



## ENDODONTIC AND SURGICAL MANAGEMENT OF FUSED TOOTH- A CASE REPORT.

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### Abstract

**TITLE:** Endodontic and surgical management of fused tooth - A Case Report

**AIM:** To describe and discuss the treatment of a challenging case of fusion between permanent left maxillary lateral incisor with a supernumerary tooth.

**BACKGROUND:** Fused tooth, also known as dental fusion, is a rare dental anomaly where two adjacent teeth in the dental arch are joined together, resulting in a single large tooth structure. This can occur in both primary and permanent teeth and is often detected during routine dental exams or radiographic imaging. Fused teeth can lead to complications such as malocclusion, esthetic concerns, and dental caries due to difficulty in maintaining proper oral hygiene. The etiology of fused teeth is not well understood, but it may result from genetic factors, trauma, or developmental anomalies

**CASE DESCRIPTION:-** Because of their aberrant structure, tooth fusion presents a challenge in endodontic and esthetic management. Among the multitude of concerns in tooth fusion, dental caries occurring in the groove between the fused crowns is of utmost importance, which may necessitate endodontic therapy if not treated. Treatment options vary depending on the severity and location of the fusion and may include orthodontic treatment, cosmetic restorations, or extraction.

**CONCLUSION:-** This case report discusses a challenging situation involving the fusion of the permanent left maxillary lateral incisor with the supernumerary tooth, which required a number of multidisciplinary surgical procedures to be carried out following endodontic therapy.

**CLINICAL SIGNIFICANCE:-** The fused teeth can be difficult to clean, leading to a buildup of plaque and bacteria which increases the risk of tooth decay and gum disease. Fused teeth can lead to a range of dental problems that require appropriate management to ensure optimal dental health and function. Early detection and management are important to prevent the potential long-term consequences of fused teeth on dental health.

**Key Words:-** Developmental dental anomaly, fused tooth, supernumerary tooth

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**BACKGROUND:**

The success of endodontic treatment depends on understanding the internal anatomy of human teeth. Identification of the probable anatomic anomalies in all tooth groups is equally crucial. Tooth fusion, which is sometimes misdiagnosed as tooth germination poses significant diagnostic and treatment challenges <sup>(1)</sup>. A broad crown with increased mesio-distal diameter and a narrow vertical groove extending towards the gingival sulcus can be clinically recognized. The prevalence of fused teeth varies depending on the population, with reported rates ranging from 0.1% to 2.5% in different studies <sup>[2]</sup>. Among the anterior dentition, maxillary incisors are most commonly affected. The etiology of fused teeth is not completely understood, but genetic factors, environmental influences, and trauma have all been implicated. Some studies have suggested a genetic component to dental fusion, with mutations in certain genes being associated with the condition. Environmental factors such as infection, radiation exposure, and drug use during pregnancy have also been linked to dental fusion. Trauma to the developing teeth, such as injury or inflammation, can also lead to fused teeth <sup>[3]</sup>. Several complications may arise as a result of tooth fusion, including cavities (in the vertical groove in- between the fused crowns, which may necessitate endodontic treatment if not treated); tooth impaction; diastemas; aesthetic and periodontal issues all of which frequently necessitate multidisciplinary treatment <sup>(4)</sup>. This case report discusses in detail the series of multidisciplinary treatments including endodontic and surgical management of tooth fusion of a permanent maxillary left lateral incisor with a supernumerary tooth.

**CASE DESCRIPTION:**

The main complaint of an 18-year-old male patient who visited the department of conservative dentistry and endodontics was pain and slight swelling in the area of his upper left front tooth for the previous month. Following a clinical examination, the maxillary left lateral incisor (tooth number 22) and an extra tooth had fused [Figure - 1A], which was later confirmed radiographically [Figure -1B]. On intraoral examination, sinus opening was visible in relation to the distal aspect of 22 which was confirmed by tracing the sinus tract with gutta percha stick and the tooth was tender to percussion [Figure -1C]. Pulp sensibility tests was done using heat, cold and EPT which revealed no response, indicative of pulpal necrosis. The lateral incisor and the supernumerary tooth were merged with a divided pulp chamber and the two root canals joined at the apex on radiographic

examination. Peri radicular radiolucency was evident on the mesial aspect of 22 with loss of lamina dura on the mesial root surface and widening of periodontal ligament space was noted. Combining the clinical and radiographic examinations, the final diagnosis was established as pulpal necrosis with chronic periapical abscess. The treatment plan outlined was conventional endodontic therapy followed by periapical surgery.

