Management of delayed eruption of a mandibular premolar tooth caused by a radicular cyst of its predecessor: A case report

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Abstract
A single or multiple factors may contribute to delayed eruption of permanent teeth. Pathologies of the primary dentition is one of the entities which gives rise to mechanical obstruction or impairment of the physiological process of tooth eruption. When the eruption is delayed particularly in relation to the biological age, chronological age and the eruption pattern of the contra-lateral tooth, special investigations are indicated to arrive at a definitive diagnosis and also to formulate the treatment plan.

The present case report is based on an 11 year old female patient who presented with a swelling in relation to the unerupted lower left second premolar tooth. Investigations revealed an extra follicular radicular cyst impacting the second premolar tooth which required multi-disciplinary management. This included marsupialization and surgical exposure along with orthodontic space maintenance, to guide the erupting tooth into the arch.

Key words: tooth eruption, delayed, mechanical obstruction, intra oral swelling, extra follicular radicular cyst.

Introduction
Tooth eruption is the process of moving the developing tooth from the bony crypt within the alveolus to the occlusal plane, into contact with specific opposing teeth. The exact mechanism of eruption is considered under number of concepts and hypotheses which are yet to be confirmed (1). The undeniable fact is that it is a complex and remarkable mechanism occurring within the human body.

Thus, normal tooth eruption is a process that occurs under the effect of multiple factors, mainly systemic and local. Some of those factors are genetics, sex, age, systemic disorders, socio-economic status and nutritional status (2,3).

It is also stated that the dental follicle and many biochemical components interact in a regulated manner, within the alveolar bone in this localized environment to enable tooth eruption.

Generally it is reported that delay in eruption is commoner than premature eruption, but when the latter does take place, it is more likely to be of a systemic influence rather than a local effect,
which needs to be investigated

Delayed eruption of permanent teeth refers to a time lapse which the general community assesses relative to the siblings, friends and more accurately to the eruption of contralateral tooth of the arch. Actual delay is accepted when the chronology is lagging behind, significantly for over 4-6 months, particularly whilst the contralateral tooth is already in the arch, considering the other information as age, sex, ethnicity and race as well.

Delayed eruption is a common complaint among patients who present to the Paediatric Dental care units. As the parents of these patients are concerned, such complaints require prompt management with reference to identifying the cause and initiating treatment further to avoid malocclusion from being established or to prevent worsening of the severity of the existing malocclusion. Thus the aim of the treatment is to enable the developing dentition to acquire functionally adequate and aesthetically acceptable occlusion.

Delay in eruption can be generalized where it occurs under the influence of genetic or systemic conditions similar to syndromes such as Down’s syndrome and Cleidocranial dysplasia.

Another entity of delay is termed primary failure of eruption, where non syndromic patients with no mechanical obstruction show failure of teeth eruption with no detectable cause.

Localized delay on the other hand can also occur due to reasons such as physical obstruction by soft or hard tissues, loss of space due to early loss of primary teeth, ectopic path of eruption and certain injuries to primary teeth such as intrusion and avulsion.

Physically, supernumerary teeth, sclerotic bone deposits, odontogenic tumors, cysts, fibrous scar tissues or mucosal barriers can resist the emergence of the tooth through bone and penetration of the mucosa.

When an intra-bony obstruction is suspected, radiological investigations, commonly via a Dental Panaromic Tomography may depict the nature of the obstruction along with the developmental condition of the tooth and position in relation to the path of eruption.

Basic guideline is to consider the possibility of saving the tooth by removal of any obstructions with surgery, with or without orthodontic traction or otherwise plan for proper space closure with multi-disciplinary management.

Radicular cysts from deciduous teeth are not common in presentation but it is more likely to occur in the mandible in association with carious or endodontically treated teeth.

This case report emphasizes the importance of proper management of carious deciduous teeth to prevent pathologies such as cysts which can prevent eruption of the developing successor and maintaining it till correct time of exfoliation, at correct developmental stage without compromising the alignment of teeth within the arch and the occlusion.

It is also mandatory to intervene as necessary with an appropriate plan in order to facilitate the development of the impacted tooth to come into functional position as expected.

**Case history**

The case presented is based on an 11 year old girl who was complaining of a swelling in the mandible on left side of approximately two months duration. She was apparently healthy. Previously this patient had undergone surgical correction of cardiac defect and was indicated to be under antibiotic prophylaxis prior to any invasive procedure. There were no known dental anomalies in the family.
On examination the swelling was mildly visible extra orally as a diffused enlargement of the mandible with no erythema or suppuration. (Fig 1)

Intra oral examination revealed erupting upper left canine with complete dentition in each quadrant up to second molars. There were septic roots of the lower left second primary molar tooth. Occlusal caries of lower left first molar was restored.

No previous treatments have been carried out to the carious lower second primary molar tooth. A diffused bony hard swelling of 2 cm x 2cm size was present on palpation which extended bucco-lingually. (fig 2) Retained septic roots of the deciduous second molar could be seen on the surface of the swelling and it had mild tenderness.

Clinically the swelling was suggestive of a cyst or tumor of odontogenic origin. The Dental Panoramic Tomography view (DPT) showed a lesion similar to a dentigerous cyst originating from the second premolar tooth. The septic roots were also present. There were no other significant anomalies to be seen. (fig 3)

A cone beam computed tomography (CBCT) view was obtained. (fig 4) The impacted second premolar tooth showed proper crown and root development which were favorable for retaining the tooth.

