

# Agensis of premolar associated with submerged primary molar and a supernumerary premolar: An unusual case report

NIRMALA S. V. S. G., SANDEEP C., SIVAKUMAR N., BABU M. S., LALITHA V.

## Abstract

The combination of submerged primary molar, agensis of permanent successor with a supernumerary in the same place is very rare. The purpose of this article is to report a case of submerged mandibular left second primary molar with supernumerary tooth in the same region along with agensis of second premolar in an 11-year-old girl, its possible etiological factors, and a brief discussion on treatment options.

**Keywords:** Agensis, Infra occlusion, submerged primary molar, supernumerary premolar

## Introduction

Agensis of permanent teeth is the most common developmental dental anomaly. It is generally determined with autosomal dominant transmission and is associated with several other dental abnormalities.<sup>[1,2]</sup> The prevalence of agensis varies from 5% to 10%, excluding third molars and it occurs mostly in second premolars and maxillary lateral incisors.<sup>[1,3,4]</sup> Researchers have indicated a relationship of 17% between agensis and infraocclusion of primary molars.<sup>[5]</sup>

Submergence is a term defining a tooth that remains below the occlusal plane.<sup>[6]</sup> Dental ankylosis is thought to be a major etiological mechanism of submergence.<sup>[6,7]</sup> Studies reported the prevalence rates of submerged primary tooth to be from 1.3% to 8.9% of the population with significantly higher incidence between the siblings.<sup>[6-8]</sup>

Ankylosis is a well-established condition associated with the infraocclusion of primary molars. It involves fusion of cementum to alveolar bone.<sup>[9,10]</sup> Often at a microscopic level, any obliteration of the periodontal (PDL) ligament may remain undetected in conventional radiographs.<sup>[11]</sup> The mechanism

of initiation of ankylosis is unknown,<sup>[12]</sup> but it is probably due to developmental disturbances in the periodontium.<sup>[10]</sup> Furthermore, changes in the distribution of epithelial cell rests of Malassez in the periodontium of ankylosed primary molars are etiologically relevant to subsequent root resorption and ankylosis.<sup>[13]</sup> The combination of the absence of a permanent successor and infraocclusion of primary molars might affect not only alveolar bone growth, which stops in the submerged area, but also occlusal disturbances such as mesial tipping of the permanent first molar.<sup>[11,14]</sup>

Supernumerary teeth are described as those in excess when compared to the normal dental formula.<sup>[15]</sup> Their reported prevalence ranges between 0.1% and 3.8% in the permanent dentition, and between 0.3% and 0.8% in the primary dentition. Incidence of supernumerary premolars is reported to be 1 in 10,000 individuals. Several studies have been conducted in order to determine their prevalence. Rubenstein<sup>[16]</sup> reported 0.64% prevalence of supernumerary premolars. Grahnén and Lindahl<sup>[17]</sup> reported that mandibular premolar supernumeraries occur in 0.29% of the general population. The etiology of supernumerary teeth is unclear and various factors, namely genetic and environmental, have been suggested.<sup>[18]</sup> It may result from hyperactivity of the dental lamina, proliferation of dental lamina remnants or cell rests, or division of tooth germs.<sup>[19]</sup>

The following report describes the management of a patient with agensis, infraocclusion, and supernumerary premolar.

## Case Report

An 11-year-old South Indian girl came to the Department of Pediatric Dentistry, with chief complaint of extra tooth in the mandibular left posterior region since six months. Physical examination revealed no abnormalities and there was no relevant medical history. Clinical examination revealed a symmetric face, normal development of dentition except the mandibular left second primary molar. The teeth present were

*Department of Pedodontics and Preventive Dentistry, Narayana Dental College, Nellore, Andhra Pradesh, India*

**Correspondence:** Dr. SVSG. Nirmala, Department of Pedodontics and Preventive Dentistry, Narayana Dental College, Nellore - 524 003, Andhra Pradesh, India.  
E-mail: nimskrishna2007@gmail.com

Access this article online	
Quick Response Code: 	Website: <a href="http://www.contempclindent.org">www.contempclindent.org</a>
	DOI: 10.4103/0976-237X.95116

16, 15, 14, 13, 12, 11, 21, 22, 23, 24, 25, 26, 36, S, 75, 34, 33, 32, 31, 41, 42, 43, 44, 85, 46 (S-indicates supernumerary tooth).

