Infraocclusion of Primary Molars: A Review and Report of Cases

SUMMARY

The aim of this study was to describe the distribution and degree of infraocclusion and to evaluate the influence of the age of diagnosis and treatment outcomes of primary molars during a period of 2 years. 21 patients, aged between 6 to 11 years, participated in the study. The children were subjected to clinical and radiographic examinations every 6 months during 2 years. Parameters assessed were age, gender, distribution and degree of infraocclusion based on radiographs, ankylosis, altered position of adjacent and successor teeth and treatment outcome.

It has been found that the most frequently affected teeth were primary second molars located in the lower arch as bilateral occurrence. The degree of infraocclusion was considered as mild in 35, moderate in 15 and severe in 6 teeth. The successors were congenitally absent in 10 infra-occluded teeth. Tipping of neighbouring teeth and the delayed eruption of the permanent successors were found to be the most frequent complications. The treatment outcome was favourable in 78% of the cases. It could be concluded that early diagnosis, correct treatment approach and follow-ups were the main factors of a successful treatment of infra-occluded primary molars.

Keywords: Infraocclusion; Primary Molars; Children; Ankylosis

Introduction

The term “infraocclusion” describes a tooth which lies below the occlusal plane. Other terms used in the literature are submerged, impaction, reimpaction, re-inclusion and secondary retention. However, it is suggested that the term “infraocclusion” gives a good description of the clinical appearance and has gained increasing use during recent years1. The term “ankylosis” has been also most widely used because of the clinical, radiographic and histological evidence, which suggested that the majority of infra-occluded teeth were ankylosed. This term refers to one possible cause or frequent association with infraocclusion. It is assumed that because of tooth ankylosis, the infra-occluded tooth remains in a fixed position while eruption of adjacent teeth appear2.

The other factors involved in infraocclusion of primary teeth are congenitally missing permanent teeth, defects in the periodontal membrane, local mechanical trauma, a disturbed local metabolism, injury to the periodontal ligament, precocious eruption of the permanent first molar or a combination of the mentioned factors3-7. A familial tendency was also indicated as the aetiology of infraocclusion8.

Infra-occluded teeth are more common with the primary teeth than the permanent teeth, and mandibular primary molars tend to be infra-occluded more frequently than maxillary primary molars2,8,9.

The aim of the study was to describe the distribution and degree of infraocclusion in a group of children aged between 6 to 11 years, and to evaluate the influence of the age of diagnosis and treatment outcomes during a period of 2 years.

Material and Methods

21 patients aged between 6 to 11 years, who were referred to the Department of Paediatric Dentistry, Ege University, due to their dental problems, enrolled in the study. The infra-occluded teeth were observed after clinical and radiographic examinations including orthopantomograph and periapical radiographs. The follow-
up examinations also comprised clinical and radiographic examinations every 6 months during 2 years. The radiographs were evaluated for resorption and ankylosis of the infra-occluded teeth and comparisons were made with radiographs taken before.

Parameters assessed were age, gender, distribution and degree of infraocclusion based on radiographs, ankylosis, altered position of adjacent and successor teeth, and treatment outcome. The degree of infraocclusion was considered as mild, moderate or severe, as described by Brearly and McKibbin. Mild was described as occlusal surface located approximately 1 mm below the expected occlusal plane for the tooth. Moderate was described as occlusal surface approximately level with the contact point of one or both adjacent tooth surfaces. Severe was described as occlusal surfaces level with or below the interproximal gingival tissue of one or both adjacent tooth surfaces.

Mobility test was performed by direct finger pressure and percussion sound was recorded after tapping the crown of the tooth vertically as well as horizontally with the handle of a probe by the first examiner to determine ankylosis.

A therapeutic approach was chosen according to the patient’s age, occlusal status, development and condition of the infra-occluded teeth, lack of a permanent successor and extent of root resorption.

