Complete infraocclusion of a previously erupted primary molar: A case report

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Abstract
The prevalence of infraoccluded or impacted primary molars was reported to be from 1.3% to 8.9% of the population with higher incidence between siblings. This is a report of a rare case of a 10-year-and-11-month-old boy with a previously erupted primary maxillary right second molar that was restored by with an amalgam filling at about three years of age. After seven years, the said tooth was found X-ray photographically to be completely embedded into the alveolar bone with an “impacted” maxillary permanent second premolar. There was also mesial tipping of the adjacent permanent first molar. The management of this case included the use of a space regainer to correct the molar tipping, surgical removal of the ankylotic infraoccluded primary molar and the use of a palatal holding arch to correct the torsiversion. This report underscores the need for early recognition of infraoccluded/ankylosed primary teeth by dentists for regular monitoring and timely and appropriate intervention.

Introduction
Primary retention refers to the cessation of tooth movement during the pre-eruptive stage resulting to an embedded tooth that fails to emerge and covered with alveolar bone. This is rarely seen, usually asymptomatic and detected only during routine X-ray photographic examination. Submergence, infraocclusion or secondary retention on the other hand, refers to the cessation of tooth movement after eruption and subsequently the tooth appears clinically to have receded from its position, usually below the plane of occlusion, after emergence into the mouth.

Infraocclusion in primary dentition is mainly in primary molars which develop during the early mixed dentition. The prevalence of infraoccluded primary molars was reported to be from 1.3% to 8.9% of the population with higher incidence between siblings. In many cases, they appear below the plane of occlusion above the gingival margin but a few can be severely occluded to be covered by gingiva or become totally embedded in bone. If left untreated, the commonly reported occlusal consequences are space loss due to tipping of adjacent teeth and/or over eruption of the opposing teeth. Other complications include the insufficient development of adequate width and height of supporting bone which may complicate future dental treatment. Severe infraocclusion in primary molars
were also reported to be associated with eruptive and developmental disturbances like ectopic placement of the succedaneous permanent dentition\textsuperscript{7}. The recommended treatment is based on the presence or absence of successors, the onset of ankylosis and early or late diagnosis\textsuperscript{4}. This report describes the secondary retention of a previously-erupted amalgam-filled maxillary second primary molar, its progress and management.

**Case Report**

A 10-year-and-11-month-old boy presenting an impacted upper right permanent second premolar and upper right second primary molar was referred to the Pediatric Dental Clinic of the Tokushima University Hospital. Dental history included regular dental visits since age one year and six months and an episode of amalgam restoration of the upper

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**Fig. 1** Intraoral photographs (A, B) taken during the first visit. (B) Photograph (mirror image) showing the mesial migration of upper right permanent first molar and the absence of permanent second premolar (white arrow).

**Fig. 2** Panoramic (A) and dental (B) X-ray photographs showing the mesially tipped upper right permanent first molar and the unerupted permanent second premolar and infraoccluded second primary molar (white arrows) with radiopaque material on occlusal.
right second primary molar at about age three. There were no significant medical and family histories. Oral examination revealed normal occlusion with eruption of permanent dentition from central incisors to first molars on both mandible and maxilla except on the maxilla with the presence of the right primary canine, the mesial tipping of the upper right permanent first molar and the absence of the upper right permanent second premolar (Fig. 1). The presence of the embedded right second primary molar with a radiopaque-appearing occlusal material superior to the unerupted upper right permanent second premolar was confirmed by X-ray photography (Fig. 2) and CT scan (Fig. 3). The root apex of the right second primary molar was shown approximating the inferior border of the maxillary sinus (Fig. 3).

The first treatment was to correct the mesial tipping of upper right permanent first molar by setting a removable space regainer. Four months after continuous use of the removable appliance, tooth axial uprighting of the upper right first molar was achieved and a sufficient space was obtained between the upper right first molar and the upper right first premolar. Surgical removal of the submerged right second primary molar was then executed under intravenous sedation and local anesthesia at the Oral Surgery Clinic of this hospital. The extracted second primary molar was found to have an occlusal amalgam filling, resorbed disto-buccal root, ankylosed mesio-buccal root and a curved palatal root (Fig. 4).

