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Featured Review Article

Extraction or preservation of deciduous molars in early mixed dentition as an interceptive treatment in agenesis of mandibular premolars in normal occlusion: A systematic review

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ABSTRACT

Background: Approximately 2.4% to 4.3% of the population has agenesis of the lower second premolars. Two main treatment options have been suggested for this condition: extraction of the deciduous molar in early mixed dentition to get a spontaneous space closure or to preserve the deciduous molar as if it was a permanent tooth.

Objectives: To systematically evaluate the efficacy and safety of deciduous molar extraction compared with no extraction, in the early mixed dentition (10–11years) in children with normal occlusion and agenesis of mandibular premolars.

Methods: A systematic literature search was conducted (August 2017) in Medline, PubMed, Embase, and The Cochrane Library and reference lists. Two authors verified data extraction. The inclusion criteria were defined according to the Patients, Interventions, Controls, Outcome methodology. Only controlled clinical studies were considered.

Results: The systematic literature review identified 824 records, of which 562 eligible publications remained after removal of duplicates. After screening of titles and abstracts, 553 studies were excluded. Nine articles were read in full text, but none of the articles fulfilled the predetermined Patients, Interventions, Controls, Outcome requirements, precluding meaningful analyses of efficacy or safety. In absence of published data, a knowledge gap was identified.

Conclusions: There are no published studies comparing patient benefits or risks of interceptive extraction of deciduous molars with preserving the deciduous molar as if it was a permanent tooth in children in the early mixed dentition with agenesis of mandibular premolars. Well-designed, longitudinal, prospective controlled studies are needed.

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1. Introduction

The mandibular premolars usually erupt at approximately 10 to 12 years of age during late mixed dentition. Their eruption causes resorption of the deciduous molars' roots, which leads to tooth exfoliation. In case of agenesis of a permanent premolar, root resorption of the deciduous tooth does not always occur and it usually remains in the dental arch [1].

Agenesis of mandibular second premolars is a condition that should be diagnosed by the general dentist after radiological examination, often during routine check-ups. Definitive diagnosis cannot be performed before the age of at least 9 to 10 years, because the tooth germ may develop late [2]. Second to agenesis of third molars, lower second premolars are the most frequently missing teeth in the permanent dentition with a reported prevalence of 2.4% to 4.3% [2], and even more frequently recorded in Scandinavian children: 6.5% to 7.8% [3,4]. Congenital absence of lower second premolars is often a challenge for the orthodontists, as they need to decide if preserving the deciduous tooth is a viable treatment option. The treatment decision needs to be based on factors such as age of the patient, type of occlusion, long-term prognosis of the primary tooth, space available in the dental arch, and the patient's attitude toward treatment [5]. Extraction is usually considered the best option if the patient has a neutral sagittal jaw relationship with and Angle class I occlusion, no spacing in the lower jaw, and has a

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normal overbite and overjet. Moreover, extractions are performed when the prognosis of the deciduous tooth is compromised in a way that precludes preserving (i.e., due to caries, root resorption, and ankyloses), regardless of the other factors. Early extraction of the deciduous tooth has the advantage of promoting spontaneous space closure and reducing the need for future orthodontic or prosthetic treatment [6,7]. On the other hand, young patients need to undergo a tooth extraction that might be unpleasant and uncomfortable in some subjects. Extractions are usually avoided when the patient has a prenormal or postnormal sagittal basal relationship, multiple agenesis, spacing, Angle class II or III malocclusion, deep bite, or when the prognosis of the tooth is good (i.e., no carious lesions, infraocclusions, or ankyloses). Long-term maintenance of the deciduous tooth has the advantage of avoiding early extractions and preventing resorption of the alveolar bone and may be a viable semipermanent solution; however, the long-term prognosis of the deciduous tooth often seems unclear [8]. Complications that may occur are ankylosis and infraocclusion. Infraocclusion and/or root resorption can jeopardize tooth prognosis and force the clinician to remove the tooth later in life, making treatment of the edentulous area more difficult and expensive, often requiring prosthetic intervention with or without implant placement [9].

To our knowledge, there are no published systematic reviews comparing early extraction of the deciduous tooth versus long-term preservation as treatment options to guide clinical decision making. Therefore, the aim of this systematic review was to investigate whether extraction is more beneficial in early mixed dentition, compared with preserving the deciduous molar in patients with agenesis of mandibular premolars, regarding space closure, risks, and complications.

2. Materials and methods

The predefined question was, “is it better to extract the deciduous molar than to maintain it, if there is an agenesis of a premolar in the corresponding position in children with normal occlusion in the early mixed dentition (10–11 years old), considering occlusion, bite function, and complications?”

Inclusion criteria for studies to be considered in this review are outlined according to the predefined PICO (patients, intervention, comparison, outcome).

2.1. Population

Children with normal occlusion in early mixed dentition (10–11 years of age) diagnosed with agenesis of mandibular second premolar.

2.2. Intervention

Extraction of the mandibular deciduous molar (10–11 years of age) in the position of the agenesis, to achieve spontaneous space closure.

2.3. Comparison

Preserve the deciduous mandibular molar in the position of the agenesis.

2.4. Outcomes

Bite function evaluated through the following:

- Functional interference due to elongation of occluding teeth
- Risk of elongation due to infraocclusion of the primary tooth
- Tipping of the neighboring teeth with risk of marginal bone loss that can cause periodontal deterioration

2.5. Risks and complications

Ankylosis of the deciduous tooth in combination with the following:

- Remaining spaces in the extraction area
- Late loss of the primary tooth that needs prosthetic replacement in adulthood
- Other complications

2.6. Limitations

Systematic review (S), randomized controlled trials (RCT), non–randomized, controlled trial (CT), and case series (only for risks and complications after extraction) were considered for inclusion (not case reports or narrative reviews), published in English, Danish, Norwegian, or Swedish language.

2.7. Literature search

In August 2017, a librarian (AL) at the regional HTA center, in Region Västra Götaland, Gothenburg, Sweden performed a systematic literature search in Medline, PubMed, Embase, and the Cochrane Library, in the lists of Health Technology Assessment (HTA) reports at the Web sites of the Swedish Agency for Health Technology Assessment and Assessment of Social Service (SBU), the Norwegian Knowledge Centre for the Health Services (NOKC), and the Danish Health Authority, using the terms adontia, tooth extraction, and deciduous tooth with relevant synonyms. The search was limited to studies in humans. The reference lists of relevant articles were perused for any additional studies not identified with this search. Detailed search strategies are accounted for in Appendix 1, and a graphic presentation of the selection process is presented in Fig. 1.

2.8. Certainty of evidence

Included studies were intended to be critically appraised using the Assessing the Methodological Quality of Systematic Reviews (AMSTAR) checklist [11] and SBU checklists [12,13]. The certainty of evidence was to be appraised according to Grading of Recommendations Assessment, Development and Evaluation (GRADE) [14].

3. Results

The systematic literature review identified 824 records, of which 562 eligible publications remained after removal of duplicates (Fig. 1). After screening of titles and abstracts, 553 studies were excluded. Nine articles were read in full text, but none of the articles fulfilled the predetermined PICO requirements (Table 1), precluding meaningful analyses of efficacy or safety. In absence of published data, a knowledge gap was identified: there are no published data comparing patient benefits or risks of interceptive extraction of deciduous molars with restraining from extraction, in children in early mixed dentition with agenesis of mandibular premolars.

4. Discussion

Traditionally the clinician has two treatment options for children with agenesis of the lower second premolars in early mixed