


Atypical association case between dens in dente and twinning

Vinicius Cesar Barbosa de Menezes ¹
Saulo Abreu ²
Thalles Diniz D`Avila Resende ³
Fabrício Resende Amaral ⁴
Carolina Drumond de Barros e Azevedo ⁵
Alexandre Camisassa Diniz Leite Greco ^{6*} 

Abstract:

The formation of the tooth, called Odontogenesis, results from the interaction of the oral epithelium and the ectomesenchyma, where this complex process follows a histological pattern at each stage of this development, thus forming structures such as enamel, dentin, pulp, cementum, periodontal ligament and alveolar bone. And in determinatated circumstances, modifications in the process of tooth development alter the morphology of the tissues, forming dental anomalies such as twinning, fusion, concrescence and Dens in Dent (Invented Tooth). Therefore, the objective of this study is to report a rare case of the presence of associated dental anomolies, twinning and Dens in Dent, diagnosed by Cone Beam Computed Tomography (CBCT).

Keywords: Dens in Dente; Tooth Abnormalities; Radiology; Diagnosis, Oral

¹ Newton Paiva, Department of Surgery - Belo Horizonte - Minas Gerais - Brasil.

² ARNALDO, Department of Prosthesis - Belo Horizonte - Minas Gerais - Brasil.

³ PUC Minas, Dental School - Belo Horizonte - Minas Gerais - Brasil.

⁴ ARNALDO, Department of Radiology and Stomatology - Belo Horizonte - Minas Gerais - Brasil.

⁵ Faculdade Pitágoras, Department of Radiology - Betim - Minas Gerais - Brasil.

⁶ ARNALDO, Department of Surgery and Implantology - Belo Horizonte - Minas Gerais - Brasil.

Correspondence to:

Alexandre Camisassa Diniz Leite Greco.
E-mail: wimagemdigital@gmail.com

Article received on October 24, 2019.
Article accepted on December 9, 2019.

DOI: 10.5935/2525-5711.20190017



INTRODUCTION

Odontogenesis is a complex process involving the interaction of the oral epithelium derived from the first arch and the ectomesenchyme derived from the cells of the neural crest, resulting in the formation of the tooth, where the mesoderm derives the dental papilla, which later differentiates into dental pulp and the dentin, and the dental sac, which forms the cementum, the periodontal ligament and the alveolar bone¹.

The formation and development of the dental organ takes place according to a defined histological pattern, obeying several stages of development: initiation, histodifferentiation, morphodifferentiation, apposition, calcification and eruption². However, each of these phases of organogenesis is sensitive to inductions of modifying nature, and in this context, several genes are involved in determining the number, shape, position and size of each tooth^{3,4}.

In certain circumstances, disturbances occur that modify the physiology and morphology of tissues, causing, as a consequence, deviations of the structure in the normal disposition, being able to affect its internal or external parts, being able to arise by multiple, local or general and sometimes undetermined causes¹, resulting in the occurrence of dental anomalies⁴.

Dental developmental anomalies (DDA) are an important category of variations in tooth morphology and are characterized by disorders in tooth size, shape and structure, and their important study therefore does not only affect the aesthetics of the teeth, but mainly, they can cause changes with functional repercussions in the dental arch, both in the maxilla and in the mandible, as well as occlusal alterations⁵. In general, anomalies can be classified as hereditary, congenital or acquired.

Hereditary anomalies occur when etiological factors act causing changes in the differentiation of the cells, causing modification in the structure, such modifications can be verified before or after birth. In congenital anomalies, the causal factors acted during the intrauterine formation phase, altering the composition and/or function of the affected organ. Already in the acquired anomalies, the etiological factors acted during the formation phase and/or postnatal development¹.

They can be classified as agenesis, hyperdontia, macrodontia, microdontia, fusion, twinning, conrescence, dens in dent, taurodontism, among others⁵. Routine radiographic examinations are of great value in relation to malformations, which often go unnoticed to the patient and the professional until the moment of the

diagnosis through clinical exams¹. Different treatments are cited in the literature for such dental anomalies, such as the use of sealants, restorations, pulp therapy, sections or surgical cuts, prostheses, dental extractions, orthodontic approach and longitudinal control⁶.

The present study has the objective of reporting an atypical clinical case of the association between two anomalies, Twinning and Dens in Dent, diagnosed by CBCT, without previous reports in the literature.

