**Critically Appraised Topic (CAT)**

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| **Project Team:**  |
| **4B-5** |
| **Project Team Participants:**  |
| **Damon Cole****Kimberly Beckford****Kara Kalterburn****Tyler Guist** |
| **Clinical Question:** |
| **What is the best dental treatment for young patients with hypomineralized teeth?** |
| **PICO Format:** |
| **P:** |
| **Children with Alagille Syndrome** |
| **I:** |
| **Aggressive Preventative and Dental Management** |
| **C:** |
| **Healthy Children** |
| **O:** |
| **Improved Quality of Life** |
| **PICO Formatted Question:** |
| **How does aggressive preventative and dental management improve quality of life of children with Alagille Syndrome compared to healthy children?** |
| **Clinical Bottom Line:** |
| **Patients with Alagille Syndrome are more likely to need liver transplants. The monitoring of oral and general health conditions and the achievement of specific protocols of prophylaxis are helpful in the prevention of complications and are fundamental to obtain the best results with liver transplantation, thus improving the quality of life of these patients.** **Dentists need to consider the specific condition of each tooth and the needs and expectations of patients when deciding how to manage hypomineralization in young patients.**  |
| **Date(s) of Search:**  |
| **10/29/2020, 11/5/2020, 11/8/2020** |
| **Database(s) Used:** |
| **PubMed** |
| **Search Strategy/Keywords:** |
| **alagille, dental, children, hypomineralization dental treatments for young patients** |
| **MESH terms used:** |
| **Alagille Syndrome/therapy, Dentition, Humans, Oral Health, Organ Specificity, Pit and Fissure Sealants, Child, Crowns, Dental Enamel Hypoplasia** |
| **Article(s) Cited:** |
| 1. Medical and dental management of Alagille syndrome: A review
2. Managing molar-incisor hypomineralization: A systematic review
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| **Study Design(s):** |
| **Meta-analysis (Article 1), Systematic Review of Cohort Studies (Article 2)** |
| **Reason for Article Selection:** |
| Meta-analysis (Article 1)Directly related to PICO question (Article 1)Systematic Review of Cohort Studies (Article 2)Directly related to clinical question (Article 2) |
| **Article(s) Synopsis:** |
| * **Alagille Syndrome (AS) affects several organs and body parts; of particular interest to dentists are affects on the oral cavity:**
	+ **May have damage to the teeth, salivary glands, periodontium, & mucous membranes; may have enamel opacities, hypomineralization, and hypoplasia of tooth enamel; and presence of talon cusps in primary and permanent teeth has been reported**
	+ **Many oral/dental changes occur after liver transplantation, which is very often necessary. Graft rejection is a major complication, caused mainly by pre- or postoperative infection from a variety of sources**
	+ **Because the oral cavity harbors numerous pathogenic bacteria, it is recommended that before surgery, all carious cavities should be treated and restored, teeth classified for the extraction should be removed, periodontium has to be healthy, and oral hygiene must be very good**
* **The most important points are careful observation, accurate diagnosis, and planned management of such patients, especially during the patient’s formative years, to prevent complications. Aggressive preventive oral care and consultations with medical specialists before any invasive procedure are obligatory. All this can improve quality of life in patients with Alagille syndrome because it allows them to receive invasive procedures, such as liver transplants and bone grafts.**
* **All dental treatment must be performed in collaboration with the physician, who will prescribe proper drug selection, and use of antibiotics as a prophylaxis or in a case of bleeding after extraction control of hemostasis. After surgery, all patients require regular dental control visits because of permanent and continuous immunosuppressive treatment.**
* **The monitoring of oral and general health conditions and the achievement of specific protocols of prophylaxis are helpful in the prevention of complications and are fundamental to obtain the best results with liver transplantation improving the quality of life of these patients. By improving the oral health of transplant recipients, the chances that the transplanted liver will become infected are much reduced, increasing the likelihood of a successful surgical outcome.**
