

Oral Presentations

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Artificial Intelligence-Based Diagnostics of Molar-Incisor-Hypomineralization (MIH)

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The aim of this study was to develop and validate a deep learning-based convolutional neural network (CNN) for the automated detection and categorization of teeth affected by molar-incisor-hypomineralization (MIH) on intraoral photographs. **Materials and Methods** The data set consisted of 3,241 intraoral images (767 teeth with no MIH/no intervention, 76 with no MIH/atypical restoration, 742 with no MIH/sealant, 815 with demarcated opacity/no intervention, 158 with demarcated opacity/atypical restoration, 181 with demarcated opacity/sealant, 290 with enamel breakdown/no intervention, 169 with enamel breakdown/atypical restoration, and 43 with enamel breakdown/sealant). These images were divided into a training (N=2,596) and a test sample (N=649). All images were evaluated by an expert group, and each diagnosis served as a reference standard for cyclic training and evaluation of the CNN (ResNeXt-101-32x8d). Statistical analysis included the calculation of contingency tables, areas under the receiver operating characteristic curve (AUCs) and saliency maps. The developed CNN was able to categorize teeth with MIH correctly with an overall diagnostic accuracy of 95.2%. The overall SE and SP amounted to 78.6% and 97.3%, respectively, which indicate that the CNN performed better in healthy teeth compared to those with MIH. The AUC values ranging from 0.873 (enamel breakdown/sealant) to 0.994 (atypical restoration/no MIH). It was possible to categorize the majority of clinical photographs automatically by using a trained deep learning-based CNN with an acceptably high diagnostic accuracy.

Indirect Restorations for Severe Affected MIH Molars

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Severe affected MIH molars are a very hard challenge because of their histological nature, the increased porosity, lack of hardness and diminished optimal substrate properties, these conditions make very difficult clinical treatment decision to take.

Composite direct restorations are the first election material to restore MIH in a wide variety of conditions even mild or severe cases, however the properties of the substrate, if are not modified, can lead to a different adhesion mistake that can affect the prognosis of the restoration. The curing light properties, the substrate conditioning, the isolation techniques, the composite selected may not be properly cured and shrinkage properties can be affected as well as gaps between dental structure and composite and this can promote the biofilm accumulation and dysbiosis.

The objective of this lecture is to show a simple protocol to improve the prognosis on the MIH severe affected molar treatment using indirect composite restorations and this will improve our skills and will open our treatment options in the future.

Direct Filling of Severe MIH-Affected Incisors: Can We Predictably Use Erosion Infiltration Process?

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Background: Nowadays, the aesthetic demand of patients with MIH is growing and fortunately contemporary dentistry of 2021 is able to respond favorably by being minimally invasive. The color perceived by the human eye of the pathological tooth is a combination of extrinsic and intrinsic color. Any alteration or modification of dental tissue, whether it is a mechanical, chemical or biological transformation, will result in a change of its original color.

Results with added value: The colored appearance, yellow/brown, sometimes orange, of the lesion is partly explained by the elementary laws of wave optics. This is then a phenomenon of absorption by organic or inorganic molecules. We propose the use of a new process of “deep erosion-infiltration” of severe MIH-affected incisors created by our team in Paris.

Clinical sequence: A specific protocol is necessary for the treatment of colored spots, that is the subject of this presentation. We will show that 3 stages of a complementary technical operating sequence are likely to be associated, depending on the severity of the lesions, in order to guarantee success: 1/ external tooth whitening, 2/ the use of sodium hypochlorite (NaOCl), 3/ minimal drilling associated with the application of opacifying composites.

Conclusion: The choice of the operating sequence will be proportional to the extent of the damage, with optimal respect for the tissue integrity of the affected teeth as a rule. New information on the nature of lesion dyes will allow us to refine our strategy based on a streamlined methodology.

Prevalence of Hypomineralised Second Primary Molars: A Systematic Review and Meta-Analysis

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Background/Aim: Several prevalence studies on HSPM have now been published with a wide variation in defect prevalence reported. Despite the development of the 2003 EAPD criteria, comparability between studies remains challenging because of the use of different diagnostic criteria, examination variability and different age groups. To date, no systematic review on HSPM prevalence has been conducted. The aim of this research was to evaluate the prevalence of HSPM worldwide on a child and tooth level and investigate the influence of diagnostic criteria on the prevalence of HSPM.