Access cavity preparation finished during the initial visit while the rubber dam was isolated, establishing pus drainage [Figure – 2A]. On confirming the working length with an intra oral periapical radiograph, Protaper gold rotary system (Dentsply Maillefer, Ballaigues, Switzerland) was used for root canal preparation. During preparation, 2.5% sodium hypochlorite (Prime dental products, Maharashtra, India) and 17% EDTA ((Dent WashPrime Dental, India) solutions were used as irrigants. For one week, intracanal calcium hydroxide (Dentocal, Anabond Stedman) dressing was placed At the second appointment, the inflammation and discomfort had subsided; hence, thermoplasticized obturation using Obtura II (Obtura Spartan, Fenton, MO) was completed with AH-plus sealer (Dentsply, Maillefer, Switzerland) [Figure- 2B]. Patient was recalled after six months and IOPA revealed persistent periodontal defect. Hence, endodontic surgery was indicated.

During the surgical treatment phase, Lignocaine hydrochloride injection 1.8 ml was injected in the buccal vestibule and full-thickness mucoperiosteal flap was elevated with no.15 periosteal elevator and two vertical incisions were made using 15C surgical scalpel (Glass Van Sterile Surgical Blades, Haryana, India) to fully expose the defect at the sinus region (10mm \*15mm) [Figure-3A]. Complete root planing and curettage was carried out using Graceys curette. This was followed by the elevation of palatal flap and placement of biodentin (Septodont, Saint-Maur-des-Fossés, France) at fusion groove site [Figure -3B]. Because the osseous lesion was so extensive, it was filled with a combination of platelet rich fibrin (PRF) and osseograft (Advanced Biotech Products Ltd, India) [Figure- 4A]. To extract PRF, 20 mL of blood was drawn from the right cubital vein and centrifuged at 3000rpm for 20 minutes. To fill in the deficiency, PRF was used together with osseograft material. The GTR membrane (healiguide; Advanced Biotech Products Ltd, India) was stretched over the defect and well covered beyond the defect margins [Figure-4B]. Using 3-0 vicryl suture (Ethicon Inc., Cincinnati, Ohio, Hamilton) the flap was repositioned [Figure- 4C] and palatal stent was

given to approximate the flap [Figure- 4D]. The patient was given post-operative instructions and prescribed antibiotics and analgesics for 5 days. The patient was summoned back at regular intervals of one week, one month and three months for follow – up. Patient remained asymptomatic with reduction in peri-radicular radiolucency during these follow up visits. On future follow up visit at the completion of 6<sup>th</sup> month ceramic veneers are planned with gingival staining to make the fused tooth look like two separate teeth.

## DISCUSSION

Morphological differences in the differentiation of the dental lamina and tooth germs are the cause of developmental defects [5]. The terms fusion, gemination, and twinning have all been used to describe the abnormality of double teeth [6]. The union of two adjacent tooth buds or the partial splitting of one into two might result in isolated large teeth. Gemination is the process of a single tooth bud attempting to divide, resulting in the formation of a bifid crown with a single root and root canal. Fusion is the joining of two normal teeth with independent tooth buds, resulting in a fused tooth with dentin confluence. Due to the difficulty in distinguishing the two situations, several authors choose to use the terms twinning or double tooth to describe fusion and gemination [7].

Madder's two-tooth rule could be a useful tool for distinguishing fusion from gemination. When a single fused tooth is counted and the number of teeth in the dental arch is fewer than one, the term "fusion" is considered. When the aberrant tooth is counted as one and the number of teeth in the dental arch is normal, then it is described as gemination or fusion with a supernumerary tooth [8]. The present case report reveals fusion of lateral incisor and a supernumerary tooth involving the coronal surfaces with two separate roots, two distinct pulp chambers and two root canals.

Clinical problems pertaining to fusion includes abnormal morphology resulting in an unaesthetic appearance, delayed exfoliation, occlusal disruptions and space discrepancies. Caries and periodontal disease are more frequent if there are fissures or grooves at the union of fused teeth [9].