Results

56 infra-occluded teeth were detected in 21 patients (11 boys and 10 girls) whose mean age was 9.4±0.8 years (Tab. 1). At the time of first examination, all the patients were in the mixed dentition stage. 18 patients had more than 1 infra-occluded tooth while 3 patients had 1 tooth in infraocclusion. 11 (19.7%) infra-occluded teeth were located in the upper jaw while 45 (80.3%) teeth were found in the lower jaw. 24 (42.9%) of the infra-occluded teeth were primary first molars and 32 (57.1%) of them were second molars. The degree of infraocclusion was considered as mild in 35 (62.5%), moderate in 15 (26.8%) and severe in the remaining 6 (10.8%) teeth. Agenesis of premolars was diagnosed in 10 (17.9%) infra-occluded teeth. Ankylosis was detected in 29 lower infra-occluded molars after mobility and percussion tests, and radiographic examination.

Table 1. Distribution of 56 infra-occluded primary molars by gender, degree of infraocclusion and location in 21 patients

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of teeth</th>
<th>Location</th>
<th>Degree of infraocclusion</th>
<th>Lack of permanent successor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Girls</td>
<td>Boys</td>
<td>Maxilla</td>
<td>Mandible</td>
</tr>
<tr>
<td>Primary first molar</td>
<td>3</td>
<td>5</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>Primary second molar</td>
<td>7</td>
<td>6</td>
<td>32</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>11</td>
<td>56</td>
<td>45</td>
</tr>
</tbody>
</table>

Out of 46 infra-occluded teeth which had permanent successors, 19 ankylosed teeth were extracted and 5 space maintainers were fitted and remained in place until the eruption of the successors. 27 infra-occluded teeth were left undisturbed waiting for the normal exfoliation, but monitored every 6 months fulfilling their function as space maintainers. At the end of 2 years, 6 teeth were exfoliated and the permanent successors erupted with a mean period of 9 months later than on the normal, contralateral side, and 10 teeth were extracted because of the root development of the successors. The remaining 11 teeth were still being monitored every 6 months. After orthodontic evaluation of the occlusion, it was decided to allow the 10 infra-occluded ankylosed molars with agenesis to persist. Composite build-ups were placed to 6 infra-occluded teeth with agenesis in order to restore the occlusion and interproximal contacts and waited for resorption. The degree of root resorption was unchanged or minimal in the infra-occluded teeth with agenesis at the end of 2 years. Migration of the neighbouring tooth was present in 62.5% of the cases, and the treatment outcome was favourable in 78% of the cases.

For 2 patients who had severely infra-occluded teeth, extraction followed by orthodontic treatment was planned, but the patients refused the treatment and showed poor compliance to the follow-up examinations. After 2 years, they were recalled and their orthopantomographs were taken. In figure 1a, the patient was 9-year-old boy and his medical history was unremarkable. The patient had 2 infra-occluded teeth, upper right primary first molar and lower left primary second molar with caries. It was decided to extract the infra-occluded teeth and an orthodontic treatment was planned, but he refused the extraction and failed to come to the follow-up examinations. After 2 years, he was recalled and an orthopantomogram was taken, shown in figure 1b. The degree of root resorption was unaltered in both of the infra-occluded primary molars. The carious teeth had been restored in a private dental clinic. The infraocclusion had worsened in both the upper and lower regions and tipping of the neighbouring
teeth was diagnosed. The upper and lower primary incisors had exfoliated and the permanent incisors had erupted as well as the permanent first molars.

In figure 2, the patient was an 8-year-old girl and her medical history was unremarkable. The patient had referred to our clinic for her non-erupted permanent first central incisor. Her orthopantomogram and intraoral clinical examination showed a lower left second primary infra-occluded molar with the tipping of the permanent first molar and a malocclusion in the upper left region (Fig. 2a and b). In view of the severity of the infraocclusion and the malocclusions, an orthodontic treatment was considered with fixed appliance therapy. The patient refused the orthodontic treatment because of financial circumstances. After 2 years, orthopantomogram and clinical examination revealed that the degree of root resorption of the infra-occluded tooth was unchanged although the root of the permanent successor has developed, but a resorption was observed at the distal root of the symmetrical primary second molar (Fig. 3a and b). The positions of the non-erupted upper permanent first central incisor, second premolar and first molar was unaltered and the remaining teeth in her mouth had a normal resorption and eruption.
Discussion

The infraocclusion is a common eruption disturbance, which constitutes a major clinical problem. It is reported that the prevalence of children with infra-occluded primary molars in the various population ranges from 1.3% to 38.5%. The prevalence could be changed due to the age of the children, ethnic differences, differences in number of remaining primary molars, and differences in the criteria used.

