CASE REPORT

First permanent molar root development arrest associated with compound odontoma

Sachin A Gunda,¹ Anil Patil,¹ Aniruddha Varekar²¹Department of Pedodontics, Bharati Vidyapeeth Deemed University Dental College and Hospital, Sangli, Maharashtra, India²Department of Oral Pathology, Bharati Vidyapeeth Deemed University Dental College, Sangli, Maharashtra, India**Correspondence to**Dr Anil Patil,
dranilp0888@gmail.com**SUMMARY**

Trauma or infection to the primary tooth may have deleterious effects on the underlying developing tooth buds. Anatomically the root apices of primary teeth are in close proximity to the developing permanent tooth buds; hence spread of infection originating from pulp necrosis of primary tooth may not only affect the underlying tooth bud but may also affect the adjacent tooth buds. The extent of malformation depends on the developmental stage of tooth or the age of patient. Presented here is a rare case of complete arrest of maxillary first permanent molar root growth due to spread of periapical infection originating from second primary molar leading to failure of its eruption and finally extraction. Histopathological analysis revealed compound odontoma associated with maxillary first permanent molar.

BACKGROUND

Developing tooth germ is complex organ consisting of cells that are tissue specific, that is, these cells differentiate into specific tissues only; any damage to these cells may affect the development of that particular tissue in tooth germ.¹ Cellular damage may occur due to impact or trauma from root of primary tooth or periapical spread of infection originating from necrotic pulp tissue of primary tooth. Cellular damage leads to developmental deformities ranging from minor discolouration, small hypoplastic area, root dilacerations, odontoma like malformations, partial or complete arrest of root development, sequestration of tooth germ and eruption disturbances.¹ Type of deformity developed depends on type of trauma, amount of periapical infection, proximity of primary tooth apices

to tooth bud, but the most important factor being stage of tooth bud development or age of the patient. Partial or complete arrest of root formation is a very rare complication affecting only 2% of the involved permanent teeth.¹ Failure of eruption of first permanent molar is still rarer²; with the prevalence of 0.01%.³ Although cases regarding damage to succedaneous teeth, viz. permanent incisors and premolars have been reported, here is a case of odontoma associated with maxillary first permanent molar root development arrest due to infection spreading in the periapical tissue originating from the pulp of primary molar.

CASE PRESENTATION

A girl of 9.5 years reported with symptom of slowly erupting first permanent molar. All other first permanent molars were completely erupted clinically. History revealed that tooth did not show any sign of eruption and was at the same position since last 2–3 months. Tender swelling over the zygomatic region 4 months back subsided in 2 days without any medications. No other relevant clinical findings were observed. Radiographs were advised but patient did not report.

Eighteen months later, at the age of 11 years the patient reported back with same symptom, along with trismus. History revealed that same type of tender swelling over the zygomatic region 6 months back. On clinical examination, cusp tips of 26 were observed, the tooth was more buccally placed and both buccal cusps impinged over the buccal mucosa, causing trauma to the mucosa. Clinically the patient had limited mouth opening, incomplete eruption of 26 with occlusal surface facing in buccal direction. Buccal mucosa and cheek mucosa were inflamed. 65 showed occlusal pit carious lesion with grade I mobility (figure 1). Except for 26 all other first permanent molars had erupted. Also, except for 27, 15, 25 all other second permanent molars and premolars had erupted.

Figure 1 Intraoral photograph. **Figure 2** Panoramic radiograph.

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Figure 3 Extracted 65, 26.

INVESTIGATIONS

Orthopantomograph (figure 2) revealed:

- ▶ 65 radiolucency (due to caries) involving enamel, dentin and pulp with root resorption.
- ▶ 16, 36, 46 complete root formation, 26 arrested root development.
- ▶ All premolars except 25 have completed more than two-third root development. 15 had not erupted due to space problem. 25 crown formation was complete with mesial axial inclination and no signs of root development initiation.
- ▶ 17, 37, 47 crown formation was complete with one-third root development. Twenty-seven crown formation was complete with no signs of root development initiation, distally placed with the bone covering more than 8 mm.
- ▶ 18, 28 showed no signs of tooth development initiation. 38, 48 were developing crown.

DIFFERENTIAL DIAGNOSIS

Based on clinical features, a provisional diagnosis of submerged 26 with arrested root development was made.

TREATMENT

Extraction of 26 and 65 was advisable under local anaesthesia. After initiation of extraction procedure for 26, it appeared to be ankylosed, hence 26 fused to the buccal cortical plate was surgically extracted. 65 was extracted along with granulomatous tissue and the profuse bleeding was controlled. Sutures were placed and postoperative instructions were given. Extracted 65 revealed root caries along with pathological root resorption and granulomatous tissue (figure 3). It was observed that 26 had normal crown and dilacerated root covered by soft tissue. Buccal surface of the tooth showed attached hard tissue resembling tooth-like structure (figures 4 and 5). Soft tissue over the roots was scraped out and sections were studied using H&E

Figure 4 Macroscopy of extracted 65, 26.

