IJL, Issue 1, Vol. 24, 2025
https://doi.org/10.31900/ijl.v24i1.525

**Research Article**

IRAQI JOURNAL OF LASER

# Esthetic and Healing Outcomes of Oral Fibroma Excision Using a Diode Laser: A Case Report

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**Article history:** Received: 9 Mar. 2025; Revised: 5 May 2025; Accepted: 27 May 2025; Published online: 15 Jun. 2025.

**Abstract:** This case report evaluates the clinical outcomes of oral fibroma excision using a 980 nm diode laser, focusing on its effectiveness in reducing postoperative discomfort, promoting healing, and improving esthetic outcomes. A 980 nm diode laser was used in CW mode at 2 watts of power to remove two fibrous masses on the buccal mucosa from a 65-year-old male patient who had presented with these lesions. The procedure was performed under local anesthesia using 2% lidocaine with 1:80,000 epinephrine. Postoperative evaluations were performed at follow-up visits on the 3rd day, 1st week, 2nd week, and 4th week to evaluate bleeding, pain, edema, functional interference, mucosal scarring, and healing through standardized clinical indices. At each follow-up visit, photographic documentation was collected to objectively track the healing progress. The procedure resulted in no bleeding, no postoperative swelling, and mild pain that did not necessitate analgesics. The recovery of function was swift. Esthetic evaluation revealed no scarring on the left side and a minor scar on the right side, with excellent overall appearance. The left fibroma site underwent complete healing by the second week, whereas the right site necessitated four weeks for full reepithelialization. The results showed that the 980 nm diode laser is a suitable substitute for traditional scalpels for oral soft tissue surgery, with few complications, mild pain after the procedure, and fast healing time. This case highlights the clinical advantages of diode lasers in minor oral surgical procedures and supports their broader adoption in clinical practice.

**Keywords:** Diode laser, oral fibroma, Soft tissue surgery, esthetic outcome, healing outcome

## 1. Introduction

Oral fibromas are the most prevalent types of oral soft tissue reactive hyperplastic lesions. They primarily arise from trauma or persistent irritation and are generally benign, rarely showing aggressive behaviors [1]. In fibroma, a fibrous submucosal mass develops as a consequence of a continuous healing process that involves scar formation and granulation tissue [2]. Because it generally arises from repeated irritation of the mucosa, fibromas are frequently seen on the buccal mucosa, tongue, and lower lip, as these regions are more susceptible to trauma [3]. The fibroma is firm, with a sessile or pedunculated base, normal color, and a smooth surface. Due to decreased vascularity, it manifests as a painless swelling that is lighter in color and more round or oval in shape than the adjacent tissue [4]. Histologically, oral fibromas have a dome-shaped structure that is covered by keratinized stratified squamous epithelium. The submucosa has a low

number of blood vessels and inflammatory cells [5]. Although scalpel-based surgical excision remains a popular option for treating oral fibromas, it is not without its risks, including intraoperative hemorrhage, infection, and slowed healing. The incredible technological breakthroughs in dentistry have made multi-wavelength lasers an essential tool for oral soft tissue surgery, allowing for accurate excision with remarkable hemostasis and field vision [6]. Diode lasers that work in the infrared spectrum are becoming a useful tool for oral soft tissue surgery. Benefits of diode laser treatment include hemostasis, improved visibility, shorter procedures, sterile environments, quicker recovery, and less pain after surgery [7]. This article presents a case report of oral fibroma excision using a diode laser. The focus is on the clinical evaluation of postoperative esthetic and healing outcomes.

## 2. Clinical case report

### *2.1 Patient presentation*

A 65-year-old edentulous male patient was sent to Basra Teaching Hospital's Department of Oral and Maxillofacial Surgery with two intraoral fibrous masses on the buccal mucosa. A clinical examination identified a firm, asymptomatic, smooth-surfaced, mucosa-colored fibroma on the right buccal mucosa, approximately 0.8 cm in diameter, and a smaller fibroma, about 0.3 cm in diameter, was found on the left buccal mucosa, exhibiting similar clinical characteristics. Both lesions exhibited characteristics associated with traumatic or irritational fibromas based on their clinical presentation (Figure 1a, Figure 2a). The treatment plan was an excisional biopsy using a diode laser.

