Infraocclusion: a case report with an unexpected outcome

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ABSTRACT. The management of infraoccluded primary molars can pose some difficult clinical questions: when to treat? What treatment to provide? Why treat? How long to wait and watch? The definition and aetiology of infraoccluded primary molars is discussed. Some of the sequelae of different treatment options are described. A case is presented of the management of a ten and a half year old girl with a severely infraoccluded maxillary left second primary molar. The initial treatment plan included surgical removal of both the infraoccluded primary molar and the permanent successor, which was impacted high in the maxilla. However, the sudden unexpected eruption of the permanent tooth allowed a successful non-surgical outcome.

KEYWORDS: Infraoccluded primary molars, Non-intervention, Waiting lists

Introduction

‘Infraocclusion’ is a term used to describe the clinical appearance of a tooth whose occlusal surface is at least 1 mm below the occlusal plane [Andlaw and Rock, 1992]. Other terms used in the literature include submergence, secondary retention, ankylosis, impaction and incomplete eruption [Kurol and Magnesson, 1984; Alexander, 1992]. These terms may relate to possible aetiological factors, although the overall mechanism of infraocclusion is not fully understood. This results in the tooth failing to maintain its position relative to the adjacent teeth in the developing dentition.

Clinical features. The clinical picture is often associated with tipping of adjacent teeth and over-eruption of opposing teeth [Messer and Cline, 1980; Kurol, 1981]. The degree of infraocclusion is generally graded according to the position of the occlusal surface in relation to the adjacent teeth [Darling and Levers, 1973; Messer and Cline, 1980; Douglass and Tinanoff, 1991].

- Grade 1: minimal. The marginal ridge of the infraoccluded tooth is occlusal to the adjacent contact areas.
- Grade 2: moderate. The marginal ridge of the infraoccluded tooth is just cervical to the adjacent contact areas.
- Grade 3: severe. The marginal ridge is at or below gingival level.

Aetiology and prevalence. Suggested aetiological factors include: genetic predisposition, absence of a permanent successor [Vorhics et al., 1952; Biederman, 1968], local failure of alveolar bone growth, trauma [Douglass and Tinanoff, 1991], and disturbed local metabolism causing structural changes in the periodontal ligament [Kurol and Magnesson, 1984].

The reported prevalence of infraocclusion in children varies widely from 1.3 to 8.9% depending on the age group examined and different diagnostic criteria [Brearley and McKibben, 1973; Kurol, 1981; Douglass and Tinanoff, 1991]. There is a peak between 8 and 9 years of age, with no significant difference between males and females. First primary molars appear to be more frequently affected than second, and mandibular more than maxillary teeth. There is an increased incidence amongst siblings [Via, 1964; Kurol, 1984; Dewhurst et al., 1997].

Infraocclusion is distinct from primary failure of eruption and may often only be distinguished by a history of progressive submergence in severe cases [Proffit and Vig, 1981; Winter et al., 1997].

Treatment and sequelae. Treatment options and sequelae depend on the severity of the infraocclusion, early or late onset and treatment, the rate of
progression, and the presence or absence of a successor [Ekim and Hatibovic-Kofman, 2001]. Radiographic examination is essential prior to treatment planning. Most infraoccluded primary molars with a permanent successor have been shown to exfoliate normally, with the erupting successor resorbing any areas of ankylosis [Dixon, 1962]. Nazif et al., in 1986, showed a statistically significant relationship between root resorption of ankylosed mandibular primary molars and root formation of their permanent successor, and that ankylosed first primary molars and their permanent successors showed a statistically significant delay in root resorption and root development. However, there was no significant difference in second primary molars and their successors. Conversely, Steigman et al. showed no such relationship between ankylosis and root formation [Steigman et al., 1974].

Extensive bony ankylosis may prevent normal exfoliation and cause problems with arch alignment. Some studies state that a 6 month delay in exfoliation is acceptable for ankylosed primary molars and that the degree of infraocclusion is not related to the amount of delay [Kurol and Thilander, 1984; Kurol and Koch, 1985; Douglass and Tinninoff, 1991].

In cases of minimal infraocclusion, careful monitoring every 6-12 months will allow assessment of the rate of progression of the condition. Where there is moderate infraocclusion, two treatment options are available: extraction or retention [Gulati and Welbury, 1998; Ekim and Hatibovic-Kofman, 2001]. Extraction may be followed by prosthetic replacement of the unit via an etch-retained bridge or implant, or orthodontic repositioning of the remaining teeth. Restoration of the infraoccluded tooth to maintain the occlusion and prevent further tipping and over-eruption can be by the use of gold crowns, stainless steel crowns, direct bonded acrylic resin dummies [Gorelich and Geiger, 1977], amalgam and composite resin [Bonin, 1970], composite crowns [Williams et al., 1995], resin bonded onlays [Cavanaugh and Croll, 1994], indirect composite onlays [Evans and Briggs, 1996] and resin bonded porcelain crowns [Gulati and Welbury, 1998].