Figure 5 Radiovisiograph of extracted 65, 26.

stain. 26 was sectioned into two halves. One half was studied by ground sectioning and other half was decalcified.

Microscopic examination of soft tissue surrounding roots of 26 showed thick bundles of collagen fibres and fibroblasts (figure 6). Ground section of 26 showed enamel with evidence of pit and fissure caries. Dentin showed dead tracts. The hard tissue attached showed areas of enamel, dentin and cementum resembling tooth with attached bony tissue (figure 7). Decalcified section of 26 showed dentin and collagenous tissue. Areas of carious dentin with structures resembling Miller's liquefaction foci was also noted (figure 8).

Histopathology of soft tissue around the tooth and findings of decalcified and ground sections taken together suggests a compound odontoma was attached to the buccal aspect of 26. This odontoma was ankylosed and probably hindering the eruption of 26.

OUTCOME AND FOLLOW-UP

At 1 week follow-up, the sutures removed and satisfactory healing observed (figure 9). Recall was advised after every 3 weeks to assess development and eruption of 25 and 27.

DISCUSSION

Eruption is a multifactorial process, whose biological mechanism remains unknown. Dental follicle is a formative organ for periodontium and Hertwigs epithelial root sheath is necessary for root development.¹ Dental follicle organ is considered as an essential requisite for bone resorption in the eruption path as well as for the formation of bone below the roots.⁴ There is a close relationship between the occlusal movement of erupting tooth and its stage of root development.⁵

Hertwigs epithelial root sheath is resistant to inflammation but if the critical distance between the root sheath and pathological changes in pulp is short, inflammation will destroy the root sheath, which may compromise normal root development.¹ In our case, pulp necrosis of 65 lead to periapical infection and

Figure 6 Microscopic soft tissue examination 26.

Figure 7 Ground section of 26.

Figure 8 Decalcified section of 26.

bone loss, which affected root development of 26. In such cases the tooth may remain impacted or often exfoliated due to inadequate periodontal support. Radiographic diagnosis of ankylosis in multirooted teeth is very difficult because of overlapping structures⁶ as labial and lingual ankylosed surfaces are not visible in the radiograph⁷ and ankylosis may be located in a minute area.⁸ Failure of eruption impedes functional occlusion, causing alterations of adjacent and opposing teeth and eventually malocclusion. Multiple local factors are involved in the failure of eruption and influence its prognosis and treatment. Among them are lack of space in the arch, dental anatomy, inclination axis, the developmental stage of the root and the depth of the molar; however, their exact roles have not been established.⁵

Odontomes are the most commonly occurring odontogenic tumours in the oral cavity and are considered as developmental anomalies rather than true neoplasm.⁹ The adage is now applied to represent lesions that contain all the dental tissues and comprises two types, the complex and the compound odontoma.¹⁰ Odontomas have been linked with trauma during primary dentition, with inflammatory and infectious processes, hereditary anomalies (Gardner syndrome, Hermann's syndrome), odontoblastic hyperactivity and alterations in the genetic components responsible for controlling dental development.¹¹ Radiographically, the compound odontoma appears as a collection of tooth-like structures surrounded by a narrow radiolucent zone.⁹ Hence, it can seldom be confused with any other entity, for example, supernumerary teeth. In our case, the diagnosis was confirmed with the aid of histopathology. Most odontomes

are asymptomatic; rarely they may become large and cause expansion of bone with subsequent facial asymmetry. Odontomes must be surgically removed, in order to prevent cyst formation and possible conversion to odontoameloblastoma.¹²

The treatment for failure of eruption of permanent molars depends on several factors, the most important being age.⁵ Treatment options include observation, extraction of the obstacle, surgical exposure, luxation and extraction of the unerupted molar.¹³ Extraction of the permanent molar is indicated

Figure 9 Postoperative healing.

when exposure, luxation and orthodontics treatment fail, in the presence of a pathological process, or when prognosis is poor.⁴ In this case extraction instead of luxation was the choice of treatment since 26 root development had arrested completely with poor prognosis associated with odontoma.

Learning points

- ▶ Maintaining good oral health is very important for proper growth and development of orofacial structures.
- ▶ Appropriate timely treatment of carious lesions of primary teeth is necessary to prevent further spread of infection to permanent successors.
- ▶ Judicious diagnosis is necessary to improve prognosis of failure of eruption of first permanent molars.

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