DENTAL

Case Report ISSN: 2690-3970

Conservative Excision of a Fibrous Epulis Using Diode Laser in a 5-Year-Old Child: A Case Report

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Received : September 06, 2026

***Published* :** October 27, 2026

ABSTRACT

Background: Fibrous epulis is a benign reactive gingival lesion that may occur in children. Diode lasers have been used for oral soft-tissue surgery because they allow localized tissue incision and effective haemostasis. However, clinical reports describing diode laser-assisted excision of histopathologically confirmed fibrous epulis in young children remain limited.

Case Presentation: A 5-year-old girl presented with an asymptomatic gingival lesion measuring approximately 3 mm, located on the interdental papilla adjacent to the primary maxillary right lateral incisor (52). Clinical and radiographic examinations revealed no underlying bone involvement. Conservative excision was performed using a 980-nm diode laser at 2 W in continuous-wave contact mode with a 300-µm initiated fibre. A minimal, clearly defined surgical margin was used to preserve the adjacent interdental papillary tissues. Adequate haemostasis was achieved without suturing. The excised tissue was submitted for histopathological examination, which confirmed fibrous epulis (focal fibrous hyperplasia). At the 2-week follow-up, complete epithelialisation and restoration of the gingival contour were observed, with no clinically evident residual lesion or early recurrence.

Conclusion: Conservative excision of a small fibrous epulis using a 980-nm diode laser was feasible and well tolerated in this paediatric case, allowing preservation of the adjacent interdental papillary tissues and satisfactory early healing. Further studies are needed to assess the benefits and limitations of diode laser surgery for paediatric gingival lesions.

Keywords: Fibrous Epulis, Focal Fibrous Hyperplasia, Diode Laser, 980 Nm, Paediatric Dentistry, Gingival Lesion

INTRODUCTION

The term epulis is a clinical descriptor referring to a localized gingival growth rather than a specific histopathological

ISSN: 2690-3970

diagnosis. Histological studies have shown that epulides comprise several distinct reactive or neoplastic entities, including focal fibrous hyperplasia, peripheral ossifying fibroma, pyogenic granuloma, and peripheral giant cell granuloma [1]. Fibrous epulis, commonly described histopathologically as focal fibrous hyperplasia, is characterized predominantly by a fibroblastic and collagen-rich connective tissue proliferation [2]. Because clinically similar gingival proliferations may have different histopathological characteristics, clinical assessment alone cannot establish a definitive diagnosis, and excised tissue should be submitted for histopathological examination [1,3].

Clinically, fibrous epulis generally presents as a localized, well-circumscribed gingival enlargement that may be sessile or pedunculated and may range in colour from pink to erythematous, depending on the presence of inflammation or ulceration [1,2]. Management generally consists of complete surgical excision and identification and elimination of potential local irritants when present. Conventional scalpel excision remains a predictable and widely available approach; however, laser-assisted surgery has increasingly been used for selected oral soft-tissue procedures.

Diode lasers operating within the 810–980 nm range are used in soft-tissue surgery because their energy is absorbed by tissue chromophores, including haemoglobin, facilitating incision and coagulation [4–6]. Reported clinical benefits include intraoperative haemostasis, improved operative visibility, and reduced need for suturing in selected procedures [5–8]. However, outcomes depend on the laser wavelength, power, emission mode, exposure time, fibre characteristics, tissue contact, and surgical technique [4,7]. These factors should be considered when interpreting the results of individual case reports [7,9,10].

Reports specifically addressing laser-assisted excision of epulis in children remain limited. Olivi et al. [11]described the excision of a fibrous epulis in a paediatric patient using an Er,Cr:YSGG laser, with satisfactory healing and no sutures required. Ghadimi et al. [12] subsequently reported the excision of epulis granulomatosa in an 8-year-old child using an 810-nm diode laser, with complete healing at 2 weeks [12]. These reports provide clinical precedents for laser-assisted treatment of paediatric gingival lesions, but differ in lesion classification, laser wavelength, and clinical circumstances.

The present report describes the conservative excision of a small, histopathologically confirmed fibrous epulis located on the interdental papilla adjacent to a primary maxillary lateral incisor in a 5-year-old child, using a 980-nm diode laser. Its specific contribution is the documentation of a 980-nm diode laser-assisted procedure in a very young child with a small lesion in a delicate interdental location, with particular attention to tissue preservation, histopathological confirmation, and early postoperative gingival contour. The case also provides the operating settings used in this individual procedure, while recognizing that a single case cannot establish an optimal laser protocol or comparative clinical advantage.

Case Presentation

This case report was prepared in accordance with the CARE (CAse REport) Guidelines [13].

Written informed consent was obtained from the patient's parents for publication of the case report and accompanying clinical photographs and radiographs.