* **Ten trials (381 participants) investigated hypomineralized molars, and four trials (139 participants) investigated hypomineralized incisors. For molars, remineralization, restorative or extraction therapies had been assessed. For restorative approaches, mean annual failure rates were highest for fissure sealants and glass-ionomer restorations, and lowest for indirect restorations, preformed metal crowns and composite restorations. One study assessed extraction of molars in young patients (median age 8.2 years), the majority of them without malocclusions, but third molars in development. Spontaneous alignment of second molars was more frequent in the maxilla than the mandible.**
* **Molar-incisor hypomineralization (MIH) is associated with significantly increased dental treatment needs, especially in severe cases, as porous enamel and possible post-eruptive breakdown promote bacteria dentin penetration, which leads to pulpal inflammation and hypersensitivity or pain**
* **Remineralization or sealants seem suitable for MIH-molars with limited severity and/or hypersensitivity. For severe cases, restorations with composites or indirect restorations or preformed metal crowns seem suitable. Prior to tooth extraction as last resort factors like the presence of a general malocclusion, patients’ age and the status of neighboring teeth should be considered. No recommendations can be given for MIH-incisors, aside from noting that sensitivity treatments were effective.**
* **Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) was shown to have a remineralizing and a desensitizing effect on MIH teeth by creating a stable super saturated solution of calcium and phosphate at the enamel surface.**
* **64 articles were evaluated, and of the 64 a total of 14 clinical trials were included for qualitative data, and 8 of the 14 were also included for quantitative data**
* **For MIH molars, 381 participants (720 molars) were treated. The mean follow-up was 3.6 years. For MIH incisors, 139 participants had been treated, with overall 274 incisors. The mean follow-up was 0.5 years.**
* **In mild cases, remineralization therapies are an option, and preferred over extraction. In the most severe cases, extractions are an option.**
* **First and foremost, hypersensitivity needs to be addressed. Remineralization with CPP-APC can be used to reduce mild or moderate hypersensitivity in MIH teeth. For more severe defects in molars, composite restorations, PMCs (preformed metal crowns) or indirect restorations can be used.**
* **It can be noted that amalgam restorations showed high failure rates in MIH molars. Adhesive restorations or sealants seem more suitable than amalgam, but the enamel-adhesive interface in MIH is more porous, leading to enamel cracks and decreased bond strength compared with sound enamel. Therefore, using an acetone-containing adhesive system prior to sealing increases the retention rates.**
* **For incisors, long-term treatment plans starting with remineralization therapy, over infiltration, and micro-abrasion. Then leading to placement of composites, veneers, or crowns.**
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| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm) See <http://www.cebm.net/index.aspx?o=1025>[x]  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)[ ]  **1b** – Individual RCT[x]  **2a** – Systematic Review of Cohort Studies[ ]  **2b** – Individual Cohort Study[ ]  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research[ ]  **4a** – Systematic Review of Case Control Studies[ ]  **4b** – Individual Case Control Study[ ]  **5** – Case Series, Case Reports[ ]  **6** – Expert Opinion without explicit critical appraisal, Narrative Review[ ]  **7** – Animal Research[ ]  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**See article **J Evid Base Dent Pract 2007;147-150**[x]  **A** – Consistent, good quality patient oriented evidence[ ]  **B** – Inconsistent or limited quality patient oriented evidence[ ]  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| * **For patients with AS, the monitoring of oral and general health conditions and the achievement of specific protocols of prophylaxis are important in the prevention of complications, to obtain the best results with liver transplantation, and for improving the quality of life of these patients. By improving the oral health of transplant recipients, the chances that a transplant will be affected by infection are significantly reduced, increasing the likelihood of success.**
* **Commonly, AS patients have hypomineralization, which needs to be treated. First, hypersensitivity needs to be addressed. Remineralization with CPP-APC can be used to reduce up to moderate hypersensitivity in MIH teeth. For more severe defects in molars and incisors, treatments may include composite restorations, PMCs, or indirect restorations.**
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