Dental Fusion and Dens Evaginatus in the Permanent Dentition: Literature Review and Clinical Case Report with Conservative Treatment

Vivian Caroline F. de Siqueira, DDS Thiago L. Braga, DDS Marco Antonio T. Martins, DDS, MS Ricardo Raitz, DDS, MS Manoela D. Martins, DDS, PhD

ABSTRACT

This clinical case report describes concomitant developmental disorders in the permanent dentition. The concurrence of bilateral dens evaginatus and dental fusion is a rare dental anomaly. Dental fusion is characterized by the union of 2 adjacent teeth at the crown level, which produces the formation of an enlarged clinical crown. Dens evaginatus is an enamel elevation similar to a cusp, generally located in the main groove of molars and premolars. The etiology of both anomalies is uncertain. The purpose of this paper was to review the related literature and present a clinical case where both anomalies are present. (*J Dent Child*. 2004;71:69-72)

Keywords: Dental Fusion, dens evaginatus, dental anomalies, development disorder

Fusion is a rare developmental disorder characterized by the union of 2 adjacent teeth at the crown level (enamel and dentin), causing the formation of a single tooth with an enlarged clinical crown. Incidence of this anomaly is approximately 0.1% in the permanent and 0.5% in the primary dentition. However, its distribution according to gender, race, and location are conflicting in the literature.^{1,2}

Its etiology is not fully understood. It is known, however, that an attempt at union between 2 dental germs takes place.¹⁴ Some believe that this alteration occurs as a result of physical forces that put developing teeth in contact, thus producing necrosis of the epithelial tissue that separates them, leading to fusion.^{1,3} Others believe that fusion results from embryological persistence of the interdental lamina between 2 germs.⁵

Clinically, the tooth exhibits a sizeable crown, with mesiodistal excess, and occurs in a variety of forms, including multiple roots and root canals. The union may be complete or incomplete, according to the stage of development when union occurred. When total fusion of the germs is clinically evident, resulting in an enlarged clinical crown with no apparent separation (grooves), the case is said to be a complete fusion and is believed to take place during the early stages of odontogenesis, probably before calcification of dental tissues. Incomplete fusion is the partial union of dental germs and clinically characterized by indentations or grooves dividing the crown. This form of fusion probably takes place after crown formation.¹⁻³

Radiographic examination will reveal independent pulp canals or a single pulp system. In some cases, teeth may have a single canal connected to 2 pulp chambers.⁴

Differential diagnosis of fusion includes gemination.^{2,5} Gemination means that 2 separate morphological units were created by division of the tooth germ. Differentiation is achieved by counting dental elements.^{3,4} Because fusion results from 2 germs which unite to form a single tooth with an enlarged clinical crown, a tooth count of the arch is 1 less tooth, whereas the tooth count in gemination, which produces a single enlarged crown due to the division of a germ, is normal. When fusion takes place involving a supernumerary dental germ, diagnosis may become difficult because the number of teeth will be the same. When fusion takes place during the primary dentition, congenital absence or eruptive retardation of the permanent successor may occur. Belated

Drs. Siqueira and Braga are dentists in private practice, São Paulo, Brazil; Drs. Martins, Raitz, and Martins are professors of oral diagnosis, School of Dentistry, Braz Cubas University, Mogi das Cruzes, São Paulo, Brazil. Correspond with Dr. Martins at mano@apcd.org.br

rhizolysis, sometimes occurring with fused teeth, may explain the eruption delay.^{3,4}

A variety of complications have been reported for these teeth, and include:

- 1. caries^{1,3};
- periodontal disease due to the space created at the fusion line between 2 teeth³;
- crown with malocclusion or lack of eruption of the adjacent teeth⁴;
- 4. esthetic problems.^{1,6}

Treatment of fused teeth varies greatly and depends on fusion location and extent. Some alternatives are:

- 1. sectioning and restoration;
- 2. reconstruction with metalloplastic or metalloceramic crown;
- 3. amputation of 1 root;
- 4. orthodontic intervention and prosthetic rehabilitation;
- 5. extraction and prosthetic reconstruction;
- 6. occasionally leaving the fused teeth untreated.⁴

In some cases, endodontic and periodontal procedures may be required. Surgery and occlusal equilibration might also be necessary.¹

