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An Unusual Case of Gemination in Mandibular Second Premolar: A Case Report

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Case Report

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ABSTRACT

Gemination refers to an attempt at division of a single toothgerm by an invagination, resulting in formation of single large tooth, with groove or notch in the crown. Bilateral presentation of this phenomenon is very rare, with prevalence of 0.01% to 0.04% in the primary, and 0.05% in the permanent dentition. This anomaly is most common in primary maxillary incisors. Gemination of maxillary central incisors, molar with supernumerary teeth was reported by many authors, whereas gemination of mandibular second premolar was rarely reported. This case report describes successful endodontic treatment of a huge geminated mandibular premolar and its esthetic rehabilitation to restore form and function.

INTRODUCTION

Developmental dental disorders may be due to abnormalities in number, size and shape or in structure. The former is due to differentiation of the dental lamina and the tooth germs and later is due to abnormalities in the formation of the dental hard tissues. In some, both stages of differentiation are abnormal. This variation in the number, form and size of teeth may occur in primary or permanent dentition. Developmental dental disorders are not only congenital but they may also be inherited, acquired or idiopathic^[1].

In 1963 Tannenbaum and Alling, defined gemination as the formation of the equivalent of two teeth from the same follicle, with evidence of an attempt for the teeth to be completely separate, this indicated clinically by a groove or depression which could delineate two teeth^[2]. The developmental anomalies example; gemination, fusion, concrescence and twinning affect the shape of the teeth. Geminated teeth arise from an attempt at division of a single tooth germ by an invagination. The resultant structure is a single tooth with two completely separated crowns or large, incompletely separated crown that have single root and root canal. The terms double tooth, double formation, linking tooth, fused teeth, jointed tooth, dichotomy, connation, dental twining, synodontia, schizodontia, mirror-image double tooth and geminated composite odontoma are often used to describe fusion or gemination^[3]. It is seen in permanent as well as in deciduous dentition. The prevalence rate of unilateral gemination is 0.5% in deciduous teeth and 0.1% in permanent dentition. Prevalence of bilateral cases is 0.01% to 0.04% in primary dentition and only 0.02% to 0.05%

in permanent dentition^[4,5]. There is no sex predilection and geminated teeth are usually found in the maxilla, while cases of fusion are more frequently seen in the mandible^[3].

There are several hypotheses regarding etiology of gemination and fusion. Grover and Lorton claim that local metabolic interferences, which occur during morphodifferentiation of the tooth germ, may be the cause^[6]. They suggest that there could be a relationship amongst gemination, twinning and odontoma, while Lyroudia et al. suggested trauma could be another possibility^[7]. Gemination is generally asymptomatic and do not require treatment. However, there could be poor aesthetics, periodontal destruction or caries leading to pulp necrosis which required treatment to restore form and function. This article reports a rare case of huge unilateral gemination of mandibular second premolar in a nineteen year-old Indian boy.

CASE REPORT

The present case report is about a 19-year-old male patient who reported to the post graduate clinic of the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in lower left posterior tooth region. The patient's medical history was not relevant. Clinically, there were two un-separated crowns in second premolar, the mesiodistal diameter of the clinical crown was larger than normal, in mesial view it appears like premolar and from distal side it appears like molar (**Figure 1d**). The length of the root was normal but it was wider cervically and conical in shape. The root apex was completely developed. Periodontal probing around the tooth and mobility were within physiological limits. Thermal testing (heated Gutta-percha and dry ice) and electric pulp testing showed a vital response. Pre-operative intra oral peri-apical radiograph (IOPA) revealed a large carious cavity exposing pulp (**Figure 1a**).

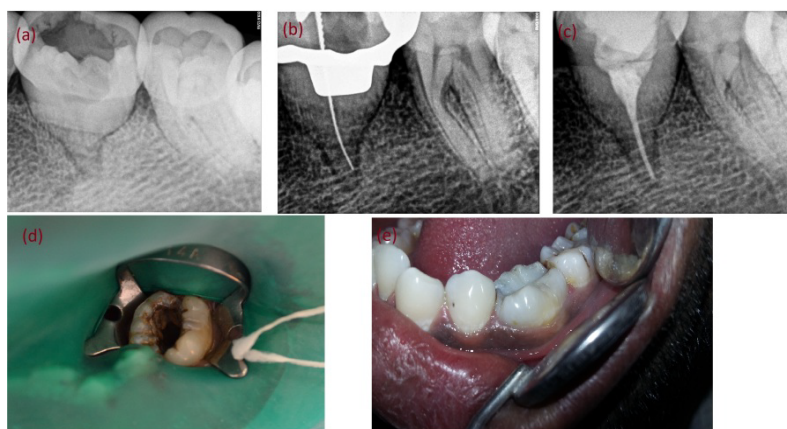


Figure 1. (a) Pre-operative radiograph showing carious tooth (b) working length determination (c) post-operative radiograph after obturation (d) clinical view of carious tooth and (e) geminated tooth after post-endodontic restoration.