### *2.2 The procedure*

The surgical procedure was described to the patient in his native language, after which informed consent was obtained .The diode laser (Quicklase 12 W Dual Plus 6″ 810+980nm, England, UK), set at a 980 nm wavelength and operated in Continuous Wave mode at 2 W, was used in the procedure. Continuous wave emission refers to the persistent tissue interaction caused by the laser's continuous output of energy when it is turned on. Infiltration anesthesia was delivered with a solution of 2% lidocaine and 1:80,000 epinephrine. The fiber tip was initially activated by using articulating paper to boost heat retention, enabling a more efficient cutting process with reduced lateral thermal damage and improved precision, which also contributed to decreased beam dispersion. All laser safety protocols were strictly followed. Protective eyewear designed for the 980 nm wavelength was provided to the patient, operator, and assistant. Continuous high-volume suction was maintained throughout the procedure to eliminate the vapor plume generated by laser cutting. The fiber tip was maneuvered in a continuous, sweeping motion with minimal contact pressure to prevent carbonization or excessive charring of the tissues. This measure together with short activation times with intermittent cold saline irrigation, and keeping the fiber tip clean aid to prevent collateral thermal damage and protect surrounding tissues. The excised fibrous lesions were immediately preserved in a 10% formalin buffer solution and dispatched for histological investigation to verify the diagnosis; irritation fibroma was confirmed. Postoperatively, the patient was instructed to utilize 0.12% chlorhexidine mouthwash bi-daily, avoid hot, spicy, citrus, and hard foods for a few days, and maintain a soft diet. Furthermore, amoxicillin 500 mg capsules were prescribed three times daily for 3 days as antibiotic coverage, and ibuprofen 200 mg tablets were given to be taken as needed during the postoperative period for pain management.

### *2.3 postoperative evaluation*

Several objective clinical indices were used to evaluate postoperative outcomes through third-day, first-week, second-week, and fourth-week follow-up appointments (Figure 1, Figure 2). For intraoperative bleeding, a bleeding index is used (1 = no bleeding, 2 = spontaneous hemostasis, 3 = needs compression, 4

= needs hemostasis) [8]. For pain after surgery, patients were asked to fill out a form if they had any pain during the first week postoperatively, using a verbal rating scale (VRS) where 0 means no pain, 1 means mild pain, 2 means moderate pain, and 3 means extreme pain [9]. Edema score (0= = No swelling, 1= = very slight edema, 2= = slight edema, 3= = moderate edema, 4= = severe edema) [10]. Function evaluation using a function interference index (0= no interference, 1= mild, 2= moderate, 3= severe) [11]. The Mucosal Scarring Index (MSI), on a scale from 0 (no scar) to 10 (greatest scar), was utilized to evaluate the surgical sites for mucosal scarring, which serves as an indicator of the esthetic outcome [12]. The Landry Healing Index assesses wound healing by clinical indicators representing the biological phases: inflammatory, proliferative, and remodeling. A score of 1 indicates poor healing characterized by significant inflammation, spontaneous hemorrhage, dehiscence, and infection. A score of 2 indicates inadequate healing characterized by sustained inflammation, bleeding upon palpation, and partial dehiscence of the incision. A score of 3 indicates satisfactory healing accompanied by moderate inflammation and partial epithelialization. A score of 4 indicates excellent healing with minimal inflammation and nearly full closure. A score of 5 indicates exceptional recovery characterized by complete epithelialization, the presence of pink, healthy tissue, and the absence of infection [13].

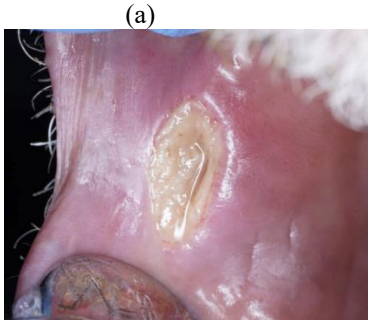
No bleeding during the surgery, and no edema noted or functional interference experienced postoperatively. Mild discomfort was reported through the first and second day with no need for analgesic (Table 1). By the fourth week, there was a barely noticeable scar on the right surgical site and no scar on the left site (Table 2). Both surgical sites demonstrated "excellent" healing, marked by pink tissue coloration and complete epithelialization, and with no complications noted (Table 3).

### *2.4 Histopathological findings*

The tissue section shows characteristics of an irritational fibroma, which is characterized by the development of thick fibrous connective tissue along with varied blood vessels and moderate chronic inflammatory cells infiltrating the stratified squamous epithelium (Figures 3a, 3b). Although the thermal effect of the laser causes ballooning degeneration in some cells, it generally has no impact on diagnosis (Figure 3c).