She had an Angle class I molar relationship. Lower left primary second molar was submerged and supernumerary tooth was present adjacent to it on the lingual side, which was showing grade III mobility [Figure 1] and was of supplemental type. The submerged tooth was tilted buccally due to the eruption of supernumerary tooth. The panoramic radiograph was taken to determine the presence and position of left mandibular second premolar and revealed that the mandibular primary left second molar was submerged in alveolar bone with root resorption and also congenitally missing second premolar [Figure 2], but mandibular right premolar and maxillary right and left premolars were present. The root of the supernumerary tooth was not completely formed.

Dental casts were made and analyzed. In view of the degree of root resorption of the retained primary teeth and severity of the infraocclusion, the patient was informed about the condition and treatment options were discussed. Oral prophylaxis was performed, the carious teeth were restored, and it was decided to extract the lower left primary second molar along with the supernumerary tooth. But, as the parent was not willing for the extraction of the submerged tooth, we could extract only the supernumerary tooth under topical anesthesia. The occlusion of the patient after extraction of the supernumerary tooth is presented in Figure 3.

## Discussion

The prevalence of infraocclusion in the mandible is considerably higher than in the maxilla, which is in accordance with other reports.<sup>[6]</sup> Several investigators have reported a higher prevalence for the primary second molar compared to the primary first molar.<sup>[7,8]</sup> The following factors have been suggested for ankylosis: disturbance in the interaction between normal resorption and hard tissue repair which takes place in primary molars during eruption of successor teeth, deficient eruptive force and infection, or a deficient vertical alveolar bone growth.

The first primary molar showed higher prevalence of infraocclusion in children below 9 years of age, while after this age, the second primary molar predominated. Rygh and Reitan<sup>[13]</sup> stated that root resorption of infraoccluded tooth occurred regardless of whether the permanent successor was present or not, which is in accordance with our report. This finding also indicates that infraocclusion is governed by intrinsic factors. Regarding the suggested influence of the permanent successor on root resorption, it is worth noting that infraoccluded primary molars with aplasia of the permanent successor also showed root resorption, in contrast to primary molars in normal positions with aplasia of the permanent successor, where a thicker cementum was



**Figure 1:** Intraoral picture showing submerged lower left primary second molar and supernumerary tooth adjacent to it on the lingual side



**Figure 2:** Orthopantomograph showing submerged mandibular primary left second molar in alveolar bone with root resorption and also congenitally missing second premolar



**Figure 3:** Intraoral appearance of the patient in occlusion

seen instead of resorption. In children of 9 to 10 years of age, resorption might still start later. However, even the roots of primary teeth that do not have a permanent successor eventually resorb. The mechanism of resorption and variable resorption rates in different cases is largely unknown.<sup>[18]</sup> Normally, the root is protected from resorption by the presence of a narrow PDL cell layer which is mainly composed of collagen fibers, fibroblasts, and cementoblasts.<sup>[19]</sup> Degradation of PDL precedes root resorption and specifically removal of the collagen fibers of the PDL is considered a main

step in the initiation of this process.<sup>[20]</sup> Collagen digestion is mediated by matrix-degrading enzymes such as the matrix metalloproteinases (MMPs) and their extracellular inhibitors, the tissue inhibitors of metalloproteinases (TIMPs).<sup>[21,22]</sup> MMPs and TIMPs are produced by osteoblasts,<sup>[23]</sup> PDL cells<sup>[24,25]</sup> as well as by odontoclasts, and osteoclasts<sup>[26]</sup> seem to play an important role in normal and pathologic bone and connective tissue turn over, as well as in physiologic root resorption process. In addition, it was found from a previous research that no primary molars in infraocclusion with agenesis of the successor exfoliated spontaneously, in contrast to primary molars for which the successor was present.<sup>[10]</sup> However, our case showed resorption of primary molar. Till date, various causes were reported for submerged teeth.<sup>[15-17]</sup> The most frequently stated cause of this phenomenon is ankylosis, i.e., the fusion of teeth with surrounding bone.<sup>[27,28]</sup> A genetic input has also been suggested, based on observations in several members of the same family.<sup>[18,19]</sup> The dental, medical, and family history of our patient did not contribute to explain the reasons for submergence. It is established in dental literature that the treatment plan of a submerged primary tooth depends on the degree of abnormality, the presence of its successor permanent teeth, and time of onset.<sup>[16-18]</sup> The simplest classification of this abnormality can be described as slight, moderate, and severe, seems to be the most useful to the clinician in which “slight” is defined as between occlusal surface and the proximal contact. “Moderate” being within the occlusal, gingival dimensions of the inter-proximal contact points and “severe” being anywhere below the interproximal contact point.<sup>[16]</sup> The related tooth of our patient remained “slight.” It was a slight submergence case and the treatment was planned based on the findings.

