

Endodontic Management of Geminated Tooth: A Case Report

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Abstract- Developmental dental anomalies are marked deviations from the normal color, contour, size, number, and degree of development of teeth. Local and systemic factors may be responsible for these developmental disturbances. Such influences may begin before or after birth, hence primary or permanent teeth may be affected. Gemination refers to the incomplete attempt of one tooth germ to divide into two. Geminated teeth have two crowns or one large, partially separated crown sharing a single root or root canal, the maxillary permanent incisors and the mandibular primary incisors are most frequently affected.

A case of a geminated maxillary right central incisor is reported. Root canal therapy on that tooth was performed as it was detected to be nonvital. Clinical significance lies in identifying a case of geminated tooth and treating the anomaly in the most conservative way.

Index Terms- Developmental anomaly, gemination, fusion, endodontic treatment.

I. INTRODUCTION

Anomalies of shape of teeth include microdontia (teeth that are physically smaller in size than usual) and macrodontia (teeth that are physically larger in size than normal). The prevalence of microdontia and macrodontia ranges from 0.8% to 8.4% in various populations. Anomalies of shape also include dens invaginatus, talon cusp, dens evaginatus, gemination, fusion, root dilacerations, taurodontism, and concrescence. A double tooth is a congenital anomaly in which two adjacent teeth are joined at the crown level (enamel and dentin), forming a single tooth with an enlarged crown. Although the cause is unknown, genetic factors may be involved. The prevalence of the defect is approximately 0.1% in the permanent dentition and 0.5% in the primary dentition, with no predominance of males vs females. The union of a supernumerary tooth and a normal tooth is referred to as diphodontic gemination. Twinning means complete cleavage of the tooth bud, resulting in the formation of an extra tooth that is usually a mirror image of its partner.

A malformed tooth often is a challenge to the dentist. Pindborg defined *fusion* as the union between dentin and/or enamel of two or more separate developing teeth^[1]. Fusion, an uncommon anomaly of the hard dental tissues, may cause clinical problems related to appearance, spacing, and periodontal conditions. The incidence of fusion is < 1% in the Caucasian population^[2]. Clinically, it is often difficult to differentiate between fusion and gemination.

Pindborg describes *gemination* as the malformation of a single tooth bud, resulting in an anomalous tooth within the normal complement of teeth^[1]. It is recognized as an attempt by a single tooth germ to divide, with a resultant large single tooth with a bifid crown and usually a common root and root canal. These anomalies may be unilateral or bilateral and may affect either dentition, although the deciduous teeth are more commonly affected. The etiology of fusion remains unknown. Shafer and colleagues have stated, "It has been thought that some physical force or pressure produces contact of the developing teeth and their subsequent fusion"^[3]. Spouge suggests that it is likely that the majority of such conditions (fusion and gemination) arise purely by chance^[4]. Lowell and Solomon believe that fused teeth result from physical action that causes the young tooth germs to come in contact, thus producing a necrosis of the intervening tissues^[5]. In addition, several authors also suggest that heredity is one of the etiologic factors^[3-5]. Fused teeth may contain separate pulp canals or share a common pulp canal. Fusion may occur between two normal teeth or between a normal tooth and a supernumerary tooth: in the latter case, differentiation from gemination may be difficult, if not impossible.

II. CASE REPORT

A 16-year-old female reported to the department of Conservative dentistry & Endodontics of Guru Nanak Institute of Dental Science & Research with pain in the maxillary anterior region in the month of September 2012.

A clinical examination revealed a geminated maxillary right central incisor having a large crown and groove between nonseparated crown on labial surface (Fig-1, 2). Medical and dental histories were noncontributory. There was no previous history of trauma or any hereditary conditions. There was tenderness on percussion for right maxillary central incisor without any mobility.

Radiographic examination showed large pulp chamber and pulp canal but the pulp chamber was observed to be blocked by pulp stone and there was mild periapical radiolucency (Fig-3, 4). The tooth was nonvital, tested by an electric pulp tester (Parkell Electronics, Farmingdale, NY, USA). Non surgical endodontic treatment of that tooth was performed. Rubber dam (Hygenic, Coltene whaledent) application was done. Endodontic access cavity was done on the palatal surface using a no. 2 round bur and a straight fissure diamond point (no. G835- 010 DIATEC AG, Dubendorf, Switzerland). There was pulp stone in pulp chamber blocking the canal (Fig-5). Initially pulp stone was

