



## MULTIDISCIPLINARY TREATMENT OF A PATIENT WITH GEMINATED MAXILLARY CENTRAL INCISORS.

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**ABSTRACT** Different cases of dental development anomalies in the permanent and temporary dentition have been reported in the literature. The purpose of this case presentation is to describe the multidisciplinary treatment of a 15-year-old patient with geminated maxillary central incisors. During clinical examination, a diagnosis of pulp necrosis was confirmed on the maxillary left central incisor and on the maxillary left lateral incisor. Radiographic examination suggested the presence of a periapical lesion in the maxillary left lateral incisor and a geminated maxillary left central incisor presenting two root canals and a periapical lesion. Endodontic and orthodontic treatments followed by restorative dentistry were performed. Follow-up examination revealed the healing of the periapical tissues. The teeth were asymptomatic and in functional use. In conclusion, an accurate treatment planning and a long-term multidisciplinary management of these unusual cases could promote a successful outcome, preserving aesthetics, functionality and the healing of the periapical tissues.

**KEYWORDS :** Endodontic treatment, Gemination, Developmental anomalies, Restorative dentistry.

### INTRODUCTION

Case reports of different dental development anomalies in the permanent and temporary dentition have been occasionally reported in the literature<sup>(1,2)</sup>. Fusion is defined as the union of two or more adjacent teeth<sup>(3)</sup> and gemination is considered as a rare developmental anomaly affecting the morphology of the teeth<sup>(4)</sup>. Being identified as a partial division of a single tooth germ resulting in one root and one pulp space with two partially or totally separated crowns<sup>(5-7)</sup>. These double teeth originate from the morph differentiation development stage, even if the exact etiology of these anatomical variations is still unknown, [8] a genetic predisposition is suggested<sup>(9)</sup>. According to some authors, these anomalies are more prevalent in the primary dentition, having a higher frequency in the anterior maxillary region,<sup>(5,9)</sup> with the possibility of presenting further anatomical variations in the permanent dentition<sup>(2,3)</sup>.

These anatomical variations have been associated with macrodontia of anterior teeth, creating problems of crowding, affecting aesthetics and resulting in plaque accumulation<sup>(2,10)</sup>. The absence of vertical to horizontal crown size harmony and its functional implications, require a multidisciplinary approach with complex restorative, endodontic, periodontal, surgical and orthodontic treatment<sup>(8,10)</sup>. In the same way, endodontic involvement of geminated or fused teeth has also been reported<sup>(3,11-15)</sup>. Dental development anomalies may compromise the different stages of multidisciplinary dental treatment. Therefore, a cautious clinical and radiographic examination should be performed for an adequate treatment planning<sup>(6,13)</sup>.

### CASE REPORT

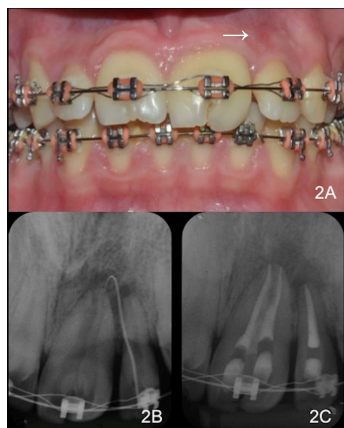
A 15 year-old male patient with a non-contributory medical history was referred to the orthodontist for dental examination with a main complaint of aesthetic problems. During clinical examination, a groove on the labial surface and an increased mesio-distal width on the maxillary central incisors were observed (Figure 1A). Radiographic

examination suggested the presence of geminated maxillary central incisors (Figure 1B), where a periapical lesion in the left central incisor was noticed (Figure 2B). Therefore, the patient was referred to the endodontist. During endodontic examination, a sinus tract located in the labial surface of the attached gum in the anterior maxillary region was detected (Figure 2A). Tracing the sinus tract with the aid of a gutta-percha point revealed its origin in the maxillary left central incisor (Figure 2B). A diagnosis of pulp necrosis was confirmed by the ice test on the maxillary left central incisor and on the maxillary left lateral incisor as well. The teeth responded normally to the palpation, percussion and mobility tests. Radiographic examination suggested the presence of a geminated maxillary left central incisor presenting two root canals and a periapical lesion. There was not family history of this anomaly. In addition, a periapical lesion was observed in the maxillary left lateral incisor. On the other hand, the maxillary right central incisor responded positively to the pulp sensitivity tests. As a result, different treatment options were discussed with the patient and among a variety of approaches, the patient agreed to multidisciplinary management, including endodontic, orthodontic and restorative treatment.



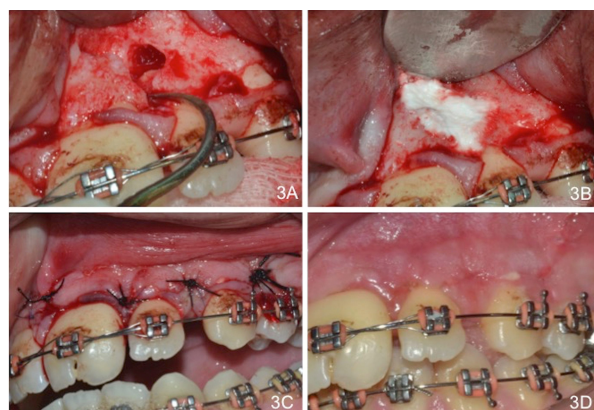
**Figure 1.** Clinical and radiographic findings. (A) Clinical aspect of the geminated maxillary central incisors. (B) Radiographic image of the geminated maxillary central incisors.

