

Laser-Assisted Operculectomy in an 8-Year-Old Child with Delayed Tooth Eruption: A Case Report

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ABSTRACT

Background:

Persistent fibrotic gingival tissue may delay eruption of permanent maxillary incisors by obstructing the eruptive pathway. Diode laser-assisted operculectomy provides a minimally invasive alternative to conventional surgery.

Case Presentation:

An 8-year-old boy presented with delayed eruption of the permanent maxillary central incisors. Clinical

and radiographic examination confirmed soft tissue impaction without hard tissue obstruction or pathology. Diode laser-assisted operculectomy was performed under local anesthesia, achieving excellent hemostasis without sutures and complete exposure of the erupting incisors.

Results:

Healing was uneventful, with minimal postoperative

discomfort and progressive spontaneous eruption of the incisors during follow-up.

Conclusion:

Diode laser-assisted operculectomy is a safe, effective, and child-friendly approach for managing delayed eruption caused by persistent fibrotic gingival tissue, facilitating physiological tooth eruption with minimal surgical morbidity.

INTRODUCTION

Delayed eruption of permanent maxillary incisors is a common concern in pediatric dentistry, with soft tissue abnormalities such as a thick or fibrotic operculum representing one of the local factors that may impede normal tooth eruption. [1] Persistence of excessive gingival tissue over an erupting tooth can interfere with functional eruption, compromise oral hygiene, predispose to plaque accumulation and gingival inflammation, and negatively affect esthetics, particularly in the anterior region where appearance is of significant psychosocial importance to growing children.

Operculectomy, the surgical removal of the overlying soft tissue, is indicated when the eruptive pathway is obstructed by gingival tissue after excluding other causes such as supernumerary teeth, odontomas, or inadequate arch space. [2] Conventional scalpel operculectomy has been widely employed; however, it may be associated with intraoperative bleeding, the need for sutures, postoperative pain, and delayed healing, which can be challenging in pediatric patients. [2]

The introduction of soft tissue lasers has provided a minimally invasive alternative for pediatric oral surgery. Diode lasers, owing to their affinity for

pigmented soft tissues, offer excellent hemostasis, reduced bacterial contamination, minimal postoperative discomfort, decreased edema, and accelerated wound healing. Their ability to provide a relatively bloodless surgical field and improved patient acceptance makes them particularly advantageous for managing soft tissue procedures in children, including frenectomy, gingivectomy, and operculectomy. [3]

This case report describes the successful management of an unerupted permanent maxillary central incisor in a pediatric patient using diode laser-assisted operculectomy. The report highlights the clinical procedure, postoperative healing, and the advantages of laser-assisted intervention as a safe, effective, and child-friendly approach for facilitating tooth eruption while minimizing surgical morbidity.

CASE PRESENTATION

An 8-year-old male patient presented to the Department of Pediatric and Preventive Dentistry with the chief complaint of missing upper front teeth. The patient's parent reported a delay in the eruption of the permanent maxillary incisors. The medical and family histories were non-contributory, and there was no history of trauma or systemic illness.

Clinical examination revealed the absence of the permanent maxillary central incisors in the oral cavity. The overlying gingival tissue appeared thick and fibrotic, suggestive of delayed eruption secondary to soft tissue impaction. No associated swelling, tenderness, fluctuation, or labial bulge was observed in the anterior maxillary region. The surrounding oral mucosa was healthy, and no signs of infection or inflammation were evident. (Figure 1)



Figure 1: Preoperative intraoral clinical photograph showing delayed eruption of the permanent maxillary central incisors

A pre-operative intraoral periapical radiograph of the maxillary anterior region demonstrated the permanent maxillary central incisor in its normal eruptive path beneath the overlying soft tissue. The developing tooth exhibited incomplete root formation with an open apex, consistent with the patient's age and physiological stage of eruption. No evidence of

supernumerary teeth, odontogenic pathology, or obstruction by hard tissue was evident on the radiograph, suggesting that the delayed eruption was attributable to persistent soft tissue coverage rather than an osseous or pathological impediment. (Figure 2)



Figure 2: Preoperative intraoral periapical radiograph showing the permanent maxillary central incisor in its normal eruptive path with incomplete root formation and an open apex. No supernumerary teeth, pathology, or bony obstruction were evident, confirming delayed eruption due to persistent fibrotic soft tissue impaction.

Based on the clinical and radiographic findings, a diagnosis of delayed eruption of the permanent maxillary central incisor due to persistent fibrotic soft

tissue (operculum) was established. Considering the absence of any hard tissue obstruction, less invasive treatment option such as laser-assisted operculectomy

was planned to expose the crown and facilitate physiological eruption.