The endodontic treatment approach is based on whether there are independent pulp chambers and canals or one pulp chamber and two canals. When it comes to restorative treatment, the aesthetic criteria is the most important consideration. Separation and extraction of the anomalous tooth with orthodontic closure of the space and reshaping

of the teeth is one of the treatment options when the pulp chambers and canals are separated [10]. Other options include surgical separation followed by restoration of both teeth. The final option mentioned in the literature is to grind the fused teeth selectively to minimise the crown width [11].

In the current case, since there is no caries or periodontal pathology, trauma is strongly suspected as the underlying cause of pulpal and periapical involvement. It's possible that an accessory opening in the fusion line allowed communication between the pulp cavity and the periodontium. Such interaction resulted in partial or complete pulp necrosis with periodontal pathology. Since the patient refused orthodontic treatment, the space between the teeth would be difficult to correct, in case the abnormal tooth was extracted. As a result, endodontic treatment was planned for the fused tooth.

In the present case report after establishing pus drainage, on completion of cleaning and shaping, calcium hydroxide was used as the intra-canal medicament. It has been demonstrated that using calcium hydroxide as a dressing for one week effectively eliminates microorganisms from the root canal [12]. Patient was asymptomatic at the end of one week, thus obturation was finished with thermoplasticized endodontic obturation utilising Obtura II (Obtura Spartan, Fenton, MO) and AH-plus sealer. Thermoplasticized guttapercha was used for obturation in order to achieve a homogeneous obturating mass, successfully filling the irregularities in the root canals and facilitating a better apical seal [13].

IOPA revealed a persisting periodontal defect during the follow-up appointment after 6 months. As a result, endodontic surgery was scheduled. Root planing and curettage was done to remove the inflamed soft tissues present in the periradicular region of an endodontically failed tooth [14]. Many materials like composites, mineral trioxide aggregate (MTA) and, glass ionomer have been used for restoring the groove . In this situation, Biodentine, a tricalcium-based cement, was used as an endodontic repair material.

PRF (platelet rich fibrin), a second-generation platelet concentration, has outperformed PRP (platelet rich plasma) in clinical trials [15]. The main function of fibrin in wound recovery is haemostasis, but it also serves as a matrix for the migration of fibroblasts and endothelial cells, which are involved in angiogenesis and responsible for tissue remodelling [16]. The defect was filled

using Autologous PRF that had been manufactured and combined with Osseograft. The bone graft material (Osseograft®) acts as a filler in the defect, sustaining the GTR(guided tissue regeneration) membrane overlying it and preventing it from collapsing. It functions as a bioabsorbable matrix for healing and encourages new bone development through osteoconductive/ osteo-inductive bioactivity, acting as a bone substitute that promotes the formation of bone. It also serves as a framework for the integration of bone-forming cells and blood vessels, resulting in the development of healthy new bone and subsequent osseous defect repair [17]. In this present case, Healiguide was used as a GTR membrane. It is composed of type I collagen similar to that found in periodontal connective tissue and hence appears to be an appropriate barrier in the GTR procedure. A palatal stent was used to cover the palatal wound and guide tissue development back to its original form. A conservative approach using a single ceramic veneer on the fused tooth is therefore planned to imitate two teeth.

#### CLINICAL SIGNIFICANCE

Dental fusion can cause several complications that can impact the patient's oral health and aesthetics. Firstly, the fused tooth can present with an abnormal morphology, resulting in an unaesthetic appearance, which can affect the patient's self-esteem and confidence. Secondly, the fused tooth can lead to delayed exfoliation, where the tooth remains in the mouth for longer than it should, leading to dental crowding and malocclusion. Thirdly, occlusal disruptions and space discrepancies may arise due to the larger size of the fused tooth, which can affect the patient's bite and lead to functional issues. Fourthly, caries and periodontal disease are more frequent if there are fissures or grooves at the union of fused teeth, as these areas are difficult to clean.

The management of fused teeth depends on the extent of fusion and the associated clinical problems. As a result, it's critical to do a thorough clinical examination and take a thorough history, as well as use imaging tests to complete the diagnosis and choose the appropriate treatment plan for the patient.