removed by round diamond bur then taper fissure diamond bur was used peripherally in pulp chamber and coronal region of root canal. Pulp extirpation was performed using a barbed broach (Dentsply-Maillefer, Ballaigues, Switzerland) and K files (Mani, Inc., Tochigi-Ken, JAPAN). The canal was thoroughly irrigated copiously with sodium hypochlorite (2.5%) and saline (0.9%). Coronal flaring of the root canal was done using Gates Glidden drills nos. 1 to 4 (Mani, Inc.). The working length was determined using Ingle's method (Fig-6), and mesial and distal angulation radiographs were taken to confirm the presence of additional canals. Formocresol was used as the intracanal medicament. The access cavity was temporarily sealed using zinc oxide-eugenol cement. The patient was recalled after 2 days for cleaning and shaping of the root canal system. At the second visit, canal preparation was completed using a step-back technique (apical enlargement was done up to International Standards Organization, no. 40 K file and the coronal flaring up to no. 70 K file). Canals were copiously irrigated with sodium hypochlorite and saline. Then access cavity was temporized with zinc oxide eugenol cement. The patient was recalled after 1 week for obturation. At the third visit, there was no tenderness on percussion of that tooth and the root canal was obturated using gutta-percha cones (Master cone- ISO 040 sizes, Maillefer, Dentsply) by combination of lateral and vertical condensation techniques (Fig-8). Zinc oxide-eugenol (DPI) was used as a sealer; then the access cavity was sealed with light cure composite resin (3M, ESPE, Valux plus) restoration (Fig-10).

III. DISCUSSION

Geminated/fused teeth afford a striking clinical manifestation of the differentiable and morphogenetic processes of tooth development. The challenge is to define the origin of the teeth and restore them to acceptable function and appearance. Indra et al. [16] emphasized that the anomaly of these teeth is unusual, but Tsesis et al. [8] reported that fused teeth are asymptomatic and do not require treatment unless they interfere with the patient's occlusion or esthetic appearance. Kim and Jou [6] reported that surgical division and orthodontic replacement of these teeth may be necessary and emphasized the importance of and need for multidisciplinary treatment.

Clinically, it may be difficult to differentiate between fusion and gemination when a supernumerary tooth is fused with a permanent tooth. A full complement of teeth indicates gemination, whilst one tooth less than normal indicates fusion (Milazzo & Alexander 1982, Camm & Wood 1989). This rule is compromised if a normal tooth fuses with a supernumerary tooth (Croll et al. 1981, Peyrano & Zmener 1995, Kayalibay et al. 1996). In this case, there was normal complement of teeth and differentiation from gemination is difficult or impossible. Concerning treatment, an exact differentiation between fusion and gemination may not be critically important (Kim & Jou 2000). Fusion between supernumerary and permanent teeth occurs less frequently than fusion between other types of teeth. Yuzawa and colleagues reported that the frequency of the fusion between supernumerary and permanent teeth is 0.1% [7]. The probability of the reported case shows fusion took place between a supernumerary tooth and the maxillary right central incisor or gemination of maxillary right central incisor. Case history and

clinical and radiographic examinations can provide the information required for the diagnosis of such abnormalities. After a judicious evaluation of all information we can report that this case represents gemination of permanent maxillary right central incisor.

The differential diagnosis of this case included the following:

- **Gemination**- In gemination, the resultant structure would have two completely or incompletely separated crowns with a single root or root canal. The incidence of this in deciduous dentition is 0.1 to 3.7%, and it is very rare in permanent dentition (0.8%). Although in this case gemination is a possible diagnosis, the occurrence of gemination labiolingually appears very likely.

- **Facial talon's cusp**- Talon's cusp generally occurs on the lingual surfaces of maxillary or mandibular lateral incisors. However, few cases have been reported in which talon's cusp occurred on the facial aspect. Talon's cusp consists of enamel, dentin, and a horn of pulpal tissue. Considering the fact that the suspected labial supernumerary tooth was not very well differentiated and that the removal of the carious tooth structure exposed the pulpal horn, facial talon's cusp may be a differential diagnosis for this case.

- **Dens evaginatus**- This developmental anomaly appears clinically as an accessory cusp or globule, which generally occurs on the premolars and is very rare on the incisors.

- **Localized enamel disturbance**- This case could also represent a localized enamel disturbance as the lesion is localized to the tooth. Trauma is one of the most common causes for such localized disturbance, but in this case the patient did not give any history of trauma. Since there was pain, so root canal treatment was considered to prevent future complications. The incisal edge of the maxillary right central incisor was intact and not discolored.

IV. CONCLUSION

Developmental anomalies of teeth are clinically evident abnormalities. They may be the cause of various dental problems (color, contour, size, number, and degree of development of teeth). Careful observation and appropriate investigations are required to diagnose the condition. Even in a tooth with extremely complex root canal morphology, a conventional endodontic treatment without surgical intervention can result in adequate healing and esthetic correction if required without any complications or the need for extraction.

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Fig-1 pre-operative



Fig-2 pre-operative view



Fig-3 standard occlusal radiograph of maxilla



Fig-4 IOPA radiograph showing the geminated tooth (11)



Fig-5 pulp stone in pulp chamber

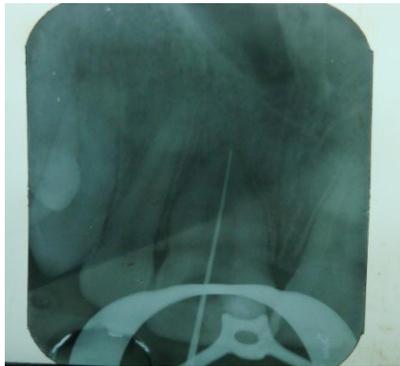


Fig-6 working length determination



Fig-7 master cone



Fig-8 post obturation



Fig-9 post operative buccal view



Fig-10 post operative lingual view