Following informed consent from the patient's parent, the procedure was performed under local anesthesia using a diode laser. The fibrotic operculum covering the erupting tooth was excised with excellent

hemostasis, eliminating the need for sutures. (Figure 3) Immediate postoperative examination demonstrated complete exposure of the incisal portions of the erupting central incisors with a clean surgical field, well-defined wound margins, and minimal bleeding or tissue trauma. (Figure 4)



Figure 3: Intraoperative clinical photograph showing diode laser-assisted operculectomy of the fibrotic gingival tissue overlying the unerupted permanent maxillary central incisor.



Figure 4: Immediate postoperative intraoral clinical photograph following diode laser-assisted operculectomy demonstrating complete exposure of the erupting permanent maxillary central incisors.

The patient was provided with postoperative instructions and scheduled for periodic follow-up. Healing was uneventful, with minimal postoperative discomfort and no evidence of infection or other complications. Progressive eruption of the permanent

maxillary central incisors was observed during subsequent follow-up visits, confirming the successful outcome of laser-assisted operculectomy in facilitating normal tooth eruption. (Figure 5)



Figure 5: Follow-up intraoral clinical photograph demonstrating progressive spontaneous eruption of the permanent maxillary central incisors following diode laser-assisted operculectomy.

DISCUSSION

Delayed eruption of permanent maxillary central incisors is a relatively common developmental concern encountered during the mixed dentition period and frequently prompts parental anxiety because of its functional and esthetic implications. [1] The permanent maxillary central incisors generally erupt between 7 and 8 years of age; therefore, failure of eruption beyond six months of the contralateral tooth or deviation from the expected eruption sequence warrants comprehensive clinical and radiographic evaluation. Although delayed eruption may result from systemic disorders such as endocrine abnormalities or genetic syndromes, local factors remain the predominant cause. [4] These include supernumerary teeth, odontomas, retained primary teeth, trauma to the primary dentition, cystic lesions, inadequate arch space, ankylosis, ectopic tooth position, and soft tissue obstruction. In the present case, radiographic examination demonstrated a normally positioned permanent maxillary central incisor with incomplete root formation and no evidence of hard tissue obstruction or

pathology, indicating that the persistent fibrotic gingival tissue was the principal impediment to eruption.

Accurate identification of the underlying etiology is essential because treatment strategies differ considerably according to the cause of eruption delay. Previous studies have reported that supernumerary teeth account for the majority of delayed eruption cases involving permanent maxillary incisors, whereas isolated soft tissue impaction is comparatively uncommon. [4] Consequently, careful radiographic assessment is mandatory before undertaking any intervention to exclude osseous obstruction or odontogenic pathology. In the present case, the absence of supernumerary teeth, odontomas, or cystic lesions allowed conservative management through soft tissue excision alone, thereby avoiding unnecessary removal of bone or orthodontic traction. Operculectomy is indicated when excessive gingival tissue persists over an erupting tooth despite adequate eruptive potential and the absence of mechanical obstruction. [2] The procedure aims to eliminate the

soft tissue barrier, expose the clinical crown, and permit continuation of physiological eruption. Conventional scalpel operculectomy has long been regarded as the standard technique; however, its use in pediatric patients may be associated with considerable intraoperative bleeding, compromised visualization of the operative field, the need for sutures, postoperative discomfort, edema, and greater patient apprehension. These factors may adversely influence patient cooperation and overall treatment experience, particularly in anxious or young children. [2]

The advent of soft tissue lasers has significantly altered the management of minor oral surgical procedures in pediatric dentistry. Among the available laser systems, diode lasers have gained widespread acceptance because of their compact design, ease of operation, affordability, and selective affinity for pigmented soft tissues containing hemoglobin and melanin. Their photothermal mechanism produces simultaneous tissue incision, coagulation, and bacterial reduction, thereby creating a nearly bloodless surgical field with excellent visibility throughout the procedure. [5,6] In the present case, laser-assisted operculectomy enabled precise excision of the fibrotic operculum with excellent hemostasis, complete exposure of the erupting incisal edge, and elimination of the need for suturing, facilitating efficient completion of the procedure.

An additional advantage of diode lasers is the reduction in postoperative morbidity. Thermal sealing of small blood vessels, lymphatics, and sensory nerve endings contributes to diminished postoperative pain, edema, and inflammation compared with conventional scalpel surgery. Laser irradiation also exhibits bactericidal effects and reduces wound contamination,

thereby minimizing the risk of postoperative infection. These biological effects promote favorable healing while improving patient comfort, often reducing the requirement for analgesics and facilitating greater acceptance of surgical treatment by pediatric patients and their caregivers. [6] Consistent with these observations, the present patient experienced uneventful healing with minimal postoperative discomfort and progressive spontaneous eruption of the permanent maxillary central incisors during follow-up.