Patient information

A 5-year-old female patient was referred to the Department of Pediatric Dentistry for evaluation of a localized gingival lesion in the maxillary anterior region. The patient's medical history was non-contributory, with no relevant systemic disease or long-term medication reported.

The lesion was located in the region of the interdental papilla adjacent to the primary maxillary right lateral incisor (tooth 52). According to the parent, the lesion had been noticed four months before presentation. The child did not report spontaneous pain or functional discomfort.

Clinical Examination

Intraoral examination revealed a small, well-circumscribed gingival nodule measuring approximately 3 mm in diameter. The lesion was located on the interdental papilla adjacent to the primary maxillary right lateral incisor (tooth 52).

The lesion was sessile, firm in consistency, pink in colour, and had a smooth, intact surface. No spontaneous bleeding, ulceration, or apparent signs of acute inflammation were observed. The surrounding gingival tissues appeared clinically healthy (Figure 1).

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Figure 1: Preoperative clinical appearance of the gingival lesion

A small, localized gingival lesion measuring approximately 3 mm was observed at the level of the interdental papilla adjacent to the primary maxillary right lateral incisor (52).

Based on the clinical appearance, a benign localized reactive gingival lesion was suspected. The main clinical differential diagnoses included fibrous epulis, pyogenic granuloma, and other localized reactive gingival proliferations.

Radiographic Examination

A periapical radiograph of the maxillary anterior region was obtained to assess the underlying periodontal and dental structures. No radiolucency, bone destruction, or cortical alteration was identified. The developing permanent successor showed no apparent radiographic abnormality.

The absence of underlying bone involvement supported a localized soft-tissue origin of the lesion.

Laser-Assisted Excision

Because of the small size and delicate interdental location of the lesion, conservative excision was planned with the aim of removing the lesion while minimizing unnecessary removal of adjacent healthy gingival tissue and preserving the interdental papillary architecture.

After local infiltration anaesthesia using 2% mepivacaine with adrenaline 1:100,000 (Medicaine 2% with adrenaline 1:100,000®, Medis, Tunisia), laser safety measures were implemented, including the use of appropriate protective eyewear.

A Doctor Smile Simpler® diode laser (Lambda, Italy), operating at a wavelength of 980 nm, was used. The laser was operated at 2 W in continuous-wave mode with a 300-µm initiated quartz fibre in contact mode. The fibre was moved in a controlled manner to permit localized tissue removal while limiting unnecessary injury to the adjacent gingiva.

The laser settings were as follows:

Wavelength: 980 nm.

Set power: 2 W.

Emission mode: continuous wave.

Fibre diameter: 300 µm.

Fibre-tissue relationship: contact.

Reported procedure duration: 300 seconds.

Calculated energy at continuous activation for 300 seconds: 600 J.

The distinction between procedure duration and actual laser activation time must be confirmed from the operative record before submission. If the laser was continuously activated for the entire 300 seconds at 2 W, the calculated energy was 600 J. If 300 seconds represents the overall procedure duration, including pauses or periods without laser emission, 600 J should be described only as a theoretical maximum under continuous activation, not as the measured energy delivered to the tissue.

The lesion was excised following its clinical perimeter, with the intention of preserving the surrounding interdental papilla and avoiding unnecessary removal of healthy gingival tissue.

ISSN: 2690-3970

The exact width of the surgical margin was not quantitatively documented in the information available for this report; therefore, a numerical margin should not be inferred retrospectively. The final manuscript should specify the actual margin or describe the procedure as a clinically conservative excision if no measurement was recorded.

Satisfactory intraoperative haemostasis was achieved, and no sutures were required (Figure 2). The excised specimen was immediately placed in 10% neutral buffered formalin and submitted for histopathological examination.

Figure 2. Immediate postoperative appearance following laser excision

Clinical appearance immediately after conservative laser-assisted excision. The lesion was completely removed with a minimal and clearly defined surgical margin. Effective hemostasis was achieved, with preservation of the surrounding gingival tissues and no need for suturing.

Histopathological Examination

Histopathological examination revealed gingival mucosa covered by stratified squamous epithelium overlying dense fibrocollagenous connective tissue containing mature collagen bundles and scattered bland spindle-shaped fibroblasts. A mild chronic inflammatory infiltrate, predominantly lymphocytic, was observed.

No cytological atypia, pleomorphism, hyperchromasia, abnormal mitotic activity, epithelial dysplasia, significant vascular proliferation, multinucleated giant-cell proliferation, or significant mineralized material was identified. The histopathological findings were consistent with fibrous epulis (focal fibrous hyperplasia).

Histopathological Illustration: If representative histop athology photographs are available, a photomicrograph should be added as a new figure, with the original magnification or scale bar and the relevant histological features indicated. If no photograph is available, the manuscript should report the histopathological findings in text without implying that an image has been provided.

