

Permanent Mandibular Second Premolar with Unusual Morphology in Association with Other Dental Variations – Report of A Rarest Case

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ABSTRACT

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The purpose of this article is to present a rarest case, in which the permanent mandibular second premolar exhibited an anomalous shape which is not reported so far in the scientific literature. In addition to this, the article also shows presence of multiple anomalies like ankylosed primary second molar, short root anomaly involving left lower central incisor and severe root dilaceration (90-degree bend) in the mandibular first molar. The specialty of this paper is that all these anomalies occurred in the same arch (mandibular arch) of a non-syndromic 10-year-old Indian male patient.

Introduction

Literature evidence shows that mandibular premolars most of the time are the most challenging teeth to be diagnosed and treated during clinical scenario. These teeth show more propensities for anomalous variations. Premolars with fusion of teeth, atypical crown dimensions, additional cusps, tubercles and deep longitudinal developmental grooves are termed as anomalous tooth morphology [1].

An ankylosed tooth can be defined as an anatomical fusion of the tooth cementum with alveolar bone as a result of some disturbance in their periodontal ligament. In this condition, such teeth will not undergo a normal eruption phenomenon, finally resulting in an under growth around the teeth [2]. Whereas, the term infraocclusion was defined by Andlaw RJ [3] as “a tooth that has failed to maintain its position relative to the adjacent teeth in the developing dentition and hence it is submerged below the occlusal level.” On the other hand, submerged primary tooth refers to the teeth which do not come to the level of adjacent normal occluding teeth. And these teeth are always 0.5 mm or more below the intact marginal ridges of the adjacent teeth. This condition develops after the eruption or emergence of teeth in the oral cavity.

Root dilacerations is one of the evolutionary disorders between the mineralized and non-mineralized parts of the root structure of the developing tooth. It can be defined as a certain degree of curvature occurring from the normal dental longitudinal axis. According to different author’s opinion, a curvature of 20 degree or more and sometimes 90 degree or more are considered as root dilacerations [4,5].

Short root anomaly/Rhizomicroly an unusual radicular anomaly was first described by Lind in 1972, affecting the development of root of the tooth resulting in short roots with rounded apices and reduced crown to ratio [6,7]. Unilateral occurrence of rhizomicroly is more common compared to bilateral presence and most frequently involved teeth by this condition are permanent maxillary incisors followed by mandibular and maxillary premolars. The reported prevalence varies from 2.4 to 10% in different population [8].

Most of the published data in the dental literature shows isolated reports on either any one of the above-mentioned anomalies [1-10]. Occurrence of all these clinical anomalies together in the same arch of non-syndromic patient is not reported so far. Therefore, with the intention of adding lighter on these

abnormal dental entities, the current paper was prepared and published.

Case Report

A 10-year-old male patient reported to a private dental practice complaining of presence of a new, small, abnormal shaped tooth in the lower left back tooth region noticed in the past one month. Patient medical history was uneventful with no any signs and symptoms of medical conditions, systemic disorders or syndromic features. Patient appeared apparently normal with well nourished. On intraoral examination, patient exhibited mixed dentition with normal occlusion. On further examination of the oral cavity, a small rudimentary tooth was observed in the place of mandibular left second premolar region (Figure 1 and 2).



Figure 1: Photograph showing small rudimentary, anomalous mandibular left second premolar (Occlusal view - yellow arrow)



Figure 2: Intra oral photograph showing anomalous (rudimentary cusp like projections) mandibular left second premolar from lateral view (yellow arrow)

On contralateral side, both first and second premolars were erupted and showed normal occlusal morphology. The rudimentary tooth had two cusps like projections over the alveolar ridge with absence of proper crown structure. There was no definite developmental groove observed. The permanent left second premolar appeared to be missing or still not erupted. For

examination of the radicular structure, patient was subjected to radiographic examination. On orthopantomography examination, a rudimentary, anomalous tooth structure was observed having single short root and single canal with apex closed. The tooth had two small rudimentary cusps (Figure 3).

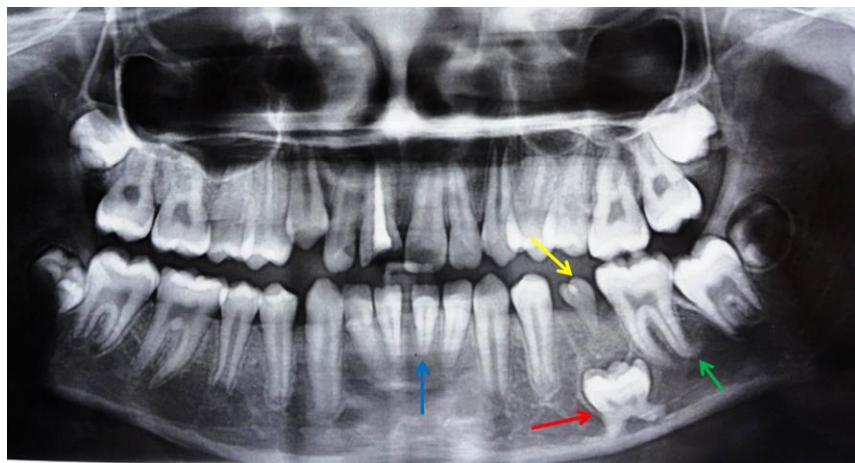


Figure 3: Orthopantomograph showing rudimentary, anomalous mandibular second premolar with short root (mimicking flower bud) (yellow arrow), ankylosed primary second molar (red arrow), and short root anomaly in lower left central incisor (blue arrow) and root dilaceration (90-degree bend) in left permanent first molar (green arrow).