Methods: A comprehensive literature search was performed through MEDLINE/PubMed, Scopus and Web of Science databases. The grey literature was also screened as were the reference lists of included studies. An adaptation of the Newcastle-Ottawa Scale was used to evaluate the quality of the studies. A meta-analysis was performed to determine the pooled prevalence of HSPM.

Results: The search strategy identified 1,988 articles, 487 were retrieved for full-text evaluation, and 37 studies were included in the meta-analysis (32 for child and 23 for tooth level prevalence), providing data from 26,805 individuals and 81,107 molars. The prevalence of HSPM was 6.8% (95% CI 4.98% - 8.86%) on a child level and 4.08% on a tooth level (95% CI = 2.80% - 5.59%). The diagnostic criteria used did not influence the prevalence results ($P \geq 0.05$). The majority of the papers (75%) showed a low- to- moderate risk of bias.

Conclusion: There was a broad variation in the prevalence reported that may be attributed to differences in the study population. The present meta-analysis showed a HSPM prevalence worldwide of 6.8% on a child level and 4.1% on a tooth level.

Genetic Polymorphisms Associated with Developmental Defects of Enamel: A Systematic Review

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Objective: The aim of the present systematic review was to assess the available literature on genetic polymorphisms associated with developmental defect of enamel (DDE).

Material and Methods: This review was registered in the PROSPERO database (CRD42018115270). Searches were conducted in the PubMed, Scopus, Web of Science, LILACS, BBO, and Cochrane Library databases, as well as in the grey literature. Observational, cross-sectional, case control, and cohort studies that evaluated the association between DDE and genetic polymorphism were included. The risk of bias of the studies was assessed using the Newcastle-Ottawa Scale.

Results: The searches led to the retrieval of 1,076 papers, and 22 studies were included. Twenty-three genes whose proteins are related to enamel development, craniofacial patterning morphogenesis, immune response, and hormone transcription/reception were included. It was observed that MIH and/or HSPM were associated with 18 polymorphisms of genes responsible for enamel development, immune response and morphogenesis. A significant association was found between the different clinical manifestations of dental fluorosis with seven polymorphisms of genes responsible for enamel development, craniofacial development, and hormonal transcription/reception.

Conclusion: The studies included in this systematic review found that DDE, such as MIH, HSPM, and DF, reported as having a complex etiology, are also significantly associated with genetic polymorphisms. Our findings appear to suggest DDEs could be associated with polymorphisms of several genes.

Injection Molding Technique: An Alternative Treatment Approach for Developmental Defects in Enamel: Two Case Reports

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Introduction: Developmental defects in enamel (DDE) are either hereditary or acquired in nature and can be presented clinically as quantitative or qualitative enamel defects according to the time of affection of the amelogenesis. DDE can be either localized or generalized affecting primary and/or permanent teeth. Differential diagnosis of DDE includes hereditary conditions such as amelogenesis imperfecta and generalized inherited disorders or syndromes associated with DDE, as well as acquired DDE that can be either caused by local or systemic causes including molar incisor hypomineralization (MIH), acquired enamel hypoplasia, and dental fluorosis among others.

The management of DDE has been always challenging especially in young permanent teeth. Injection molding technique, also known as injectable resin composite restorative technique, using composite resin restoration is considered a novel alternative direct/indirect restorative method that translates diagnostic wax up into composite restorations.

Objective: The aim of these case reports was to restore first permanent molars as well as permanent anterior teeth with resin composite restoration using the injection molding technique in two adolescents.

Methods: Two adolescents with a differential diagnosis of acquired enamel defects and MIH affecting their first permanent molars as well as their permanent anterior teeth were restored with highly filled flowable composite resin restoration using the injection molding technique and were followed up for 1 year.

Conclusion: The use of injectable resin composite technique in these two case reports provided a simple, less technique sensitive, highly esthetic and functional immediate outcome as well as accurate anatomy replication of diagnostic waxed-up models of teeth affected with DDE. This treatment modality is minimally invasive, repairable, and relatively inexpensive alternative treatment for these teeth compared to ceramic full coverage restorations and veneers. Long term follow up is needed to assure its long-lasting effect.