Case Report

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An Unusual Sequela of High Frenal Attachment: A Rare Impact on Coronal Integrity in an Unerupted Incisor – A Case Report

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Keywords
Tooth eruption, delayed eruption, Impacted teeth, High labial frenum, Aberrant frenal attachment.

Introduction

Tooth eruption is a complex physiological process involving the axial movement of a tooth from its developmental position within the alveolar bone to its functional location in the oral cavity [1]. Any disturbance in this process can result in delayed eruption or impaction, which poses significant clinical challenges during the mixed dentition period [2]. Among the various local factors that can interfere with eruption, an abnormally high frenal attachment plays a crucial role, particularly in the anterior maxillary region [3]. The frenum is a membrane fold made of muscle and connective tissue fibers that connects the lip and cheek to the gingiva, alveolar mucosa, and underlying periosteum [4].

A high labial frenum may exert continuous mechanical traction on the gingival tissue and developing tooth bud, creating fibrotic tension that impedes the eruption pathway of the tooth. This condition may also result in midline diastema, gingival recession, and abnormal tooth positioning once eruption occurs [5]. When the central incisors are affected, the consequences extend beyond oral function, leading to compromised esthetics, speech difficulties, and psychosocial distress in growing children [6]. Therefore, early identification and timely management of a high frenal attachment are essential to prevent eruption disturbances and associated sequelae.

Contemporary dentistry advocates minimally invasive approaches for soft-tissue management. The advent of laser technology has transformed conventional frenectomy procedures by providing superior precision, reduced intraoperative bleeding, minimal postoperative discomfort, and faster healing compared to scalpel-based techniques [7]. The term LASER stands for Light Amplification by Stimulated Emission of Radiation, and its application in pediatric patients has shown high levels of acceptance and clinical success [8,9].

This case report presents the management of an unerupted maxillary central incisor associated with a high frenal attachment using a diode laser–assisted surgical approach, emphasizing the hidden role of frenum on eruption and the efficacy of using a conservative approach for its management.

Case Presentation

An 11-year-old girl reported to the Department of Pediatric and Preventive Dentistry with a normal gait, moderately built and well-nourished, well-oriented, alert, and responsive. Her chief complaint was the non-eruption of the upper left central incisor. The contralateral incisor had erupted approximately 12–15 months earlier. (Figures 1 and 2) A detailed dental and medical history related to the unerupted tooth was obtained.

Figure 1: Pre-operative intra-oral photograph showing a Eruption bulge of 21 associated with high frenal attachment.

Figure 2: Pre-operative intra-oral photograph showing papilla penetrating type of frenal attachment with buccal view of eruption buldge.

The treatment options were thoroughly explained to the parents, and informed consent was obtained for laser-assisted management.

Extraoral examination revealed a symmetrical facial form with no gross abnormalities. Intraoral examination showed a mixed dentition stage. A high labial frenal attachment extending close to the alveolar margin in relation to the maxillary left central incisor region was noted, resulting in blanching of the adjacent tissue upon lip movement. The gingival tissue appeared tense over the unerupted tooth area, suggesting mechanical interference with its eruption pathway. No other soft-tissue abnormalities were detected.

An intraoral periapical radiograph (IOPA) of the maxillary anterior region revealed the presence of a fully developed permanent left maxillary central incisor positioned within the alveolar bone (Nolla stage 9) with the root formation nearly complete (Figure 3). The tooth was covered by a thin layer of bone and soft tissue, with no signs of pathology or abnormal orientation. The follicular space appeared normal, and there was no evidence of cystic changes or obstruction due to any odontogenic lesion. The right maxillary central incisor was normally positioned and in occlusion.

Based on the clinical and radiographic findings, a diagnosis of delayed eruption of the maxillary left central incisor associated with a high frenal attachment. The high frenum was considered to be which exerting fibrotic traction over the eruptive pathway, mechanically impeding the tooth's emergence into the oral cavity. So, the treatment plan was decided to carry out surgical exposure of the crown along with labial frenectomy using a soft tissue diode laser.