On further examination, an ankylosed primary second molar was found which was placed closed to the inferior border of the mandible which had curved mesial and distal roots and was impacted in mesio-angular direction. When other teeth were inspected suspecting presence of other dental anomalies, the permanent mandibular left central incisor exhibited short root with blunt and closed apex with crown to root ratio equal to 1:1, compared to contralateral incisor and other teeth. In addition to this, in the permanent mandibular left first molar, severe root dilacerations was noticed in the distal root with almost 90-degree bend in the apical one third of the root. The mesial root showed mild dilaceration. Finally considering the clinical morphological features, radiographic features and literature evidence the case was diagnosed as non-syndromic, rudimentary, anomalous premolar in association with ankylosed primary molar and multiple dental anomalies like short root anomaly and root dilacerations was made. Patient was informed about the presence of multiple anomalies in his mouth and recalled to discuss about the possible treatment options for the problem. But unfortunately, patient did not turn up for the next visit.

Discussion

Careful examination of the crown morphology along with radicular anatomy and landmarks are clinical prerequisites for the identification of variable anatomy. Premolar teeth with anomalous morphology in turn are accompanied by anomalous endodontic morphology [1]. Therefore, in a clinical situation with a carious tooth which provides insufficient picture regarding the coronal anatomy, it is essential to observe the anatomy of the contralateral tooth which gives valuable insights into the possible underlying anatomy. Premolar teeth with anomalous variations usually have narrow mesio-distal dimensions and thereby results in difficulties during endodontic treatment like narrow access to

canals, lack of visibility and apical third trifurcation [9,10].

Reports on unusual occurrence of mandibular second premolars are very less. Recently, 2023 Nagaveni reported a case of bilateral occurrence of mandibular second premolars mimicking a mandibular first molar in association with bilateral supernumerary premolars which is rarely shown in the literature [9]. Nagaveni et al, in 2015[10] published a case, in which mandibular second premolar had four cusp patterns mimicking a second molar (molarization of premolar) again in Indian patients. A recent cross-sectional study [1] showed 82% of two cusp pattern and 61% of H shaped groove pattern in the second premolars among Chennai (India) population. In the present case, the second premolar had two small rudimentary cusps with no definite developmental groove separating the cusps. On radiographic examination even the root appeared very short. The extensive literature review did not reveal this type of morphology in the second premolar. The premolar tooth almost looked mimicking a small flower or bud and not resembling to any other tooth morphology. Therefore, this case represents one of the rarest cases in the dental literature pertaining to unusual anatomical pattern of mandibular second premolars. This type of variations is utmost important not only from clinical point of view but also from anthropological point of view to rule out atavistic features of dental evolution.

Dental Infraocclusion is an uncommon phenomenon characterized by location of teeth below the occlusal plane. Authors in the literature have used the different synonyms like infraocclusion and submergence to refer to a process called tooth ankylosis [11,12]. The reported frequency of ankylosed primary molars ranges from 1.3% to 38.5% [11]. The most commonly affected teeth by this condition are the mandibular first primary molars followed by mandibular second and maxillary primary molars. Children in the age group ranging from seven to eleven years show high incidence of ankylosed primary molars. The

exact etiology behind the occurrence of infraocclusion is not stated. However, various theories have been suggested as possible etiological factors like, traumatic injury to Hertwig's epithelial root sheath, a disturbance in local metabolism, deficiency in bone growth, inflammation, chemical or thermal irritations, localized infection and familial pattern [12,13]. Messer in 1980 [2] classified the extent of the infraocclusion of each ankylosed primary molar using the study models into three types. Depending on this, tooth ankylosis can be classified as slight, moderate and severe. In slight ankylosis, the infraocclusion is measured 2 mm from the occlusal level, in moderate type the submerged tooth is placed with occlusal surface close to the contact area. In case of severe ankylosis, infraocclusion is seen well below the contact area of the adjacent teeth [2]. Submerged primary molars with severe bony

ankylosis clinically interfere with the normal exfoliation and eruption of the permanent teeth. From the present case, it was strongly noticed that submerged tooth may be impacted and be remain in the alveolar bone, below the permanent premolars or may be seen close to the lower border of the mandible. Therefore, author thought to suggest a new classification system based on the present case and from the data collected from the previous reports [11,12]. This new classification system is described as follows (Table 1); Type I – Slight ankylosis, Type II – moderate ankylois, Type III - severe ankylosis and Type IV – Impacted ankylosed tooth. From type I to III, the description is similar to the classification given by Messer LB [2], except for type IV which includes impacted submerged tooth placed below the roots of permanent successor within the alveolar bone.

