whole Statherin (100 mg/l). The cultures were incubated in growth medium which was sampled at 4, 24 and 48 h. Inflammatory mediators, IL-1α and IL-8, were measured at these 3 time points using sandwich ELISA. Epithelial viability was assessed using a modified MTT assay.
Results: Statherin and both concentrations of StN21 had no effect on cell viability (MTT assay). SLS demonstrated a small degree of cell proliferation (PBS = 100%; SLS = 120 ± 3.62%). Both concentrations of StN21 demonstrated no significant difference in IL-1α and IL-8 production when compared with PBS and whole Statherin protein at 4, 24 and 48 h ($P < 0.05$).
Conclusion: It can be concluded that StN21 has no effect on epithelial models and, due to this lack of toxicity, could be considered for use as a therapeutic agent.

O04–30

Frequency of fluoridated milk to re-mineralize artificial carious lesions

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Introduction: Milk is a universal dietary component that could be an effective medium for the delivery of fluoride. The objective of this study was to determine whether the frequency of treating artificial carious lesions with fluoridated milk of different concentrations alters the re-mineralizing potential.
Materials and methods: Artificial carious lesions, (90–180 μm deep), were formed on the buccal and lingual enamel surfaces of extracted molars using a de-mineralizing solution. The teeth were

sectioned to create specimens 100–150 μm thick. The sections were painted with a varnish except for the outer surface of the lesion. The specimens were randomly divided into thirteen groups and treated with: water, plain milk or fluoridated milk (2.5 ppm, 5 ppm, 10 ppm) once, twice or on alternate days using a 20-day pH cycling model. Lesion depth and mineral content (Vmax) before and after the pH cycle were evaluated using polarized light microscopy and microradiography. Paired *t*-test, ANOVA and Student-Newman-Keuls tests were employed to make comparisons within each group and between the different groups.

Results: Fluoridated milk (2.5 ppm, 5 ppm, 10 ppm) significantly reduced the lesion depth and increased the Vmax of the lesions in comparison to the control groups ($P < 0.05$). Specimens treated with 2.5 ppm fluoride milk twice daily exhibited the greatest reduction in lesion depth ($P < 0.05$).

Conclusion: Fluoridated milk has a beneficial effect on the progression of artificial enamel carious lesions. Milk with 2.5 ppm fluoride, when used twice daily, exhibited a greater re-mineralizing potential than when used once daily, or on alternate days with the same or higher concentrations.

O04–31

Treatment strategies for occlusal caries lesions in children and adolescents

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Introduction: The current strategy for occlusal caries lesions with dentin penetration is operative treatment. The aim of this study was to compare the effectiveness of non-operative sealing with conventional restoration of manifest occlusal caries lesions in the young permanent dentition.

Material and Methods: This ongoing study has a prospective, randomized design with two parallel arms. The material consisted of 402 occlusal caries lesions in 402 patients aged 6–16 years. All lesions were limited to the outer half of the dentin and assessed to be in need of restorative treatment. Informed consent was obtained from the patients/parents and the project was approved by the Danish Ethics Committee. After randomization, 280 sealants and 122 resin restorations were carried out by 74 public dentists. In January 2009, 40% of the included teeth (106 sealants and 54 composite restorations) were available for clinical and bitewing follow-up after 1 year. Chi-square tests were applied for statistical comparisons between sealants and restorations.

Results: 79% of the sealants were successful after one year; 14 (13%) were repaired and 9 sealants (8%) were replaced by restorations. One restoration was replaced (2%), which was significantly different compared with the sealant group ($P < 0.05$). The radiographic assessment showed caries progression in exclusively 6% of the sealed teeth ($P < 0.005$).

Conclusion: The results indicate the possibility of extending the criteria for non-operative sealing of occlusal caries lesions in the young permanent dentition. However, a longer observation period is needed for final conclusion, and the outcome will be monitored for at least 3 years.