Postoperative Follow-Up

The postoperative course was uncomplicated. No significant postoperative discomfort was reported, and no analgesic medication was required. The child and her parent were instructed to maintain gentle oral hygiene and to avoid mechanical trauma to the surgical site during the healing period.

At the 2-week follow-up, the surgical site showed complete epithelialisation with a healthy clinical appearance and restoration of the local gingival contour. No residual lesion, abnormal bleeding, infection, or clinically evident inflammation was observed (Figure 3).The child and her parent were satisfied with the clinical outcome.

DOI: https://doi.org/10.35702/dent.10028

ISSN: 2690-3970

Figure 3. Clinical appearance at 2-week follow-up.

Complete and satisfactory healing of the surgical site 2 weeks after laser excision, with restoration of the gingival contour and no evidence of residual lesion or recurrence.

DISCUSSION

The present case describes conservative excision of a 3-mm fibrous epulis in a 5-year-old child using a 980-nm diode laser. The lesion was located on the interdental papilla adjacent to the primary maxillary right lateral incisor, making preservation of the surrounding gingival architecture an important clinical consideration. Histopathological examination confirmed the diagnosis, supporting the importance of submitting excised gingival lesions for microscopic assessment even when they appear clinically benign.

The terminology surrounding epulis warrants consideration. Epulis is a descriptive clinical term encompassing several histopathological entities rather than a single disease [1]. Focal fibrous hyperplasia represents one of the major histopathological patterns encountered among epulides [1,2]. The differential diagnosis may include peripheral ossifying fibroma, pyogenic granuloma, peripheral giant cell granuloma, and peripheral odontogenic fibroma. Manabe et al. demonstrated that peripheral odontogenic fibroma and fibrous epulis may require histopathological and, in selected cases, immunohistochemical assessment for distinction [3]. Therefore, the diagnosis in the present case was established through histopathological examination.

Complete surgical excision is generally recommended for localized fibrous gingival lesions. In the present case, the small size and interdental location of the lesion justified a conservative approach intended to remove the lesion while minimizing unnecessary loss of healthy gingival tissue. Excessive excision in this anatomical area could potentially compromise the local gingival contour. The use of a small-diameter initiated fibre and controlled contact movements facilitated localized tissue removal. The satisfactory postoperative appearance at 2 weeks supports the feasibility of this approach in the present case, although it does not establish long-term preservation of the papilla or exclude subsequent recurrence.

Diode lasers have been used in oral soft-tissue surgery because their interaction with haemoglobin and other tissue chromophores facilitates cutting and coagulation [4–6]. Romanos and Nentwig evaluated a 980-nm diode laser in 22 patients undergoing various oral soft-tissue procedures and reported satisfactory haemostasis and precise incision margins [4]. Reviews have likewise described the application of diode lasers to gingival and other oral soft-tissue lesions [5,6]. These characteristics were relevant to the present procedure, in which satisfactory haemostasis was achieved during excision of a small lesion in a narrow interdental area. Nevertheless, the absence of a comparator prevents attribution of this outcome exclusively to the laser.

The paediatric context is also important. Surgical procedures in young children may be influenced by fear of conventional

ISSN: 2690-3970

instruments, bleeding, and postoperative management. Reviews of paediatric laser applications have described potential benefits including reduced intraoperative bleeding and decreased need for sutures in selected procedures [7-10]. Genovese and Olivi reported patient acceptance of laser treatment among children undergoing hard- and soft-tissue procedures, although acceptance varied by treatment type [10]. In the present case, satisfactory haemostasis and the absence of a need for suturing accompanied an uncomplicated postoperative course. These observations are case-specific and should not be interpreted as proof of reduced pain, improved cooperation, or superior patient acceptance because these outcomes were not assessed using standardized measures.

The available reports of laser-assisted excision of paediatric epulis provide the closest clinical comparisons. Olivi et al. reported removal of a fibrous epulis using an Er,Cr:YSGG laser at 2780 nm, with satisfactory healing and no need for sutures [11]. Ghadimi et al. described removal of epulis granulomatosa in an 8-year-old boy using an 810-nm diode laser, with complete healing at 2 weeks [12]. The present case differs from these reports in the combination of a 5-year-old patient, a small lesion histopathologically confirmed as fibrous epulis, an interdental papillary location adjacent to a primary maxillary lateral incisor, and use of a 980-nm diode laser. In particular, the anatomical focus on a small interdental lesion makes conservative tissue removal and preservation of local gingival contour central to the report. These differences define the case's clinical contribution; they do not demonstrate that the technique is more effective than previously reported laser methods or conventional scalpel excision.