Table 1: *New classification proposed by the present author pertaining to ankylosed or submerged primary molars*

Type	Degree of infraocclusion	Description
Type I	Slight	Infraocclusion is measured 2 mm from the occlusal level
Type II	Moderate	The submerged tooth is placed with occlusal surface close to the contact area
Type III	Severe	Infraocclusion is seen well below the contact area of the adjacent teeth
Type IV	Extreme severe	Impacted submerged tooth placed below the roots of permanent successor within the alveolar bone/close to the lower border of the mandible

On radiographic examination, these ankylosed primary molars show obliteration in the periodontal ligament space and less radiopacity in the roots [13]. In severe ankylosed teeth, the tooth is poorly distinguished from surrounding alveolar bone. On histological examination, researchers have shown focal areas of fusion of cementum and bone and fibrosis with very few cells in the periodontal ligament remnants. The mucopolysaccharidase activity, which is important factor in initiating normal process of root resorption during the eruption of permanent successor is absent in this condition [14].

Clinical management of ankylosed primary molars includes meticulous diagnosis, proper treatment and regular recall appointments for success of the treatment. Complications developing from this condition are well documented in the literature. These submerged teeth may lead to clinical problems like destruction of periodontal tissues through occlusal force and food packing, increased susceptibility to dental caries, prolonged retention of infraoccluded teeth, eruption process of the permanent successors get disturbed, prolonged retention of infraoccluded teeth and extrusion of opposing teeth. Therefore, it is essential to diagnose the

ankylosed primary molars in the early stage to prevent complications arising from the ankylosed tooth [11-15].

The treatment options available for the management of ankylosed and impacted primary molars are really difficult and it includes enucleation of the impacted primary molars. This treatment option is associated with some risks factors like there are chances of damaging the mental foramen or inferior dental canal [14,15]. Therefore, when planning for the enucleation of the ankylosed primary molars, the potential risks must be considered carefully. In the present case, as the ankylosed primary molar was close to the mandibular canal, periodic observation was planned and patient was kept under observation with regular follow-up.

In addition to the above anomalies, patient exhibited short root anomaly involving mandibular permanent left central incisor. The current author in 2011, had published an unusual occurrence of multiple dental anomalies involving both crown and root portion of a permanent mandibular central incisor like dens invaginatus, talon cusp, macrodontia and short root anomaly [16]. Recently, the same author presented an occurrence of short root anomaly in permanent mandibular molars of Indian population [7]. Author also made an effort to rename this condition to a new term called “Rhyzomicroly” as tooth with long or gigantic roots are called as “Rhyzomegaly” in the dental literature. There are reports showing occurrence of this anomaly in mandibular central incisors and even generalized appearance [17]. Clinically, these teeth appear normal in crown morphology including surrounding soft tissues and no treatment is required unless mobility is seen due to severe shortness in the root. On radiographic examination, these teeth appear normal along with surrounding alveolar bone structure. During different treatment procedures like orthodontic and prosthetic procedures, practitioners should be aware and have in-depth knowledge on the management of this rare condition before initiating treatment. Severe

forces exerted during orthodontic movement of these teeth will cause resorption leading to mobility and exfoliation of the tooth [7,17]. Radiographic evaluation is absolutely essential to rule out the condition with short root anomaly or rhizomicroly.

Root dilacerations are the anomalies pertaining to shape of the roots encountered in either primary or permanent teeth [5]. The prevalence of occurrence of root dilacerations in primary teeth is rare as compared to permanent teeth. Nagaveni et al [5] published a case of severe dilacerations with 45-degree bend starting from the middle third of the root found in impacted mesiodens. Usually, mesiodens are found with short and straight single roots. However, in this case the mesiodens exhibited an unusual appearance characterized by presence of root dilaceration which is not reported so far in the existing literature. This radicular condition when present significantly affect dental therapeutic procedures especially during root canal treatment. Asheghi et al, recently found a prevalence of 45% of root dilacerations in maxillary second molars in their study, which were evaluated using an advanced imaging technique like Cone beam computed tomographic images [18]. Most of the dilacerations were located in the apical third of the roots. In the case described here, root dilaceration was observed in the mandibular left first molar involving the distal root with an inclination of almost 90 degrees. The root dilacerations was evident at the apical part of the root with severe bend in the root. Therefore, clinician should be careful during root canal treatment as there are chances of instrument separation, ledge formation and perforation of the root with such root dilacerations. Even during exodontic procedure, the tooth should be carefully luxated in order to avoid root fracture. Therefore, preoperative radiographs are highly essential to rule out such root dilacerations observed in permanent teeth. The author of this paper published numerous unusual dental anomalies which are highly essential for the research field to formulate new protocols and guidelines in

the management of such anomalies which further enhance the existing evidence in the dental anomalies' literature [19-30].

Conclusion

Knowledge of unusual occurrence of multiple dental anomalies in normal patients is important to render proper treatment and to avoid unwanted complicated sequel arising from such conditions.

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