Dens evaginatus, also known as tuberculum anomalous, is a developmental anomaly described as an enamel elevation similar to a cusp, generally located in the main groove of molars and premolars.^{7,8} It may also be observed on the palatal aspect of incisors.^{8,9} The teeth mostly involved are mandible premolars, followed by molars and incisors.^{7,8,10}

Evaginated teeth vary in type and aspect depending on occlusal interdigitation, location of the enamel protuberance, and the stage of abrasion and attrition, which might hinder the diagnosis.^{7,10} The etiology of evagination is uncertain, but genetic factors may be involved. A racial predominance is observed mainly in Asian, Japanese, and Chinese subjects.¹¹ Evaginated teeth require early diagnosis and treatment because they may result in pulp necrosis and periapical alterations such as root cyst and pericementitis.¹² Radiographic and histological examination reveals an accessory cusp consisting of enamel, dentin, and a normal pulp extension.¹³

Treatment varies according to pulp tissue status, tubercle integrity, and stage of development of the root.¹²

Richardson and Krudson in 1985¹⁴ suggested a preventive approach, including prophylaxis and acid etching with phosphoric acid, followed by restoration with composite resin. These authors say that such teeth are susceptible to caries due to deep pits and fissures.

Prophylactic treatment methods for evaginated teeth using a preventive composite restoration or a conservative amalgam restoration entail less probability of pulp involvement.¹¹

Some authors advocate periodic grinding of the tubercle to stimulate the formation of reparative dentin. The procedure can be followed by the application of 8% fluoride for 5 minutes to mitigate sensitivity.¹⁵ When the evagination is worn down by attrition or is fractured, the dental pulp might be exposed. In either case, Young¹⁶ recommends prophylactic treatment of the vital pulp through direct or indirect pulp protection. If pulp necrosis occurs after the treatments proposed above, endodontic treatment should be performed with calcium hydroxide paste whenever incomplete root formation is present to induce apexification.^{12,15,17}

The orthodontic importance of these teeth is related to occlusal interference and lack of alignment in the arch. Treatment varies from tubercle removal to extraction of the involved tooth.¹⁷

This is a report of a case of dental fusion in conjunction with evaginated teeth in the permanent dentition.

CASE REPORT

A 16-year-old, white male came in for routine dental care at the oral diagnosis clinic, Braz Cubas University (Mogi das Cruzes, São Paulo, Brazil). Examination revealed developmental disorders in several mandibular teeth. A tooth with an enlarged clinical crown was observed in the area of the mandibular incisors (Figure 1), as well as an accessory cusp on the central portion of the occlusal aspect of the first and second right and left mandibular premolars (Figure 2). A tooth count revealed fusion between the mandibular left, central, and lateral incisors. Radiographic examination confirmed the fusion, revealing a tooth with 2 crowns, 2 pulp chambers, and 2 independent root canals (Figure 3).

The premolars had protuberances on the occlusal area, which were formed by enamel and dentin (Figure 4). Because the patient had no esthetic dissatisfaction related to the fusion, no clinical procedure was performed at the time. Owing



Figure 1. Dental fusion of central and lateral mandibular left incisor.



Figure 2. Clinical aspect of first and second right and left mandibular premolar evaginated teeth.



Figure 3. Radiographic examination confirmed the fusion, revealing a tooth with 2 crowns, 2 pulp chambers, and 2 independent root canals.

to generalized malocclusion and the lack of contact between the accessory cusps and antagonists, grinding of accessory cusps was unnecessary. The patient is still being observed and should return every 6 months for assessment of the integrity of the tubercles, as well as for routine dental treatment.

DISCUSSION

The incidence of dental developmental disorders is variable. However, dental fusion and evaginated teeth, when isolated, are rare anomalies. This patient did not have a syndrome and did not report any traumatic injury or other similar cases in his family.

Dental fusion is the union of 2 dental germs³ and is characterized by an enlarged crown and by 1 tooth less in the total arch count. Individual pulp canals or a singlepulp system can be observed on radiographs. Generally, the condition requires consideration of a variety of treatments. Several treatment approaches are advocated in related literature, including reduction of crown size followed by restoration,² removal of the tooth,⁴ orthodontic treatment,⁴ or no treatment.

The fusion case reported here involved the mandibular left central and lateral incisors, with complete union of the crown and 2 pulp canals and chambers. Since there was no esthetic



Figure 4. Radiographic examination exhibiting right mandibular premolars with protuberances on the occlusal areas.

involvement, no invasive treatment was performed. Prophylaxis, supragingival scaling, dental hygiene instructions, and clinical follow-up were the only procedures taken to prevent caries and periodontal disease.