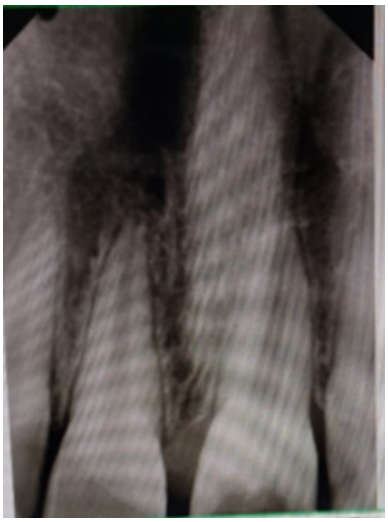

Figure 3: Pre-operative intra-oral radiograph showing normally erupting #11 and impacted 21.

On the day of the procedure, a topical anesthetic (lidocaine gel) and local infiltration using 2% lignocaine with 1:80,000 epinephrine was administered in the labial and palatal mucosa. The crown was exposed labially and palatally first followed by the frenectomy procedure using soft tissue diode laser with 810 nm wavelength (Figure 4). The patient reported minimal postoperative discomfort and the examination revealed adequate exposure of the crown with well-defined surgical margins and no signs of tissue trauma (Figure 5A,5B and 5C). Patient was advised to avoid sticky, hard or spicy food items for 1 week and was prescribed 0.12% chlorhexidine mouthwash for 2 weeks. Additionally, topical application of vitamin E at the surgical site was prescribed to promote healing.

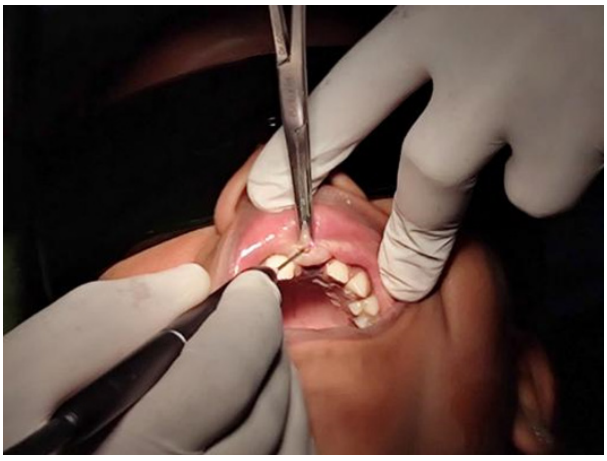

Figure 4: Intra-operative photograph showing diode laser–assisted frenectomy and surgical exposure of the impacted 21.

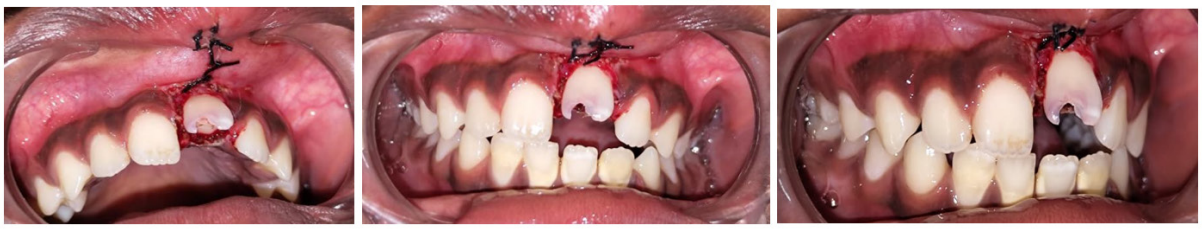

Figure 5A, 5B and 5C: Immediate post-operative photograph showing crown exposure with #21 and frenectomy performed using laser.

Post-Operative Follow Up

Patient was followed up after 1 week, 1 month and post-operative healing was uneventful (Figure 6).

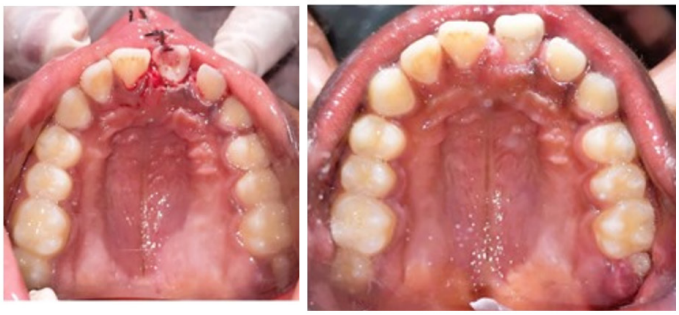

Figure 6A and 6B: 1-week post-operative photograph showing GIC restoration done in 21 following crown exposure performed using laser.