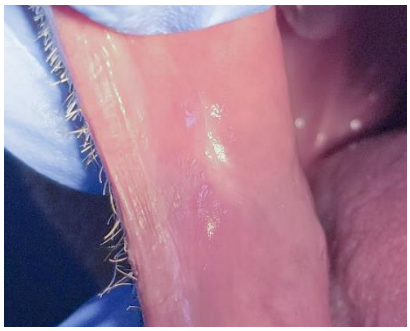
(a)

(b)



(c)

(d)



(e)

**Fig.1:** clinical progression of right fibroma (a) preoperative (b) immediate postoperative (c) 3rd day postoperative (d) 1st week postoperative (e) 4th week postoperative.

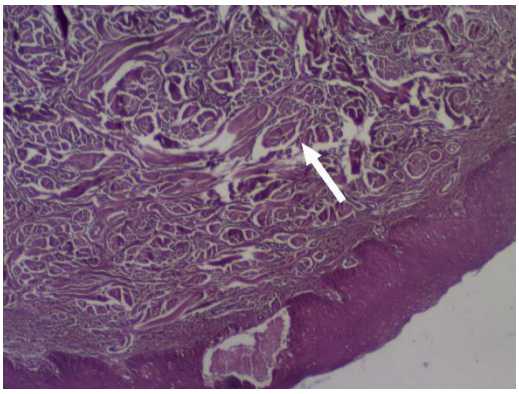
(a)

(b)

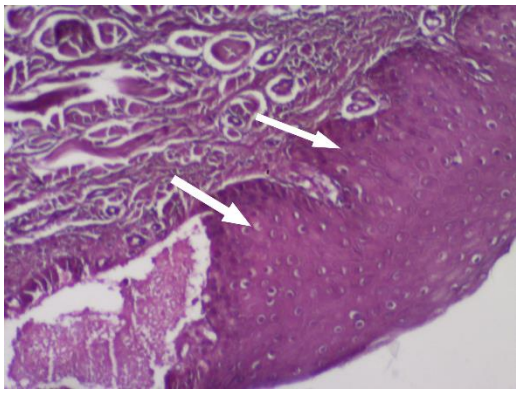
(c)

(d)

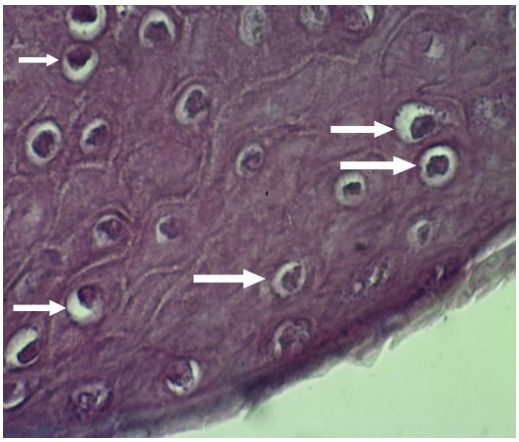
**Fig.2:** clinical progression of left fibroma (a) preoperative (b) immediate postoperative (c) 3rd day postoperative (d) 4th week postoperative



(a)



(b)



(c)

**Fig.3**: histology section at different magnification (a) the section shows densely collagenized fibrous connective tissue bundles admixed with few chronic inflammatory cells (The magnification power 4x). (b) The section shows stratified squamous epithelium covered by the densely collagenized fibrous connective tissue bundles (magnification power 10x). (c) The section shows the thermal effect of the laser, causing ballooning degeneration in some cells (magnification power 40x).

**Table 1.** Pain index (VAS) through the first week postoperatively.

| Day | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 |
|---|---|---|---|---|---|---|---|
| Score | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

**Table 2.** Mucosal scarring index for the two fibromas through follow-up visits.

| visit | Right fibroma | Left fibroma |
|---|---|---|
| 3rd day | 8 | 4 |
| 1st week | 7 | 2 |
| 2nd week | 4 | 0 |
| 4th week | 2 | 0 |

**Table 3.** Healing index for the two fibromas through follow up visits.

| visit | Right fibroma | Left fibroma |
|---|---|---|
| 3rd day | 3 | 4 |
| 1st week | 4 | 4 |
| 2nd week | 4 | 5 |
| 4th week | 5 | 5 |

## 3. Discussion

Benign oral lesions are frequently observed in routine clinical practice throughout all age groups. A comprehensive understanding of these lesions is crucial for clinicians to correctly distinguish between illnesses and administer suitable treatment. If neglected, these benign oral lesions may advance to more severe forms, thereby diminishing the patient's overall well-being [14]. In this case report, the patient was suffering from two fibroma lesions on both sides of the buccal mucosa, which interfered with the feasibility of fabricating and fitting a complete denture.