An additional contribution is the reporting of the laser settings used. The device was set to 2 W in continuous-wave contact mode with a 300-µm initiated fibre. The reported procedure duration was 300 seconds, but the interpretation of this value requires a distinction between elapsed procedural time and actual laser activation time. At a constant power of 2 W, 300 seconds of uninterrupted activation would correspond to a calculated energy of 600 J. If activation was intermittent, the actual cumulative energy would be lower. Furthermore, total energy alone does not describe the distribution of energy within the tissue: fibre movement, contact pressure, tissue characteristics, and the duration of activation at individual points also influence the thermal effect. The reported settings should therefore be understood as a description of this case, not as a validated or recommended dose for fibrous epulis [13,14].

The histopathological implications of laser excision should also be considered. Thermal effects produced by lasers may alter tissue adjacent to the incision and potentially complicate histological interpretation [15–17]. Angiero et al., in a retrospective study of oral soft-tissue lesions excised with an 808-nm diode laser, reported that thermal alterations were particularly relevant in very small specimens [15]. Experimental studies have also demonstrated that the extent of thermal damage depends on the laser type and operating parameters [16]. A systematic review subsequently concluded that thermal effects vary substantially according to laser type and settings and emphasized the importance of minimizing thermal damage when obtaining oral biopsies [17]. In the present case, the specimen was suitable for histopathological diagnosis despite its small size. This finding demonstrates diagnostic feasibility in this individual case but does not exclude thermal alteration at the specimen margins.

The clinical advantages of diode laser surgery should not be interpreted as evidence of superiority over conventional scalpel excision. A randomized clinical trial comparing diode laser and scalpel surgery for fibrous hyperplasia reported differences in operative duration, analgesic requirements, and wound healing [18]. Comparative evidence also indicates that laser and scalpel techniques may both be appropriate for excisional biopsy of selected oral lesions, with the choice depending on clinical circumstances and the need to preserve specimen quality [19]. The value of the diode laser in the present case was the feasibility of controlled conservative excision with satisfactory haemostasis in a delicate anatomical site, rather than demonstrated superiority over another technique.

The favourable healing observed at the 2-week follow-up is consistent with satisfactory outcomes reported after laser-assisted oral soft-tissue procedures [4,8,11,12]. However, wound healing is influenced by several factors, including wavelength, power, exposure time, tissue characteristics, and surgical technique. Experimental comparisons have shown that healing patterns may differ between laser and scalpel incisions [20]. Complete epithelialisation at 2 weeks should therefore be interpreted as an individual clinical outcome and not as evidence that diode laser surgery necessarily produces faster healing than conventional surgery.

This report has several limitations. First, it describes a single clinical case and cannot establish comparative efficacy, safety, or long-term effectiveness. Second, the lesion was very small and localized, limiting the applicability of the findings

ISSN: 2690-3970

to larger, deeper, or more vascular lesions. Third, follow-up was limited to 2 weeks, preventing assessment of long-term recurrence. Fourth, the surgical margin was not quantitatively measured, and the actual cumulative laser activation time must be distinguished from the overall procedural duration. Finally, the case does not establish an optimal energy dose or demonstrate superiority over conventional excision.

Despite these limitations, the case documents the feasibility of conservative 980-nm diode laser-assisted excision of a small fibrous epulis in a young child. Its specific clinical contribution is the combination of a very young patient, a delicate interdental location, histopathological confirmation, and a detailed account of the laser settings used. Further comparative studies with standardized reporting of activation time, surgical margins, histopathological effects, gingival outcomes, and longer follow-up are needed to clarify the appropriate indications and relative benefits of diode laser surgery in paediatric gingival lesions.

CONCLUSION

Conservative excision of a small fibrous epulis using a 980-nm diode laser was feasible in this 5-year-old child, with satisfactory intraoperative haemostasis, no need for suturing, histopathological confirmation, and complete epithelialisation at 2 weeks. The case contributes a clinical description of laser-assisted excision of a histopathologically confirmed fibrous epulis in a delicate interdental location in a very young child. These findings support the feasibility of this approach in selected cases but do not establish its superiority over conventional scalpel excision or define an optimal laser protocol. Further comparative studies and longer follow-up are required.

STATEMENTS

Acknowledgements

The authors express their sincere gratitude to the patient and her legal guardians for their consent and cooperation.

Ethical Statement

This case report was conducted in accordance with the principles of the Declaration of Helsinki. No experimental procedures were performed beyond routine clinical care. All diagnostic and therapeutic interventions were part of standard pediatric dental management adapted to the patient's medical condition.

The case report was prepared following the CARE guidelines for case reports to ensure transparency and completeness of reporting.

Informed Consent

Written informed consent was obtained from the patient's legal guardians for clinical examination, photographic documentation, and publication of anonymized clinical data and images. The guardians were informed that no identifying personal information would be disclosed and that participation was voluntary. Consent was obtained prior to manuscript preparation.

Data Availability

All relevant clinical information is included in this case report. Additional information is available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding

No specific funding was received for this case report.

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ISSN: 2690-3970

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