Discussion

Tooth eruption is a multifactorial process with various theories offering different perspectives [10,11]. In this case, the uneruption of 21 teeth was noted both clinically and radiographically (Nolla stage 8 - with 2/3 of the root completed) supporting the root elongation theory [12]. Any disruption in the timing of tooth eruption, whether it be delayed or early, could indicate a change in craniofacial development or other health problems. Genetic problems, endocrine diseases (such as hyperpituitarism or hyperthyroidism), preterm delivery, obesity, and malnutrition are all factors associated with early eruption [13]. There are two types of genetic abnormalities that impair tooth eruption: those that alter the development of enamel (amelogenesis imperfecta, Hurler's syndrome) and those that interfere with osteoclastic activity (cleidocranial dysplasia, osteopetrosis) [14]. Research indicates that more hereditary variables affect tooth growth than eruption [15,16]. There was no family history of any associated conditions in this instance. Unerupted maxillary incisors can have a major impact on dental and facial aesthetics and when they don't erupt at the expected time it is prudent for the clinician to determine the etiology and formulate an appropriate treatment plan [17].

High labial frenal attachment is an uncommon but significant local factor contributing to the non-eruption of anterior teeth. An aberrant frenum extending close to or across the alveolar crest can create a fibrous barrier over the eruptive pathway or exert tension on the gingival tissues, hindering the tooth's normal eruption trajectory. Studies have reported that a high frenal attachment may also lead to midline diastema, gingival recession and alveolar bone dehiscence if left untreated [18,19]. But, the present case a unique finding that is the distruction of coronal portion of the tooth due to the interfernce cauesd by the frenum was noted. Early identification and correction of such attachments are essential for guiding normal eruption and maintaining periodontal health.

The objective of this case is to increase awareness of uncommon presentations of unerupted maxillary incisors associated with coronal tooth destruction, where a high frenal attachment acts as a significant etiological factor. While delayed eruption of permanent incisors is often attributed to causes such as trauma, supernumerary teeth, cystic lesions, or space loss, the role of aberrant frenal attachment is frequently overlooked. In this case, the high frenum not only contributed to the mechanical obstruction of tooth eruption but also resulted in fibrotic traction on the gingival tissues, leading to localized inflammation and coronal structure compromise.

Traditionally, fibrotic tissue over unerupted teeth is removed using scalpels, often causing discomfort and delayed healing. This case demonstrates the effective use of a 980 nm diode laser as a minimally invasive alternative, offering better hemostasis, reduced pain, and faster healing. Laser-assisted exposure thus provides a safer and more comfortable approach for managing such cases in pediatric dentistry [20-22].

In this case, laser excision was performed to remove the hyperplastic labial mucosa obstructing eruption of the maxillary central incisors. Kumar et al. reported that diode lasers offer advantages over conventional scalpel methods, including minimal discomfort, fewer complications, and faster healing in children. Laser use reduces operative time, anesthesia requirements, and provides superior hemostasis and visibility—especially beneficial in pediatric patients. Recent studies also support laser therapy for its accelerated wound healing, reduced postoperative pain, edema, and lower analgesic need [23-25].

Conclusion

This case highlights the importance of recognizing high frenal attachment as a potential etiological factor in the delayed eruption and coronal destruction of maxillary incisors. While common causes such as trauma, supernumerary teeth, cystic lesions, or space loss are routinely considered, soft tissue influences like aberrant frenum attachment are often underestimated. Beyond the routine clinical and radiographic assessments, practitioners must acknowledge the extended influence of a high frenum on both eruption patterns and coronal integrity of the involved tooth. A

comprehensive evaluation of all possible etiologies—including mechanical, developmental, and soft tissue factors—is essential for accurate diagnosis and effective management of such cases.

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