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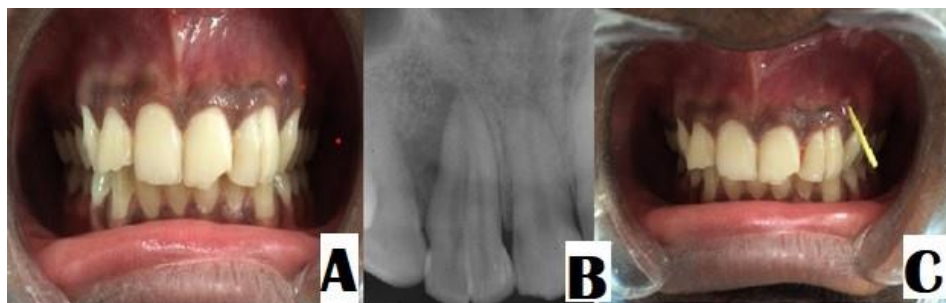
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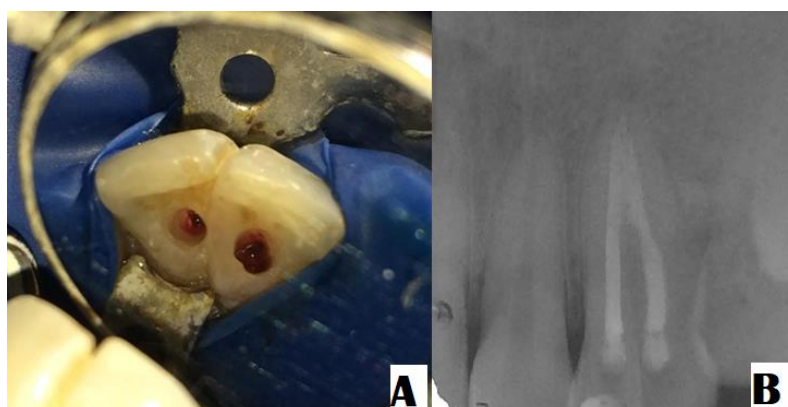
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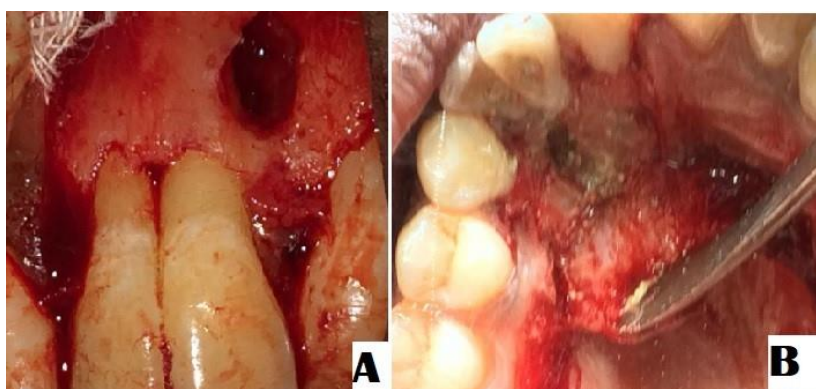
**FIGURES**



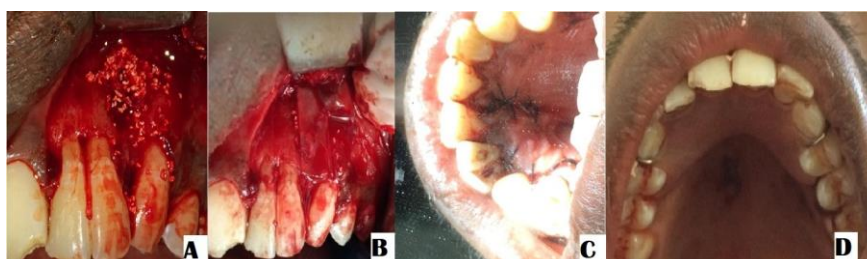
**Figure – 1:**A) Pre- operative intra oral frontal view fusion in 22; B) Pre-operative Intra oral periapical radiograph; C) Tracing of sinus tract using gutta percha stick.



**Figure – 2:**A) Access cavity preparation under rubber dam isolation; B) Immediate post- obturation radiograph



**Figure – 3:**A) Full thickness mucoperiosteal flap elevation with exposure of the osseous defect; B) Elevation of palatal flap and biodentin placement at fusion- groove site



**Figure – 4:**A) Placement of PRF and bone graft in the osseous defect; B) GTR placement over the graft; C) Flap repositioned and suturing done; D) Placement of palatal stent to approximate the flap.