In cases of severe infraocclusion, extraction is usually the treatment of choice, particularly in cases of severely delayed or ectopic eruption of the permanent successor. Where no successor is present, prosthetic replacement or orthodontic treatment should be considered. Early extraction is often advised, as removal may become increasingly more difficult as the infraocclusion progresses. The tendency of ankylosed maxillary molars to be severely infraoccluded usually indicates early extraction [Kurol and Koch, 1985].

This report describes an unexpected outcome of delayed extraction in the case of a severely infraoccluded second maxillary primary molar.

**Case report**

A ten and a half year old girl was referred to the department in March 1999, for advice and treatment regarding her infraoccluded maxillary left second primary molar (65). The tooth had progressively ‘submerged’ in relation to the adjacent teeth. She was a regular dental attender and had required no previous active treatment. Her medical history was unremarkable.

On examination she was in the permanent dentition, with good oral hygiene and no soft tissue pathology. All the permanent teeth were present with the exception of the maxillary left second premolar (25) and all the wisdom teeth. There were no obvious carious lesions present. The maxillary left first premolar and permanent molar (24 and 26) were tipped with virtually complete closure of the space for 25. The second primary molar and second premolar (65 and 25) were not visible or palpable. A panoramic radiograph revealed the presence of the completely submerged maxillary left second primary molar (65) with its permanent successor (25) displaced high above the roots of the first premolar (24) (Fig. 1). The roots of 65 had been completely resorbed with only the shell of the crown remaining. There was severe tipping of the adjacent first permanent molar and premolar. All four third permanent molars were developing as expected.

**FIG. 1** - Panoramic radiograph of a ten and a half year old girl, taken at presentation, March 1999, showing infraocclusion of 65.
In view of the loss of space and the high position of the second premolar, it was decided to place the patient on the waiting list for surgical removal of the submerged primary molar (65) and its permanent successor (25) under general anaesthesia.

The patient’s name eventually came to the top of the waiting list 10 months later, in January 2000, and she duly attended for her day-stay general anaesthetic (GA) procedure. When she was examined prior to the GA it was obvious that the permanent second premolar was erupting palatally and that the majority of the retained primary molar had been resorbed. Her operative procedure was immediately cancelled.

A simple removable orthodontic appliance was subsequently constructed. This was preferred by the patient to a fixed appliance. It had Adam’s cribs on 14, 15 and 24, and a palatal finger spring to distalise and upright 26 and create space for 25. By June 2000, the maxillary left second premolar was almost completely erupted. A new panoramic radiograph showed the residual shell of the primary molar lying between 25 and 26 (Fig. 2). These remnants were easily removed under local analgesia. By this time the premolar was nearly into occlusion and there was no need for further orthodontic intervention. At her final review in August 2001, her occlusion was satisfactory and she was discharged from the department (Fig. 3).

Discussion

Decisions regarding the management of infraoccluded primary molars are usually based on an assessment of the degree of infraocclusion, the amount of root resorption, and the presence and position of the permanent successor. In this case, the infraoccluded tooth was below the gingival level and the adjacent teeth had tipped to close the space. The permanent successor was very highly positioned and displaced from its normal path of eruption. The contralateral tooth was fully erupted into occlusion. Most clinicians would agree that in cases of this severity, surgical removal of the infraoccluded tooth, with or without its permanent successor, was the treatment of choice.

This girl waited 10 months in order to have her treatment completed under GA, but in that time the severely displaced premolar had begun to erupt. This case raises many questions regarding the treatment of infraoccluded primary molars and the timing of any surgical intervention: why did the primary molar suddenly resorb at this late stage? What made the impacted ectopically placed permanent premolar suddenly erupt? Therefore, for how long, if at all, should we wait and watch ‘sinking’ primary molars? These questions remain unanswered and are the subject of continuing debate.

In this particular case, a successful non-interventional outcome was achieved without the need for surgery or a GA, and where all the permanent units were retained. However, we would advise caution on adopting a ‘wait and see’ approach. There is no guarantee that infraoccluded teeth will resorb or impacted teeth erupt. A more reliable outcome could have been achieved by earlier referral and removal of 65 and then a space maintainer with a loop retainer attached to a molar band on 26 being fitted.

References