Twinning

Twinning is an anomaly with a hereditary tendency, due to the attempt of two teeth to develop from a single dental germ without, however, separating completely as a consequence of this⁷, we have a tooth with a size larger than without changing the number of teeth in the affected dentition⁸. In the most of cases it occurs in the deciduous dentition, the incisors being the most affected. Geminated teeth usually present incomplete division, where a large, double or bifid crown is seen, with a groove from the incisal edge to the cervical region, a single root and a single canal, therefore they present normal root canals but are enlarged by the attempt of division⁹. This anomaly may be related to the pressure or physical forces present during dental development. This change in structure can cause cariogenic, periodontal, occlusal and aesthetic problems, with specific treatment for each case.

Dens in dent (wrapped tooth)

Also known as Invigorating Tooth (IT), it is a developmental anomaly that is characterized by invagination of the enamel organ in the dental papilla, beginning in the crown, being able to extend until the root, being limited by the enamel, occurring in the phases of proliferation and morphodifferentiation³. The first reported case was in 1952, when Rabinowicht reported a case of a 3-year-old child exhibiting this anomaly^{2,3}. Alterations in pressure tissue, trauma or infection are among some theories that suggest its appearance, in addition to some that suggest that it is a hereditary alteration⁵.

In histological sections, it presents as an enamel organ deepened in the dental papilla during the process of tooth formation occurring prior to calcification of the tissues, and may extend to the root portion¹⁰. The invaginated tooth can be classified into three categories according to the depth of invagination. Type I, invagination is confined to the coronary portion, ending in the blind foramen. Type II, the invagination is kept inside the main channel, extending beyond the cemento enamel

junction. Type III, invagination extends throughout the root canal, reaching the tooth apex, giving rise to two or more foramina^{5,10}.

The clinical aspect varies from a slight increase of the cingulate groove to a deep groove that extends to the apex of the tooth and can affect homologous (bilateral) teeth, causing the genesis and development of occult caries in these places, with an incidence of 0.04 to 10% in the general population, affecting both deciduous and permanent teeth, being the most affected lateral incisors, followed by central incisors, premolars, canines and molars, mainly in the upper arch⁵.

Radiographically, the affected teeth show a root enlargement, with a dilated invagination limited by well-delineated, tooth-like enamel, which the knowledge of the clinical and radiographic features of the dentition is important to facilitate diagnosis and treatment of the anomaly that predisposes the affected teeth to caries and pulp diseases¹¹.

CASE REPORT

Patient W. C., male, 27 years and 10 months old, leukoderma, attended the clinic of the Integrated Dentistry of the Faculty of Dentistry FEAD presenting as main complaint the presence of “crooked teeth”. Patient did not report systemic alteration, history of trauma or previous surgeries in the maxillary region. At the intra-oral clinical examination, an increase in volume was observed in the right and left lingual regions of the mandibular ridge, with normal tissue color, presenting a hard consistency at palpation and absence of symptomatology.

A panoramic radiograph was requested to evaluate the maxillomandibular complex. In the imaging exam was identified the presence of the teeth 38 and 48, semi-included, meisoangulated, with an image suggestive of an intimate contact relationship between the roots and the mandibular canals. Elongated and calcified styloid processes. Partial closure in both maxillary sinuses, suggestive of sinusopathies. Condylar planation and the presence of supernumerary teeth in the upper right lower right and left lower limbs. The right mandibular supernumerary showed an image suggestive of dental anomalies to be clarified (Fig. 1).

For a better evaluation of the supernumerary and the relation with adjacent teeth and anatomical structures, a concomitant conical been computed tomography (CBCT) of the mandible was requested. The presence of two types



Figure 1. Panoramic radiograph evidencing the presence of supernumerary teeth, with images suggestive of dental anomalies presence.

of dental anomalies was verified in the right mandibular supernumerary teeth, Twinning, evidenced by the presence of a single pulp chamber in a tooth with incomplete division and Dens in Dent, where it can be observed presence of dental enamel invaginating into the interior of the pulp chamber. These teeth were included and impacted in a lingual position in relation to the adjacent teeth, promoting the expansion of the lingual bone cortex, displacement of the mandibular canal and the mental foramen, as well as the intimate contact relationship between the roots and these anatomical structures (Figs. 2 and 3).

After the diagnosis, the patient was referred to the buco-maxillofacial surgery and traumatology clinic for a surgical procedure to remove the supernumerary teeth present, and then began orthodontic treatment.

