

## CASE REPORT

# Geminated premolar tooth: Report of a rare developmental abnormality and literature review\*

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### ABSTRACT

#### Geminated premolar tooth: Report of a rare developmental abnormality and literature review

Gemination is a rare developmental abnormality. This abnormality occurs when one tooth bud attempts to split into two, resulting in a large bifid crown and usually a single root and root canal. The main reason of gemination is unknown. Gemination may be associated with any syndromes or it can be asyndromic. Gemination of premolar teeth is uncommon. The aim of this paper is to describe a rare case of gemination involving a mandibular first premolar, review similar case reports and discuss treatment and care modalities in literature. Our search revealed that only 13 cases of geminated premolar teeth (including supernumerary premolar teeth) were reported in the last 39 years. Proper clinical and radiographic examination, proper oral hygiene education and if needed symptomatic treatment planning is necessary to manage this rare developmental abnormality.

### KEYWORDS

Dental anomaly, double tooth, gemination, mandibular first premolar

### ÖZ

#### Premolar dişte geminasyon: Nadir görülen bir gelişimsel anomali bildirisi ve kaynak derlemesi

Geminasyon nadir görülen gelişimsel bir anomalidir. Bir şekil anomalisi olan geminasyon, bir diş tomurcuğu iki bölünmeye çalışıldığında ortaya çıkar ve büyük bir bifid kron ve genellikle tek bir kök ve kök kanalı ile sonuçlanır. Geminasyonun temel nedeni bilinmemektedir. Geminasyon sendromlarla ilişkili olabilir ya da olmayabilir. Premolar dişlerin geminasyonu nadirdir. Bu yazının amacı; mandibuler birinci premolar dişte nadir görülen bir geminasyon olgusunu tanımlamak, literatürdeki benzer vaka raporlarını incelemek ve tanı seçenekleri ile tedavi yöntemleri hakkındaki güncel kaynakları değerlendirmektir. Araştırmamız, son 39 yılda premolar dişte geminasyon ile ilgili sadece 13 tane olgu sunumu olduğunu (süpernumere premolar dişler dahil) ortaya çıkardı. Bu nadir görülen dental anomaliye yaklaşımda doğru klinik ve radyografik muayene ile oral hijyen eğitimi ve semptomatik tedavi planlaması gereklidir.

### ANAHTAR KELİMELELER

Dental anomali, ikiz diş, geminasyon, mandibuler birinci premolar

Occasionally there may be deviations from the normal dental structures and appearance. They are considered abnormalities when they create aesthetic and functional problems.<sup>1</sup> Dental abnormalities can be caused by developmental abnormalities of tooth size, shape, number and structure.<sup>2</sup> These abnormalities are not only congenital but they may also be inherited, acquired or idiopathic and they can occur in primary or permanent teeth.<sup>1</sup>

Gemination is one of the dental shape abnormalities which result may be an invagination of the crown with partial or complete division through the crown and tooth, producing identical structures. Gemination can occur in both dentitions, but especially the deciduous

teeth are affected.<sup>3</sup> Prevalence of gemination, according to different studies, is 0.01-0.5% in deciduous teeth and 0.05-0.1% in permanent teeth.<sup>4,5,6</sup> The frequency of occurrence in men and women is equal and they are usually found in the maxilla.<sup>1</sup> Also in geminated teeth, enamel or dentin can be hypocalcified or hypoplastic.<sup>3</sup> The aetiology of gemination is still not clear, but some factors like vitamin deficiencies, trauma, systemic diseases and genetic predispositions have been considered.<sup>2</sup>

The aim of this paper is to describe a rare case of gemination involving a mandibular first premolar and summarised similar case reports found in literature.

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## CASE REPORT

A 48-year-old male patient administered to our clinic for prosthetic restoration of edentulous areas. The medical, social, and family history was unremarkable, as were the result of physical examination. Clinical examination revealed the presence of a large abnormal tooth in the region of the mandibular right first premolar (Figure 1). To recognize the extent and nature of the tooth, the intraoral periapical radiograph was taken using Size 2 E/F Kodak Insight Film (Eastman Kodak Co, Rochester, NY). Radiographic examination shows the presence of two crowns, which were fused by enamel and dentin with one single root (Figure 2). According to radiographic appearance, it had been diagnosed as gemination. The tooth did not create any functional or aesthetic compromise and the patient had no complaint with this abnormal tooth. No treatment was done since and the patient is being kept under annual follow-up.