Mandibular premolar supernumeraries have been reported as 6.6%, 9.2%,<sup>[26]</sup> and 14%<sup>[29]</sup> of all supernumeraries. The wide variation in percentage reported can be attributed to variations in size of study, age range, racial composition, and methods of detection.

The combination of infraocclusion of primary molars and agenesis of the permanent successors is rare and that with supernumerary premolar is very rare.<sup>[12]</sup> Delaying extraction increases the risk of additional alveolar bone loss, and one of the consequences of long-standing and untreated infraocclusion of the primary molar is over eruption of the opposing teeth.<sup>[11]</sup> In this case, parent was not willing for extraction of submerged lower left second primary molar.

Based on genetic studies, it is evident that agenesis is a heterogeneous trait and that several mutated genes are responsible for this anomaly. Studies of odontogenesis at the molecular level, mostly with mouse teeth as models, indicate that the development of teeth is under strict genetic control, which determines the position, number, and shape of different teeth.<sup>[1]</sup> Once agenesis of permanent teeth is detected, it is necessary to confirm the congenital

absence of other permanent teeth, but it was not found in this case. Similarly, several theories, including atavism, dichotomy, hyperactivity of dental lamina, and the concept of multifactorial inheritance, have been proposed to explain the etiology of supernumerary teeth.<sup>[30,31]</sup>

Several techniques can be used for patients who have no permanent successors, if the submerged tooth has adequate crown exposure, and sufficient root length to be maintained for many years as a functional unit in the dental arch.<sup>[19]</sup> The submerged tooth can be extracted and orthodontic therapy can be used to create ideal occlusion and arch integrity. In patients whom orthodontic therapy is not indicated or has not been undertaken, other procedures have been commonly used. The submerged tooth can be extracted and removable or fixed space maintainer can be placed to restore proximal and occlusal function until such time as a fixed partial dental prosthesis is indicated. When the submerged tooth has been retained until or near maturity, the anatomic crown form, occlusion, and proximal contacts can be restored with a gold casting stainless steel crown, acrylic resin crown, all ceramic or composite resin crown, or composite resin with amalgam.<sup>[20-26]</sup>

According to the literature and based on the morphology of the tooth, this case may be considered as agenesis of premolar associated with submerged primary molar and a supernumerary premolar.

## Conclusion

The main purpose of submerged primary molars with successors is to allow the normal eruption of the successor. The first decision is to determine the time of onset. Late-onset cases usually are in a slight infraocclusion; hence, treatment objectives are focused on the exfoliation of the submerged tooth. Early-onset cases are divided into those diagnosed early and those diagnosed late. Late diagnoses of early-onset conditions are likely to present with tipped adjacent teeth, supra-eruption of the antagonist, and therefore indicate orthodontic intervention followed by extraction. Thus, whenever a tooth is congenitally missing, an early diagnosis is vital to provide adequate treatment and to prevent malocclusion, particularly if agenesis occurs in association with another dental defect.

## References

1. Arte SN, Neiminen P, Apajalahti S, Haavikko K, Thesleff I, Pirinen S. Characteristics of incisor-premolar hypodontia in families. *J Dent Res* 2001;80:1445-50.
2. Symons AL, Stritzel F, Stamation J. Anomalies associated with hypodontia of the permanent lateral incisor and second premolar. *J Clin Pediatr Dent* 1993;17:109-11.
3. Boruchov MJ, Green LI. Hypodontia in twins and families. *Am J Orthod* 1971;60:165-74.
4. Davis PJ. Hypodontia and Hyperdontia of permanent teeth in Hong Kong school children. *Community Dent Oral Epidemiol*