DISCUSSION

The initial stages of dental exams are extremely relevant to the success of diagnosis, prevention and treatment of oral pathologies where anamnesis and clinical examination should be performed in all situations with radiographs and tomography performed when necessary. The negligence of these steps in an initial consultation could cause irreversible future damage to the patient, since dental anomalies or other lesions requiring treatment may not be detected⁴.

Neville et al.¹² described that twinning is defined as an attempt to form two teeth from a single dental germ by invagination, the number of teeth is normal when the anomalous tooth is counted, and there may be two crowns that share the same the root canal or complete cleavage (twinning), resulting in two teeth from a single germ (the dental germ is bipartite and has two crowns and a single root). It occurs in the proliferation phase, when the tooth can divide in two and if this happens, twins (schizodontia) originate.

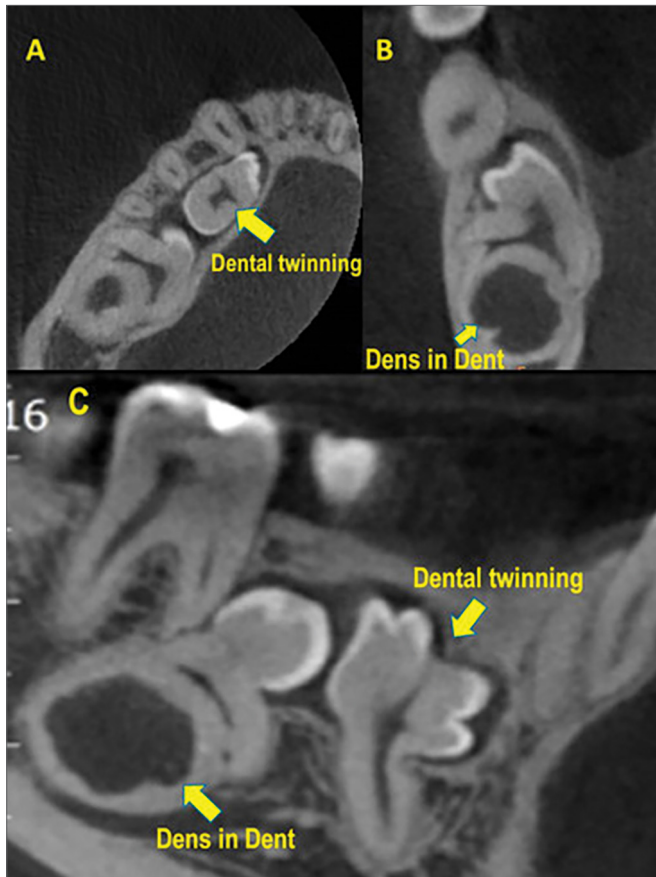


Figure 2. A) Axial reconstruction; B) Sagittal reconstruction; C) Coronal reconstruction, evidencing the presence of associated Dens and Gemination.

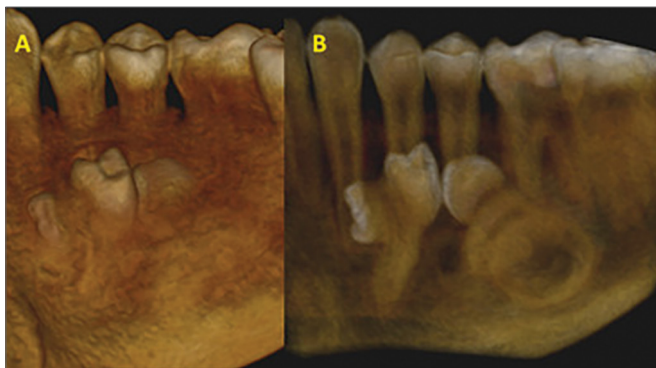


Figure 3. A) 3D reconstruction evidencing the presence of supernumerary teeth, by a lingual view; B) 3D reconstruction using software CS 3D Imaging for better visualization of the teeth.

It has been observed that, although trauma is suggested as a possible cause, the etiology of twinning is unknown and in some reported cases may be hereditary. These teeth may be aesthetically unacceptable and cause crowding and the progression of eruption of permanent teeth should be carefully monitored with cautious clinical and radiographic observation¹³.

Dens in dent is a deep invagination of the crown surface (in this case, invaginated crown tooth) or the root (invaginated tooth radicular), limited by enamel epithelium and therefore an authentic case of heteroplasia and shape anomaly⁹. It is frequently found in permanent upper lateral incisors, being developed during the proliferation phase¹⁴. There is controversy regarding the etiology of this morphological alteration, although it probably occurs as a result of an extra invagination of the internal epithelium of the enamel inside the dental crown before its mineralization, resulting in an intra-coronary formation of enamel and dentin³.