Surgical management was carried out with extraction of the roots of the second Primary molar tooth and marsupialization of the cyst under SABE prophylaxis cover. The incisal biopsy of the cyst revealed the diagnosis of a radicular cyst in relation to carious primary molar. (fig 5)

One week following the surgery a removable orthodontic appliance was fitted with a bulb positioned in to the bony socket of the extracted tooth (fig 6) to ensure that the eruption pathway is maintained patent. Orthodontic traction was not applied considering the favorable location and the development stage of the roots of the second premolar molar tooth. Patient was kept under observation and the acrylic plate was gradually trimmed to provide space for tooth eruption.

Eight months after surgical intervention, the tooth was visible in the arch. Thus, the space maintainer was discontinued. (fig 7) Patient was free of any symptoms.

Discussion
Variation in eruption time of teeth and sequence is a common complaint among the patients attending Paedodontic units. Especially the parents tend to become anxious when comparing with other children of the same age. The importance of such a complaint in a clinician’s perspective is the need for arriving at a proper diagnosis. There are number of local and systemic conditions that can delay the eruption process of teeth.

This patient complained specifically of the swelling in the left premolar region of the mandible, where a grossly carious remnant of a deciduous second molar was present. The contralateral tooth was present in correct alignment that gave the basis for suspecting a delay in eruption. As this patient was 11 years old and by definition it could be permitted to be kept under observation, yet the swelling implied the presence of some underlying pathology.

Clinically an odontogenic cyst was considered a possibility, yet presentation of a radicular cyst in primary dentition, which is reported to be rare with only 0.5 - 3.3% of all radicular cysts(10,11), was to be excluded. Radicular cysts are the commonest odontogenic cysts of inflammatory origin with a reported prevalence of about 7- 54%(10). Yet the lesser presentation in the primary dentition is said to be due to the draining of apical and inter-radicular inflammatory
exudates rather than accumulating and forming a cyst. Nevertheless as Mass et al\(^{(14)}\) proposes the prevalence of radicular cysts could be much higher than the reported statistical value considering the less likely interest at subjecting the tissues from an extracted deciduous tooth to histopathological investigations.

Since the age of this patient is only 11 years, it is also not justifiable to suspect a dentigerous cyst so early, which normally appears in relation to an impacted tooth. Therein the retained septic roots too made radicular cyst the more likely diagnosis.

Cyst formation results in bone expansion, delayed eruption, malposition of the developing teeth, resorption of erupted or developing teeth, enamel defects or likely damage to the developing successor\(^{(9,12)}\). Some of these features as bone expansion and delay in eruption were present in this case as well.

Herein the radiological findings too were consistent with a dentigerous or a radicular cyst where the lesion appeared radiolucent and unilocular. It was inter radicular in location relative to the deciduous molar while the crown of the developing premolar was apparently within the lesion similar to a dentigerous cyst.

As it has been reported, the common findings with a radicular cyst originating from deciduous teeth are caries, mandibular buccal cortical expansion, well defined unilocular radiolucency, thin reactive cortex and displacement of succedaneous teeth\(^{(11)}\). But, the acute inflammation is more like to create a dento alveolar abscess and drain in younger individuals with odontogenic infections. Our patient’s presentation could be related to this typical clinical scenario. Generally management of teeth with such presentations have to be critically evaluated considering the possibility of maintaining the tooth.

For teeth with delayed eruption, observation, elimination of obstacles, exposure with or without orthodontic traction, auto transplantation, and control of systemic causes are suggested\(^{(3,4)}\). When delayed eruption is associated with a cyst, enucleation of the cyst with extraction of the associated tooth\(^{(10,12)}\), or marsupialization with space maintaining device for facilitating the eruption of the permanent tooth can be carried out and is evidently a successful maneuver\(^{(10)}\).

Thus, extraction of septic roots, marsupialization, decompression of the radicular cyst and fitting of an acrylic plate with a projection, which was designed for the patient were carried out, aiming to maintain a patent pathway for the eruption of the premolar.

Histopathological findings were consistent with that of a radicular cyst with proliferating non keratinized stratified squamous epithelium and arcading pattern rather than a dentigerous cyst with thin epithelium\(^{(15)}\).

After a period of almost 8 months, the tooth gradually emerged into the oral cavity and radiologically the development and bone healing were uneventful.

When a young patient presents with a direct complaint of a disturbance in tooth eruption or a symptom that could suggest a pathology, considering the age, sex, clinical signs, symptoms and appropriate investigations, clinicians should be always attentive to the possibility of compromised eruption which can be treated and rectified with proper timely intervention.

More importantly, multi-disciplinary treatment involving Paedodontists, Dental surgeons, Orthodontists and Oral pathologists along with general physicians or the relevant specialists in cases with special needs may together succeed in optimizing the treatment outcome for better oral health as well as general wellbeing of these children.
Conclusion
This case report presented an 11 year old female patient with intra oral and extra oral swellings in relation to the left mandibular premolar region. This patient was diagnosed to have an extra follicular radicular cyst originating from the septic deciduous molar tooth which was managed with surgical and orthodontic intervention. By the end of 8 months’ time period, the displaced permanent tooth was evident, emerging in to the oral cavity, without any complications.

Timely intervention with an appropriate treatment plan enabled the permanent tooth of this patient to be saved. This further highlights the importance of proper dental care in children and also timely intervention which can prevent the need for complicated treatment procedures in the future.

References
1. Inger K. Mechanism of tooth eruption; a review article including a new theory for future studies on the eruption process. Scientifica 2014; ID -341905
Figure 1. Extra oral view

Figure 2. Intra oral view

Figure 3. DPT view

Figure 4. CBCT View

Figure 5. Histopathological

Figure 6. Space maintenance appliance

Figure 7. Erupting second premolar tooth (one year and 6 months after the surgery)