- 1987;15:218-20.
5. Svedmyr B. Genealogy and consequences of congenitally missing second premolars. *J Int Assoc Dent Child* 1983;14:77-82.
  6. Douglass J, Tinanoff N. The etiology, prevalence and sequelae of infraocclusion of primary molars. *J Dent Child* 1991;58:481-3.
  7. Kuroi J. Infraocclusion of primary molars, epidemiologic and familial study. *Commun Dent Oral Epidemiol* 1981;9:94-102.
  8. Mc Donald RE, Avery DR. *Dentistry for the child and adolescence*. 6<sup>th</sup> ed. St. Louis: CV Mosby; 1997. p. 198-205.
  9. Darling AI, Levers BG. Submerged human deciduous molars and Ankylosis. *Arch Oral Biol* 1973;18:1021-40.
  10. Kuroi J, Magnusson BC. Infraocclusion of primary molars: An epidemiological study. *Scand J Dent Res* 1984;92:564-76.
  11. Sidhu HK, Ali A. Hypodontia, Ankylosis and infraocclusion. A report of a case restored with a fiber reinforced ceramic bridge. *Br Dent J* 2001;191:613-6.
  12. Kuroi J, Thilander B. Infraocclusion of primary molars with Aplasia of the permanent successors; A longitudinal study. *Angle Orthod* 1984;54:283-94.
  13. Rygh P, Reitan K. Changes in the supporting tissues of submerged deciduous molars with and without permanent successors. *Eur Orthod Soc Tr* 1963;39:171-84.
  14. Winter GB, Gelbier MJ, Goodman JR. Severe infraocclusion and failed eruption of deciduous molars associated with eruptive and developmental disturbances in the permanent dentition: A report of 28 selected cases. *Br J Orthod* 1997;24:149-57.
  15. Altay N, Cengiz SB. Space regaining treatment for a submerged primary molar: A case report. *Int J Paediatr Dent* 2002;12:286-9.
  16. Rubenstein LK, Lindauer SJ, Issacson RJ. Development of supernumerary premolars in an orthodontic population. *Oral Surg Oral Med Oral Pathol* 1991;71:392-5.
  17. Grahnen H, Lindhal B. Supernumerary teeth in the permanent dentition: A frequency study. *Odontol Rev* 1961;12:290-4.
  18. Rasmussen P, Kotsaki A. Inherited primary failure of eruption in the primary dentition: Report of 5 cases. *J Dent Child* 1997;64:43-7.
  19. Andreasen JO. Review of root resorption systems and models. Etiology of root resorption and homeostatic mechanisms of the periodontal ligament. In: Davidovitch Z, editor. *Birmingham: EBSCO Media*; 1988. p. 9-22.
  20. Rygh P. Orthodontic root resorption studied by electron microscopy. *Angle Orthod* 1977;47:1-16.
  21. Birkedal-Hansen H. Proteolytic remodeling of extracellular matrix. *Curr Opin Cell Biol* 1995;7:728-35.
  22. Birkedal-Hansen H, Moore WG, Bodden MK, Windsor LJ, Birkedal-Hansen B, DeCarlo A, *et al.* Matrix metalloproteinases: A review. *Crit Rev Oral Biol Med* 1993;4:197-250.
  23. Otsuka K, Pitaru S, Overall CM, Aubin JE, Sodek J. Biochemical comparison of fibroblast populations from different periodontal tissues; characterization of matrix protein and collagenolytic enzyme synthesis. *Biochem Cell Biol* 1988;66:167-76.
  24. Kapila YL, Kapila S, Johnson PW. Fibronectin and fibronectin fragments modulate the expression of proteinase inhibitors in human periodontal ligament cells. *MATRIX Biol* 1996;15:251-61.
  25. Wu YM, Richards DW, Rowe DJ. Production of matrix-degrading enzymes and inhibition of osteoclast-like cell differentiation by fibroblasts-like cells from the periodontal ligament of human primary teeth. *J Dental Res* 1999;78:681-9.
  26. Okamura T, Ssimokawa H, Takagi Y, Ono H, Sasaki S. Detection of collagenase Mra in odontoclasts of bovine root resorbing tissue by in situ hybridization. *Calcif Tissue Int* 1993;52:325-30.
  27. Mueller CT, Gellin ME, Kaplan AL, Bohannon HM. Prevalence of ankylosis of primary molars in different regions of the united states. *J Dent Child* 1983; 50:213-8.
  28. Solares R, Romero MI. Supernumerary premolars: A literature review. *Pediatr Dent* 2004;26:450-8.
  29. Rajab LD, Hamdan MA. Supernumerary teeth: Review of the literature and a survey of 152 cases. *Int J Paediatr Dent* 2002;12:244-54.
  30. Hasen K, Kjeer I. Persistence of deciduous molars in subjects with agenesis of second premolars. *Eur J Orthod* 2000;22:239-43.
  31. Bjerklin K, Bennet J. The long term survival of lower second primary molars in subjects with agenesis of premolars. *Eur J Orthod* 2000;22:245-5.

**How to cite this article:** Nirmala S, Sandeep C, Sivakumar N, Babu MS, Lalitha V. Agenesis of premolar associated with submerged primary molar and a supernumerary premolar: An unusual case report. *Contemp Clin Dent* 2012;3:S99-102.

**Source of Support:** Nil. **Conflict of Interest:** None declared.