**Figure 1.**

Intraoral photograph showing bifid crown in mandibular right first premolar.

A) Buccal view, B) Lingual view, C) Occlusal view



**Figure 2.**

Intraoral periapical radiograph showing two separate crowns and two distinct pulp chambers with a single root

## DISCUSSION

Gemination is described as an attempt by a single tooth bud to divide. This abnormality may occur during tooth bud morpho-differentiation as a result of developmental aberration of both, the ectoderm and mesoderm.<sup>2</sup> Gemination is frequently seen in incisors and canines in the anterior maxillary region, also molar and premolar teeth can be affected.<sup>7</sup> Bilateral cases are uncommon, with a prevalence of 0.01%-0.04% in primary dentition and 0.02-0.05% in permanent teeth.<sup>1</sup> According to our literature review concerning geminated premolar teeth, there was a 1:1 maxilla: mandible localization ratio. Only two of them had been reported bilaterally. Gemination can also be associated with other abnormalities of teeth such as mesiodens, talons cusp, and dens invaginatus. Posterior teeth are very rarely affected.<sup>7</sup> In this article, gemination of mandibular first premolar was reported. Previous case reports involving gemination of premolars are summarized in Table 1.

A literature search was performed in PubMed and Google Scholar database. A manual search was done to detect related published articles in dental journals. The literature was investigated using the following search terms: "geminated teeth", "gemination case report" and "geminated premolar tooth". Inclusion criteria: case reports, full-text papers in English-language.

Thirteen case reports of geminated premolar teeth (including supernumerary premolar teeth) were selected. Data were collected according to age, gender, year of publication, the number of geminated teeth and their location on the jaw, used imaging methods and treatments (Table 1).

For the cases diagnosed as geminated premolar teeth, age ranged widely from 14 to 38 years. Case reports of geminated premolar teeth, there was a 10: 3 male: female ratio. Intraoral periapical radiography was most used imaging protocol (in 10 cases reported). Only two cases were evaluated with using tomography.<sup>16,17</sup> Pain, swelling, and food lodgement were the chief complaint when geminated premolar teeth are symptomatic.

**Table 1.**

**Summary of case reports of premolar gemination in chronological order (M: Male, F: Female, Max: Maxilla, Mand: Mandibula, R: Right, L: Left, IOPAR: Intra-oral Periapical Radiography, NR: Not Reported)**

Study	Year	Age	Sex	Jaw	Side	Number of Geminated Teeth	Tooth	Symptoms	Imaging method	Treatment
Kamansky <sup>12</sup>	1978	19	M	Mand	R	1	Second Premolar	Asymptomatic	IOPAR	NR
Ren-Jye Chen et al <sup>13</sup>	1990	37	M	Max	R	1	Second Premolar	NR	IOPAR	NR
Aryanpour et al <sup>14</sup>	2002	38	F	Mand	R	1	First Premolar	Pain and Swelling	IOPAR	Endodontic treatment and periodontal flap surgery/ separation of two segments
Carlos M Aguiar et al <sup>15</sup>	2011	20	F	Max	L	1	First Premolar	Sinus tract	IOPAR	Endodontic treatment
Ge Yang <sup>16</sup>	2012	21	M	Max	R	1	Supernumerary	Hard Lump Feeling in Mucosa	Panoramic and CBCT	NR
Ather et al <sup>17</sup>	2012	19	M	Max	R	1	Supernumerary	Asymptomatic	IOPAR, Panoramic, Occlusal Radiography CT	Follow-up
Geetha Vijay et al <sup>18</sup>	2013	26	M	Mand	L	1	First Premolar	Food Lodgement and Discomfort over the gums	IOPAR	Patient refused treatment
Rajesh Ebenezer et al <sup>5</sup>	2013	27	M	Mand	L and R	2	Second Premolars	Pain on Left Side	Panoramic	NR
Varun Menon et al <sup>19</sup>	2014	26	M	Mand	R	1	Supernumerary	Chronic Irritation on Right Lateral Border of Tongue/ Food Lodgement	NR	Extraction
Nandini et al <sup>7</sup>	2014	14	M	Max	L	1	First Premolar	Asymptomatic	IOPAR	No treatment
Soin et al <sup>20</sup>	2015	23	M	Max and Mand	L and R	3	Supernumerary	Extra tooth in upper left posterior region.	IOPAR, Panoramic	Extraction/ Follow-up
Hamid Mazaheri et al <sup>2</sup>	2015	34	F	Max	L	1	First Premolar	Asymptomatic	IOPAR	Follow-up without any treatment
Rahman et al <sup>1</sup>	2016	19	M	Mand	L	1	Second Premolar	Pain	IOPAR, Panoramic	Endodontic treatment
Current Case		48	M	Mand	R	1	First Premolar	Asymptomatic	IOPAR	Follow-up without any treatment