Etiology involves genetic and environmental factors, where the interaction between mesenchymal and epithelial cells play an important role in tooth development, being regulated by several protein signaling programs, such as fibroblast growth factors, morphoproteins genetics, tumor necrosis factors, Wnts and sonic hedgehog, and these variations in the genes involved in these signaling pathways affect the morphogenesis of the teeth. Patient with numerous dental anomalies, including DI has been reported to have a deletion of chromosome region 7q32.25, where the prevalence of DI ranges from 0.3 to 10%¹⁵.

Dens in dente is formed from the evagination of an area of the internal enamel epithelium and its underlying odontogenic mesenchyme in the dental organ during initial tooth development and recorded a prevalence ranging from 0.25 to 5.1% affecting upper lateral incisors in several population groups, where the upper lateral incisors in descending order of frequency are: central incisors, premolars, canines and the last molares⁴.

CONCLUSION

Dental anomalies require careful and judicious examinations by clinical and radiographic methods to provide diagnostic hypotheses as well as differential diagnoses, providing adequate planning and treatment. The anamnesis should be detailed, being of fundamental importance so that no morphological character is neglected and possible anomalies diagnosed.

The imaging exams, mainly CBCT, have an important role in the identification of possible alterations of the dental organ, such as Twinning and dens in dent, allowing the diagnosis and the most appropriate treatment for each case.

REFERENCES

1. Bönecker MJS, Ferreira SLM, Birman E. Prevalence of dental anomalies in children aged 0 to 36 months. *J Bras Fonoaudiol.* 2003;4:89-93.
2. Carvalho MGP, Perez GP, Alves SS, Christo BC. Fusão, geminação ou macrodontia? Relato de um caso clínico. *Rev Endod Pesq Ens.* 2006;2:1-8.
3. Cho SY. Dental abscess in a tooth with intact dens evaginatus. *Int J Paediatr Dent.* 2006;16:135-8.
4. Afify AR, Zawawi KH. The prevalence of dental anomalies in the Western region of Saudi Arabia. *ISRN Dent.* 2012;2012:837270.
5. Andrade CES, Lima IHL, Silva IVS, Vasconcelos MG, Vasconcelos RG. As principais alterações dentárias de desenvolvimento. *Rev Saluvista.* 2017;36:533-63.
6. Rodrigues MP, Osório SG, Franzin LCS, Osório A. Fusão e geminação: Relato de caso clínico. *Rev Uningá Rev.* 2014;20:56-8.
7. Bueno CES, Fontana CE, Miguita KB, Davini F, Araújo RA, Cunha RS. Tratamento endodôntico de incisivo superior geminado. *Rev Sul Bras Odontol.* 2011;8:225-30.
8. Brandão ECB, Ribeiro AA, Seabra LMA. Rare Condition of Dens Invaginatus in a Maxillary Primary Molar and a Bicrootated Maxillary Primary Canine diagnosed during Routine Examination. *Int J Clin Pediatr Dent.* 2017;10:193-5.
9. Barbosa CKR, Lopes LD, Freitas PHR, Borges PG, Silva RFC, Cunha MS, et al. Alterações morfológicas na cavidade pulpar que influenciam no tratamento endodôntico. *UFES Rev Odontol.* 2005;7:47-51.
10. Kaneko T, Sakaue H, Okiji T, Suda H. Clinical management of dens invaginatus in a maxillary lateral incisor with the aid of cone-beam computed tomography – a case report. *Dent Traumatol.* 2011;27(6):478-83.
11. Bansal M, Singh N, Singh AP. A rare presentation of dens in dente in the mandibular third molar with extra oral sinus. *J Oral Maxillofac Pathol.* 2010;14:80-2.
12. Neville BW, Damm DD, Allen CM, Bouquot JE. *Patologia oral e maxilofacial.* Rio de Janeiro: Guanabara Koogan; 2002.
13. Jung M. Endodontic treatment of dens invaginatus type III with three root canals and open apical foramen. *Int Endod J.* 2004;37:205-13.
14. Ruschel HC, Bervian J, Ferreira SH, Kramer PF. Dente decíduo duplo: relato de um caso atípico. *Rev Fac Odontol.* 2011;16:85-9.
15. Zhu J, Wang X, Fang Y, Von den Hoff JW, Meng L. An update on the diagnosis and treatment of dens invaginatus. *Aust Dent J.* 2017;62:261-75.