Dens evaginatus is a dental developmental anomaly characterized by presence of an accessory cusp made of enamel and dentin, with or without pulp tissue. In most cases, it occurs on the occlusal surface of premolars. The clinical implications of evaginated teeth depend on the degree of occlusal interference and on the wearing down that occurred. The most frequent complications are fracture and excessive wear that might trigger pulpal and periapical pathologic alterations.¹¹ Teeth presenting these accessory cusps are more susceptible to caries because of their anatomy. Of the 4 evaginated teeth reported here, only the second mandibular left premolar exhibited pigmented fissures, and clinical follow-up was recommended.

As to the risk of fracture and occlusal interference associated with dens evaginatus, the literature presents several therapeutic approaches, most frequently grinding the cusps followed by the application of fluoride to diminish sensitivity.^{10,11,13} Due to generalized malocclusion and lack of contact of the accessory cusps, no periodic grinding was performed for this patient. Periodic clinical follow-up is of utmost importance in these cases to prevent caries and allow early intervention whenever pulp alterations and fractures occur.

REFERENCES

- 1. Kayalibay H, Uzqamis M, Akalin A. The treatment of a fusion between the maxillary central incisor and supernumerary tooth: Report of a case. *J Clin Pediatr Dent.* 1996;20:237-240.
- 2. Velasco LFL, Araujo FB, Ferreira ES, Velasco LEL. Esthetic and functional treatment of a fused permanent tooth: A case report. *Quintessence Int.* 1997;28:677-680.
- 3. Milano M, Seybold SV, McCandless G, Cammarata R. Bilateral fusion of the mandibular primary incisors: Report of case. *J Dent Child.* 1999;66:280-282.

- 4. Surmont PA, Martens LC, De Craene LG. A complete fusion in the primary human dentition: A histological approach. *J Dent Child.* 1988;55:362-367.
- 5. Hitchin A, Morris I. Geminated odontome—connation of the incisors in the dog: Its etiology and odontogeny. *J Dent Res.* 1966;45:575-583.
- 6. Mochizuki K, Yonezu T, Yakushiji M, Machida Y. The fusion of three primary incisors: Report of case. *J Dent Child.* 1999;66:421-425.
- 7. Ju Y. Dens evaginatus: A difficult diagnostic problem. *J Clin Pediatr Dent.* 1991;15:247-248.
- Ngeow WC, Chai WL. Dens evaginatus on a wisdom tooth: A diagnostic dilemma. Case report. *Aust Dent J.* 1998;43:328-330.
- 9. Fukuta Y, Totsuka M, Takeda Y, Yamamoto H. A central tubercle on the lingual surface of the upper lateral incisor: Report of case. *J Nihon Univ Sch Dent.* 1997;39:86-88.
- Pécora JD, Vansan LP, Saquy PC, Souza Neto MD. Dens evaginatus em pré-molares inferiores. *Rev Assoc Paul Cir Dent.* 1991;45:535-536.

- 11. Sim TPC. Management of dens evaginatus: Evaluation of 2 prophylactic treatment methods. *Endod Dent Traumatol.* 1996;12:137-140.
- Geist JM, Mich D. Dens evaginatus: Case report and review of the literature. *Oral Surg Oral Med Oral Pathol.* 1989;67:628-631.
- 13. Wong MT, Augsburger RA. Management of dens evaginatus. *Gen Dent.* 1992;40:300-303.
- 14. Richardson DS, Krudson KG. Talon cusp: A preventive approach to treatment. *J Am Dent Assoc.* 1985;110:60-62.
- 15. Chen KS. Conservative management of dens evaginatus. *J Endod.* 1984;10:253-257.
- 16. Yong SL. Prophylactic treatment of dens evaginatus. *J Dent Child.* 1984;41:289-292.
- McCulloch KJ, Mills CM, Greenfeld RS, Coil JM. Dens evaginatus: Review of the literature and report of several clinical cases. *J Can Dent Assoc.* 1998;64: 104-106.

Copyright of Journal of Dentistry for Children is the property of American Society of Dentistry for Children and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use. Copyright of Journal of Dentistry for Children is the property of American Academy of Pediatric Dentistry and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.