The present case also highlights the importance of preserving the natural eruptive mechanism whenever possible. Since the tooth exhibited incomplete root formation with an open apex and maintained its physiological eruptive path, simple removal of the overlying fibrotic tissue was sufficient to permit continued eruption without orthodontic intervention. Previous studies have shown that teeth with favorable positioning and approximately two-thirds root development possess substantial eruptive potential once local obstacles are eliminated. [7] Therefore, timely diagnosis and minimally invasive intervention may prevent the need for more complex surgical exposure combined with orthodontic traction, reducing treatment duration, patient morbidity, and financial burden.

Beyond its clinical advantages, laser-assisted operculectomy offers important behavioral benefits in pediatric dentistry. The absence of extensive bleeding, reduced tissue trauma, shorter operating time, and elimination of sutures contribute to a less intimidating surgical experience, thereby enhancing child cooperation and reducing dental anxiety. These characteristics are particularly valuable when treating

young patients, in whom behavioral management is often as important as the surgical procedure itself. The minimally invasive nature of diode laser surgery aligns well with the principles of contemporary pediatric dentistry, which emphasize patient comfort, tissue preservation, and improved quality of care.

LIMITATIONS

Although this case demonstrates a successful clinical outcome, certain limitations should be acknowledged. As a single case report, the findings cannot be generalized to all cases of delayed eruption. Long-term follow-up evaluating periodontal health, gingival architecture, tooth vitality, and eruption stability was limited. Furthermore, comparative clinical trials evaluating diode laser-assisted operculectomy against conventional scalpel techniques with respect to postoperative pain, healing rate, patient satisfaction, cost-effectiveness, and long-term periodontal outcomes remain limited. Well-designed randomized controlled studies with standardized laser parameters and extended follow-up are required to establish evidence-based clinical guidelines for managing soft tissue-related eruption delays.

CONCLUSION

In summary, this case supports the use of diode laser-assisted operculectomy as a conservative, predictable, and child-friendly approach for managing delayed eruption caused by persistent fibrotic gingival tissue. Careful clinical and radiographic assessment to exclude underlying hard tissue pathology, followed by timely minimally invasive intervention, can facilitate physiological tooth eruption while minimizing surgical morbidity and enhancing patient acceptance. The favorable clinical outcome observed in this patient reinforces the growing role of soft tissue lasers

as an effective adjunct in contemporary pediatric dental practice.

REFERENCES

1. Aldowsari M, Alsaif FS, Alhussain MS, AlMeshary BN, Alosaimi NS, Aldhubayb SM, AlQahtani S. Prevalence of Delayed Eruption of Permanent Upper Central Incisors at a Tertiary Hospital in Riyadh, Saudi Arabia. *Children* (Basel). 2022 Nov 19;9(11):1781.
2. Abate A, Cavagnetto D, Fama A, Matarese M, Bellincioni F, Assandri F. Efficacy of Operculectomy in the Treatment of 145 Cases with Unerupted Second Molars: A Retrospective Case-Control Study. *Dent J* (Basel). 2020 Jul 1;8(3):65.
3. Silva AS, Nunes AMM, Neves PAM, Lago ADN. Use of high-power lasers in pediatric dental surgeries: case reports. *Gen Dent*. 2022 May-Jun;70(3):56-59
4. Suri L, Gagari E, Vastardis H. Delayed tooth eruption: pathogenesis, diagnosis, and treatment. A literature review. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2004 Oct 1;126(4):432-45.
5. Bhattacharjee S, Mohanty S. Laser-assisted Operculectomy in an 8-Year-old Child Using Diode Laser: A Case Report. *Indian Journal of Forensic Medicine & Toxicology*. 2020 Oct 1;14(4).
6. Kourehpaz N, Pakdel F, Katebi K, Sarbakhsh P, Baghaei T, Milani F, Hashemi M. Comparison of consequences of operculectomy using conventional surgical knife and laser: A systematic review and meta-analysis. *Crescent*

Journal of Medical and Biological Sciences.

2024;11(2).

7. Yao EH, Du JH, Jiang XQ. Tooth Root Development and Homeostasis during Eruptive and Post-eruptive Movement. Chin J Dent Res. 2024 Dec 6;27(4):273-289.