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Research

Correlation of root resorption and infraocclusion in mandibular deciduous second molars without succedaneous permanent teeth

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ABSTRACT

Background: The aim of this study was to evaluate the extent of root resorption, the prevalence of infraocclusion, and the correlation between these variables in orthodontic patients with mandibular deciduous second molars without succedaneous permanent teeth from childhood to 30 years of age.
Methods: One hundred fifty-eight patients were stratified into four groups, by age: group 1, patients ranging from 5 to <10 years of age; group 2, from 10 to <15; group 3, from 15 to <20; and group 4, from 20 to 30 years. Panoramic radiographs and dental casts were examined to verify the presence of infraocclusion and to classify the extent of root resorption using scores from 1 (no resorption) to 5 (absent tooth).
Results: Group 1 (age 5–<10 years) had a significantly lesser extent of root resorption than did the other groups, but the intergroup difference in the prevalence of infraocclusion was not significant. In the overall cohort, 25% of the teeth had infraocclusion, with a positive significant correlation between root resorption and infraocclusion.
Conclusions: The results of this study suggest that root resorption tends to increase from the first to the second decade of life and to remain stable until the third decade. Furthermore, one-fourth of these patients with second premolar agenesis showed infraocclusion of deciduous molars, and the amount of root resorption was positively correlated with infraocclusion.

1. Introduction

The high prevalence of agenesis of mandibular second premolars is very important in orthodontics, because it significantly influences treatment planning and may impose certain mechanical difficulties [1–3]. Once agenesis of a permanent second premolar is identified, the orthodontist often faces a challenging decision regarding the proper treatment option: extraction of the deciduous tooth, followed by space closure or implant replacement, or maintenance of the deciduous tooth until its exfoliation.

Recent studies have shown that maintenance of mandibular deciduous second molars in patients with second premolar agenesis represents a viable treatment option for solving this tooth disorder [4–7]. There are many advantages with this treatment alternative, such as prevention of the need for prostheses or implants and avoidance of excessive anterior retraction, which could negatively affect the facial profile. However, concerns regarding maintenance of the deciduous molars would be associated with some regressive changes that can be seen in these teeth, such as the reduction of pulp size, pulp degeneration, pulp stones, abnormal odontoblastic pattern, hypercementosis, shortening of root lengths, and the submergence of deciduous molars in alveolar bone compared with the occlusal level of adjacent teeth [8,9]. Furthermore, there is an uncertainty about the duration of deciduous mandibular second molar exfoliation [8].

Regarding the exfoliation time, Kurol and Thilander [8] showed that root resorption in deciduous molars that lack permanent succedaneum teeth is often slow compared with that in deciduous molars with permanent successors. Some investigators have

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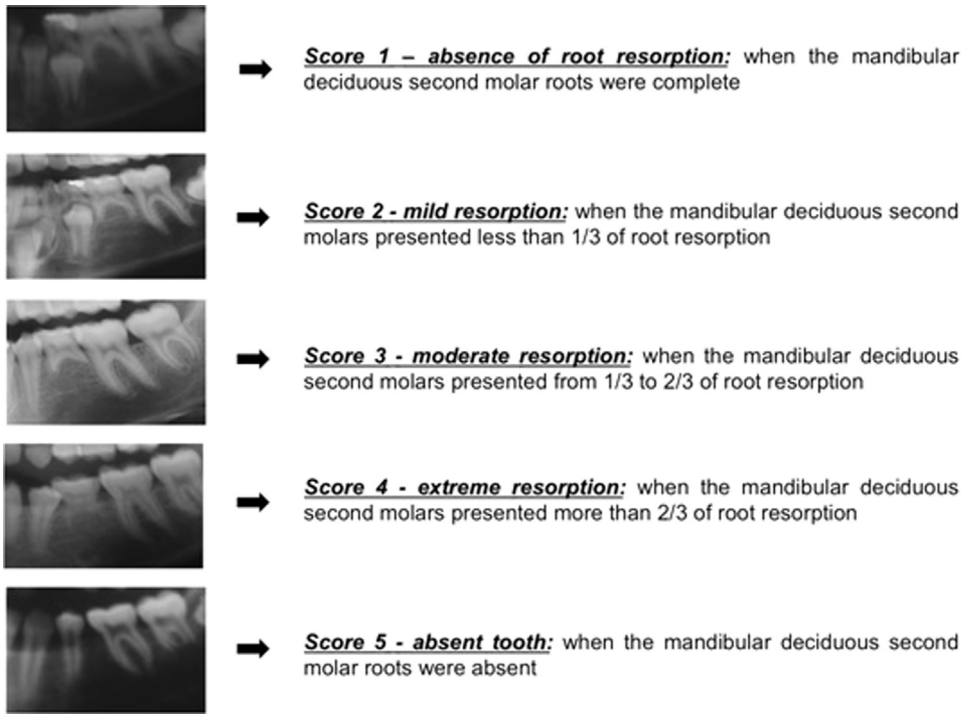