The differential diagnoses of gemination include fusion and macrodontia.<sup>6,8</sup> Gemination and fusion have very close similarity but with different aetiology.<sup>7</sup> They are commonly referred to as “double tooth”, “double formations”, “joined teeth”, or “fused teeth”.<sup>9</sup> Anatomy of pulp can be used in the differential diagnosis of these abnormalities.<sup>2</sup> Fused teeth have separate pulp chambers and root canals, while geminated teeth usually have a single big root and root canal. In cases of fusion, enamel and/or dentin of the crowns are united, but there are two roots/canals in a single root. In contrast, in gemination the structure most often shows two crowns either totally or partially separated with a single root and one root canal.<sup>7</sup>

Mader’s “two tooth” rule can be used for differential diagnosis between fusion and gemination. According to this rule the abnormal tooth is considered as a single tooth. When the number of teeth in the dental arch is counted, fusion is considered when there is a lack in teeth count; gemination or fusion between normal and supernumerary teeth is considered when teeth count is normal.<sup>10</sup> Abnormal tooth morphology should also be considered in the differential diagnosis. Supernumerary teeth are usually amorphous or conical thus fusion of a normal and supernumerary tooth will have a unified crown of different halves. But geminated teeth have two halves which are mirror image and a buccolingual groove extending to the incisal edge.<sup>10</sup>

Macrodontia is an abnormality and the teeth are larger than normal crown, root and pulp morphology. Different from gemination, this abnormality does not exhibit bifid crown and deep fissures.<sup>7</sup>

Although teeth with gemination are reported to be usually asymptomatic as seen in our case; and do not require treatment<sup>5</sup>; in our review of literature, 8 of the cases examined had symptoms such as pain, swelling, and food lodgement, only 4 of the cases were asymptomatic and one of them had no reported data. Most common complications with this abnormality are dental caries and periodontal diseases because of bacterial plaque accumulation in the deep fissures or grooves and may cause a need for treatment due to aesthetic or functional problems.<sup>2,8,11</sup> Fissure sealants or resin restorations for these grooves and fissures reduce the caries risk of these teeth.<sup>2</sup> Also canal anatomy of these teeth must be well understood to prevent complications.<sup>8</sup> Gemination can affect tooth alignment and arch symmetry causing crowding, delayed eruption of adjacent teeth and midline shift.<sup>2</sup> After clinic and radiologic examination, the treatment modalities for gemination can be no treatment, selective grinding, surgical separation and endodontic therapy of the remaining part and orthodontic therapy. In most cases reviewed, teeth were treated or

treatment was recommended.<sup>18</sup> Among the treatment methods of reported cases; separation, endodontic treatment, flap operation and extraction treatments were present.

In conclusion, it is very important that clinicians have enough knowledge about this rarely seen tooth abnormality. Detailed anamnesis, careful clinical and radiological examination is necessary in the diagnosis and conservative treatment methods should be considered before more complex pathology occurs.

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