Counting the number of teeth a diagnosis of gemination was made, however differential diagnosis of fusion could not be ruled out as third molar was impacted. To confirm the no. of teeth present orthopentogram (OPG) was taken. OPG showed that total no. of teeth was normal, sixteen in mandibular arch and sixteen in maxilla (**Figure 2**). These findings confirmed the diagnosis of gemination.



Figure 2. OPG view showing geminated tooth and normal tooth count.

Root canal treatment followed by post endodontic restoration was planned for the patient. Local anesthesia was given using 1.8 mL 2% lignocaine with 1:200,000 epinephrine (Xylocaine). A rubber dam was placed and a conventional endodontic access opening was established with an Endo Access bur and an Endo Z bur (Dentsply Tulsa, Tulsa, OK). A single canal was found (**Figure 1b**). Coronal enlargement was performed with gates glidden drills. Root canal was explored with ISO #15 K-file. The working length was determined with the help of an apex locator (Root ZX; Morita, Tokyo, Japan) under rubber dam isolation. Cleaning and shaping were performed using K-file instruments (Dentsply Maillefer) with step back technique. During root canal preparation, irrigation was performed using normal saline, 2.5% sodium hypochlorite solution and 17% ethylene diamine tetra-acetic acid (EDTA). Final rinsing of the canals was performed using 2% chlorhexidine. The canal was then dried with absorbent points (Dentsply Maillefer)

and obturation was performed using thermoplasticized gutta-percha technique (Dentsply Maillefer) and AH Plus resin sealer (Maillefer Dentsply, Konstanz, Germany). A final radiograph was taken to establish the quality of the obturation (**Figure 1c**). After completion of root canal treatment, the tooth was restored with a posterior composite (3M ESPE, St Paul, MN) (**Figure 1e**).

DISCUSSION

An anomaly is disorder of growth or development in the anatomical structures that results in anything different from normal. Gemination is an attempt of the division of a developing tooth bud resulting in an incomplete formation of two teeth. Clinically, it shows large tooth. Radiographically, there is only one root and usually only one root canal. In gemination, a normal number of teeth are maintained. This anomaly has a large bifid crown, which usually found as an isolated trait^[8]. Complete Case history, clinical examination, and radiographic investigation can provide the information required for the diagnosis of such abnormalities^[9]. Due to this low prevalence the importance of this anomaly tends to be under estimated.

Gemination is the result of a developmental aberration of both the mesoderm and the ectoderm. These disturbances are related to the local metabolic interferences occurring during morphodifferentiation of the tooth germ. The main etiology of gemination remains unknown, but physical pressures leading to the union of teeth and genetic inheritance have been suggested as possible causes^[10,11]. Gemination is most commonly seen in maxillary primary incisors but is a rare phenomenon in permanent dentition with the prevalence of 0.1 -0.2%. It is mostly unilateral so that its bilateral presentation is extremely rare with the prevalence of 0.01 to 0.05%^[4,5]. Türkaslan et al. and Sener et al reported few cases of this type of gemination^[12,13]. According to Nik-Hussein, the anomalies of permanent teeth are strongly associated with anomalies in the primary dentition; for example, presence of gemination in primary dentition is associated with involvement of permanent teeth in approximately 60% of cases^[14]. The teeth involved in our case was mandibular second premolar.

Gemination of maxillary central incisors, molar with supernumery teeth was reported by many authors, whereas gemination of mandibular second premolar was rarely reported. So, our case is a rare clinical presentation. In the present case it was a single large tooth with large pulp chamber and cervicoincisal groove running on the labial surface. Radiographically only one pulp chamber was visible and in OPG the anomalous tooth is counted as one unit as the number of teeth in the arch was normal. The problems associated with geminated teeth are esthetics for midline shift, malocclusion and crowding. The presence of groove and fissure on labial and lingual surfaces predispose the teeth for caries and periodontal disease^[5].

The differential diagnoses of gemination are fusion and macrodontia. Fusion is the union of two tooth buds to fuse into one with two distinct pulp chambers. In the present case, the possibility of fusion between mandibular second premolar and supernumerary tooth was taken into consideration because clinically second premolar was missing and first molar was present in the mandibular arch, also because of the rarity of geminated second premolar. But on careful clinical and radiographical examination differential diagnosis of fusion was ruled out because tooth no was normal. Clinically, tooth was enlarged but morphologically it resembles premolar from mesial view and first molar from distal view. So, diagnosis of macrodontia was ruled out as in case of macrodontia the tooth is normal in all the aspects except for its size^[15].

Although, thorough clinical examination, case history, IOPA and OPG was sufficient to confirm the diagnosis of gemination, recent advances like cone beam computed tomography could be used to confirm it^[16].

CONCLUSION

The gemination is a morphological alteration that sometimes is confused with fusion and macrodontia but confirmed by thorough clinical and radiographic interventions. Gemination of mandibular premolar is not a common phenomenon. So, this case report represents management of a geminated premolar to preserve its health and restore its esthetics.

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