Fig. 1. Scores of root resorption. These five panoramic radiographs were expanded to show with detail the regions of deciduous teeth with no permanent successor. Each represents one of the five different scores of root resorption used in this study.

pointed out that deciduous teeth without a permanent successor are often retained beyond the time of normal exfoliation [7,8]. According to Bjerklin and Bennett [10], if deciduous molars are present at 20 years of age, they appear to have good prognoses for longitudinal maintenance.

Likewise, mandibular deciduous second molars with no succedaneous permanent teeth often show infraocclusion [7]. Classic studies have reported that if infraocclusion occurs early, the prognosis for occlusion development is worse [11,12], and that this disturbance could require extraction of the deciduous molar [8].

Evaluation of the extent of root resorption and infraocclusion is important in establishing a prognosis for deciduous tooth maintenance in the long-term and for treatment planning [6,7,13]. According to a longitudinal study in Scandinavian individuals, a positive significant correlation between the extent of root resorption and infraocclusion of mandibular deciduous second molars was found [10].

This study aimed to evaluate the extent of root resorption, the prevalence of infraocclusion, and the correlation between these variables in orthodontic patients with mandibular deciduous second molars lacking succedaneous permanent teeth, from childhood to 30 years of age.

2. Methods and materials

2.1. Sample selection

The sample consisted of male and female patients aged 6 to 30 years with agenesis of 1 or both mandibular second premolars whose records included panoramic radiographs and dental casts. This sample was the same as that used by Garib et al. [14] in an earlier study and included all cases of mandibular second premolar agenesis from a Brazilian Dental School and from eight private dental offices. The orthodontic records of 158 patients (99 females, 59 males) were included. The majority of the patients were white/Mediterranean.

2.2. Categorizing the sample according to age ranges

The selected patients were stratified into four groups of increasing age ranges: group 1 included patients ranging from 5 to <10 years of age; group 2, from 10 to <15 years; group 3, from 15 to <20 years; and group 4, from 20 to 30 years.

All 158 patients and a total of 251 mandibular deciduous second molars were evaluated with regard to infraocclusion and extent of root resorption. Group 1 included 19 patients, of whom 10 had unilateral absence of the second premolar and 9 had bilateral absence; group 2 comprised 85, of whom 45 had unilateral and 40, bilateral, absences; group 3, 44, of whom 22 had unilateral and 22 had bilateral absences; and group 4 had 10 patients, of whom 4 showed unilateral and 6, bilateral, absences.

2.3. Assessment and classification of infraocclusion

Assessment of infraocclusion in the mandibular deciduous second molars with an absence of the permanent successor was performed by an experienced examiner (D.G.F.), using panoramic radiographs and dental casts. Infraocclusion was classified as absent if the occlusal surface of the deciduous molar was at the level of the occlusal plane, or present if the occlusal surface of the deciduous molar was below the level of the occlusal plane [5,6,11].

2.4. Scoring of root resorption

The following scoring system was used by the examiner to assess the extent of root resorption of the mandibular deciduous

Table 1
Intraexaminer error (kappa statistics)

Evaluation	Agreement %	%CV	Strength of agreement
Root resorption (n = 40)	88	0.84	Almost perfect
Infraocclusion (n = 44)	94.44	0.85	Almost perfect

%CV, coefficient of variation.