Three months after extraction of the upper right
Fig. 5  (A) Intraoral photograph showing the eruption of the upper right second premolar in torsi-version (mirror image). (B) Palatal holding arch modified with buccal and palatal buttons.

Fig. 6  Oral condition after a 4-month continuous use of the holding arch showing the upper right second premolar at the proper bucco-palatal orientation (mirror image).

Fig. 7  Panoramic (A) and dental (B) X-ray photographs showing the upper right permanent second premolar (white arrows) maintaining normal position at 12-month recall.
second primary molar, the succedaneous permanent second premolar was found to be partially erupted in place, but in 90° torsiversion (Fig. 5A). A palatal holding arch appliance modified with buccal and palatal buttons was then designed and set to correct the torsiversion (Fig. 5B). After four months of use of the palatal appliance, the upper right permanent second premolar was found at the proper buccopalatal orientation (Fig. 6) and erupting in place at 12-month recall (Fig. 7). The patient was then seen on regular recall follow-up.

Discussion

The proposed etiology of infraoccluded primary teeth includes periodontal ligament disturbances, deficient eruptive force, local infection, trauma, chemical or thermal irritation, disturbance in interaction between normal resorption and hard tissue repair and even genetic output1–3). The possibility though of limited area of dental ankylosis is thought to be the major etiological mechanism1,4). It is theorized that ankylosis may occur anytime during or following active eruption1). After disturbances in the periodontal ligament area, the ankylosed tooth remains in a fixed position, while the surrounding tissue including other teeth moves more occlusally with the eruptive process1). The ankylosed tooth will then become progressively inferior which is further influenced with the eruption and tipping of the adjacent permanent first molar and finally being “submerged” as seen in the present case (Fig. 8A–C). We assume that the case presented here resulted from the ankylosis of the primary molar and simultaneous growth of the surrounding maxilla and eruption of adjacent teeth. Its migration may end with the completion of the surrounding bone development. The presence of the submerged upper right second primary molar must have inhibited the movement of the tooth germ of the upper right permanent second premolar forcing the later into rotation and malposition as reported with a similar case8). If the rotation of a permanent tooth is diagnosed early, a conservative treatment using a modified palatal holding arch has to be done before there is complete closure of the root apex to facilitate the derotation of the tooth.

With infraoccluded teeth, it is important that they be diagnosed early so that the use of X-ray photographs is to be emphasized. Once a diagnosis of infraocclusion is made in primary or mixed dentition, it is necessary to determine whether the tooth is ankylosed and if there is a permanent successor present4,6). If the tooth is not ankylosed and the permanent successor is present, it has been suggested to wait for normal exfoliation, which can
be delayed 6 to 12 months). The aim of treatment is to allow the eruption of the successor. Prevention of tipping of adjacent tooth, over eruption of opposing tooth can be prevented by restoration of the occlusal surface, placement of stainless crown or occlusal resin build-up. If there is severe or progressive infraocclusion below the gingival margin, severe tipping, ectopic eruption of the permanent successor, caries or abscess formation, extraction is indicated. In the absence of a permanent successor, the decision to preserve or extract the infraoccluded tooth depends on the dental condition of the tooth, root support, occlusion, and patient’s preference. Space maintenance may be necessary to prevent molar drifting or tilting. If the infraerupted tooth is ankylosed, tooth must be monitored regularly and restored if necessary to prevent tipping of adjacent tooth or over eruption of opposing tooth. It was recommended that the general practitioner be prepared to refer for a specialist’s opinion if in doubt. In particular, referral to a specialist is suggested prior to the eruption of the permanent first molar when it is evident that a deciduous molar has failed to erupt or has become severely infra-occluded.

The presence of infraoccluded primary teeth requires early recognition, vigilant and regular recall and timely, appropriate intervention. Ankylosis of these teeth does not imply a static position but must be viewed with the dynamics of growth of the surrounding tissue. Extraction is indicated if the tooth becomes moderately infraoccluded and early extraction and space maintenance is usually indicated for severe infraocclusion.

References