Local anesthesia was administered and the teeth were isolated with a rubber dam. Endodontic access cavities were performed and the working length was determined with an apex locator (Root ZX Mini, J.Morita, Kyoto, Japan) and confirmed radiographically. The root canals were prepared with K-files using a crown-down technique (apical enlargement was performed up to ISO no. 40) under copious irrigation with 1% sodium hypochlorite solution, followed by saline (0.9%). The root canals were dried with sterile paper points and a calcium hydroxide paste was placed as an intracanal medicament for 2 weeks. After this period, the teeth were asymptomatic and the root canals were filled with gutta-percha points and endodontic sealer (Sealer 26, Dentsply, Rio de Janeiro, Brazil) by the means of a hybrid filling technique (Figure 2C). Finally, the endodontic access cavities were sealed with composite resin.



**Figure 2.** Endodontic examination and treatments. (A) Note the presence of a sinus tract located in the labial surface of the attached gum in the anterior maxillary region (arrow). (B) Tracing of the sinus tract revealed its origin in the maxillary left central incisor. (C) Radiographic image of the endodontic treatments performed on the maxillary left central incisor and on the maxillary left lateral incisor.

In 2015, 18 months after endodontic treatment, the presence of a sinus tract located in the labial surface of the attached gum in the anterior maxillary region was detected. After explaining the patient the different treatment options, the patient agreed to undergo exploratory surgery. During the surgical procedures, local anesthesia was administered and a full thickness flap was reflected (Figure 3A). Osteotomy through the buccal plate was made with the aid of chisels and under copious irrigation with sterile saline. A curettage of the exposed area was performed, removing all the pathological tissues. Afterwards, the surgical cavity was filled with calcium sulfate and the suture was done (Figure 3B and 3C).



**Figure 3.** Surgical procedures. (A) Full thickness flap division. (B) Filling of the surgical cavity with calcium sulfate. (C) Suture. (D) Clinical follow-up 2 weeks after the surgery.

#### Outcome and Follow-Up

The patient was re-examined two weeks after the surgical procedures (Figure 3D) and every 3-6 months for multidisciplinary management.

Follow-up examination revealed the teeth were asymptomatic and in functional use. The healing of the periapical tissues was observed during radiographic examination as well (Figure 4A-4C). 14 months after the surgery, the orthodontic treatment was concluded and the aesthetic procedures were performed (Figure 4D and 4E). For this purpose, diamond burs (801.018; 850.018; 852.018, JOTA, Rütthi, Switzerland) were used for the dental preparation, followed by a polishing system (Sof-Lex™, 3M Espe, California, United States of America). Afterwards, a gingival retraction cord (Ultrapak 0000, Ultradent, Utah, United States of America) was used for tissue displacement prior to impression with a silicone type A material (SwissTec HydroXtreme, Coltene/Whaledent, Altstätten, Switzerland). A bis-acrylic composite was applied for the fabrication of provisional crowns (Protemp™ 4, 3M, California, United States of America). Finally, the teeth were restored with veneers made of lithium disilicate glass-ceramic ingots (IPS e.max Press MT-A2 shade, Ivoclar Vivadent, Zurich, Switzerland).



**Figure 4.** Clinical and radiographic follow-up examination. (A) 1 year and 6 months control. (B) 2 years and 6 months control. (C) 2 years and 8 months control. (D-E): Clinical aspect of the restored maxillary geminated central incisors.

#### DISCUSSION

In this case, the treatment of geminated maxillary left central incisor has been described, in virtue of a midroot connection between the two root canals<sup>[9]</sup>. Sometimes, the diagnosis of gemination versus fusion cannot be conclusively established<sup>[11,15]</sup>. For this reason, the traditional terminology exposed in this case is used as the potential embryologic cause of the anomaly and not as an exact diagnosis as recommended by some authors<sup>[9,16,17]</sup>. In virtue of the anatomical variations and the complexity of the root canal system present in fused and geminated teeth, the management of geminated maxillary central incisors has been described, demonstrating the importance of a multidisciplinary approach for an efficient treatment planning<sup>[3]</sup>. As explained by Zoya et al.<sup>[18]</sup>, the lack of knowledge and failure to refer complicated cases to specialists could lead to further complications, affecting the treatment prognosis. According to Rani et al.<sup>[15]</sup>, double teeth can cause esthetic and functional problems as well as carious lesions in the grooves. Periodontal problems associated with sub gingival grooves, asymmetries in the anterior region, malocclusions and endodontic complications associated with a reduced thickness of enamel and dentin have also been found<sup>[13]</sup>.

In this case, endodontic, surgical and orthodontic treatments followed by restorative dentistry were performed. Success in endodontic procedures requires an accurate knowledge of the internal tooth's morphology<sup>[4]</sup>. Due to the unusual morphology of the root canal system, the root canal treatment of teeth with development anomalies, demand special attention and careful treatment planning<sup>[7,13]</sup>. As stated by some authors, restorative dentistry, surgical procedures and/or orthodontics are suggested for the treatment of dental occlusion and aesthetics in these patients<sup>[3,7,8,17,19,20]</sup>. Concerning the surgical procedures performed in this case, the use of calcium sulfate as a graft material has been reported in the literature, showing satisfactory results in improving the healing of the surgical area<sup>[21-23]</sup>.

#### CONCLUSIONS

An accurate treatment planning and a long-term multidisciplinary

management of these unusual cases could promote a successful outcome, preserving aesthetics, functionality and the healing of the periapical tissues.

### CONFLICT OF INTEREST

The authors deny any funding or conflict of interest associated with this case report.

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