Infraocclusion is found from 3 years of age and prevalence of infraocclusion has been reported to reach a peak at ages from 6 to 11 years of age. It is also mentioned that the variations in the age could possibly be related not only to genetic predisposition to infraocclusion but also to the inception of this condition and the exfoliation time the infra-occluded tooth. The age range from 6 to 11 years is in the present study, too.

Infraocclusion of primary molars is usually found not to be sex linked. However, a more frequent occurrence in girls than in boys has been reported in some studies. No gender predominance was observed in our study. Most investigations have reported that the primary second molars were most commonly found in infraocclusion. However, it has recently been reported that the primary first molars were more often found in infraocclusion. This difference is most probably due to the fact that mandibular primary first molars ankylose earlier, produce less infraocclusion and usually exfoliate on time, which means that they may go undetected. In contrast, mandibular primary second molars produce more severe infraocclusion and a slight delay in the eruption of their successors. In children with more than 1 tooth affected, bilateral occurrence was reported to be more common. The most frequently affected teeth were primary second lower molars (57.1%), as in a bilateral occurrence in our study.

The degree of infraocclusion can be from mild to severe. Depending on the degree of infraocclusion, the occlusion and the position of the tooth germ could be affected. Infra-occluded teeth could have a high potential to malocclusion. In the literature, complications of infra-occluded primary molars were stated as tipping of the neighbouring teeth, loss of space, extreme eruption of the antagonist, posterior open bite and rotations in the successor teeth. In the present study, tipping of neighbouring tooth was found to be the most frequent complication.

Infraocclusion in children seemed to be associated with agenesis; the prevalence of missing successors underneath primary molars with infraocclusion varied from 5 to 67%. In the present study, the prevalence of missing successors was found as 17.9% of the total cases.

When considering treatment options for the infra-occluded primary molars, there is no general agreement. It was reported that the most important influencing factor was the presence or absence of the permanent successor and when successor is absent, root resorption was slow and spontaneous exfoliation less likely. In this study, the degree of root resorption was unchanged or minimal in the infra-occluded teeth with agenesis after 2 years.

Teague et al. reported that treatment depends upon the patient’s age, the condition of the primary molar, the patient’s preference, jaw relationship and occlusion. When the successor was present, the infra-occluded tooth could exfoliate normally. However, exfoliation was usually delayed by only 6 to 12 months compared with contra-lateral unaffected tooth and infra-occluded tooth should not be extracted solely to prevent an increase in infraocclusion. Kurol and Koch compared extraction and non-extraction management of contra-lateral teeth in patient’s with bilateral infra-occluded primary molars and

![Figure 3a: Orthopantomograph of the same patient after 2 years, showing no resorption of the infra-occluded primary second molar roots, and no alterations at the left upper region with a severe malocclusion](image1)

![Figure 3b: The intraoral view of the patient showing eruption of the lower left permanent canine and the first premolar](image2)
found that there was no significant delay in exfoliation of non-extracted infra-occluded teeth. McDonald et al\textsuperscript{21} suggested that if cooperation of patients was obtained, observation was the best approach. On the other hand, some authors recommended early tooth extraction for the treatment of infra-occluded teeth and treatment regimens could remain controversial\textsuperscript{5}.

In the present study, therapeutic extraction was chosen in patients with several occlusal disturbances, risk of impaction of a permanent tooth or ankylosed teeth with significant delay in root resorption. We suggest that infra-occluded primary molar should not be extracted before the time it should exfoliate if the successor is present, unless ankylosis was detected. Only when the resorption did not proceed normally and ankylosis was observed, then extraction should be considered. In case of agenesis, it was suggested that persistence of infra-occluded primary molars could serve as a semi-permanent solution for the patients.

**Conclusion**

It was revealed that, in the management of the infraocclusion, early diagnosis and correct treatment approach play significant roles in eliminating the dental problems, particularly malocclusion. Multidisciplinary treatment and periodic follow-ups could be suggested in order to prevent the complications of infra-occluded primary molars.

**References**


Correspondence and request for offprints to:

Dr. Naban Kocatas Ersin
Ege University, Dental Faculty
Dept of Paediatric Dentistry
35100 Bornova, Izmir
Turkey
E-mail: naban@dent.ege.edu.tr