The 980 nm diode laser was chosen for its established clinical benefits in soft tissue surgery, especially within the maxillofacial area. This wavelength exhibits significant absorption by hemoglobin, facilitating efficient photothermal interaction and prompt hemostasis during the procedure. The application facilitated accurate incisions with reduced intraoperative bleeding, thereby obviating the necessity for sutures and enhancing surgical visibility. Furthermore, diminished postoperative pain, edema, and scarring were noted, aligning with outcomes documented in prior clinical studies [15].

In this case, the Continuous Wave mode was employed, since it has demonstrated efficacy in delivering consistent coagulation and precise tissue ablation, particularly with the 980 nm diode laser. A variety of thermal management strategies were implemented to minimize the risks associated with extended continuous wave exposure, which, as shown in the literature, may elevate the potential for thermal injury to adjacent tissues. This was accomplished by optimizing laser power, minimizing exposure duration, and employing fine optical fibers for accurate energy transmission. Local anesthetic and continuous monitoring additionally minimized the risk of overheating. These solutions facilitated the secure utilization of continuous wave mode, consistent with prior research on 980 nm diode laser applications [16].

The variation in healing durations between the left and right fibroma primarily accounted for the disparity in lesion size. The larger fibroma on right side may have resulted in delayed healing relative to the smaller lesion on left side due to the greater surface area requiring epithelial covering and tissue regeneration. Also larger lesions display a more substantial thermal necrosis zone post-laser treatment, potentially hindering tissue regeneration and epithelialization. In contrast, smaller lesions exhibit a reduced necrosis zone, facilitating expedited recovery. This explanation is consistent with previous studies, which reported that larger lesion size and increased thermal necrosis can delay epithelialization and tissue regeneration following laser excision [17] [18]. The use of diode lasers to treat oral lesions is a simple, effective, and risk-free substitute for conventional methods. There are many advantages to this modality over the standard surgical method. For example, it reduces pain, improves vision, expedites recovery, lessens scarring, preserves tissue elasticity, and precisely excises soft tissue abnormalities [19]. Through stimulate the division of epithelial cells, vascular proliferation, collagen production, and fibroblast proliferation the healing process is much faster with the use of diode lasers [20]. Furthermore, hemostasis assistance during soft tissue procedures can lead to less postoperative pain and less need for analgesics [21]. The results from our case were consistent with these findings, demonstrating that diode laser excision facilitated rapid healing, reduced discomfort, and lowered the need for analgesics. During the follow-up appointments, the patient shows a positive outlook for complete recovery. He achieved complete reepithelization of the surgical site. The patient reported no concerns post-surgery. Furthermore, he has received training on

maintaining dental hygiene and caring for his denture, and he currently wears a well-fitting complete denture. The current study offers significant clinical insights into the healing process after diode laser excision of oral fibroma; nevertheless, it is constrained by its classification as a single case report. The findings cannot be generalized to a broader population without further validation via bigger clinical studies or randomized controlled trials. Differences in individual patient characteristics, lesion properties, and surgical techniques may influence healing results. Future studies employing larger sample sizes and comparative analysis with conventional surgical methods are crucial to confirm and improve these findings.

## 4. Conclusions

Diode laser surgery appears to be a promising substitute to standard scalpel excision of oral fibromas. Minimal bleeding, less discomfort, and quicker recovery are the outcomes of diode laser excision, as shown in this case report. Esthetic and healing outcomes can be enhanced by integrating diode lasers into conventional dental procedures. However, this result relies on a single case report; additional research with bigger sample sizes and comparative clinical trials is essential to verify these first findings and establish definite clinical recommendations.

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# عنوان البحث باللغة العربية (النتائج الجمالية والشفائية لاستئصال الورم الليفي الفموي باستخدام ليزر الدايود)

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**الخلاصة:** هذا التقرير يقيّم النتائج السريرية لاستئصال الأورام الليفية الفموية باستخدام ليزر دايود بطول موجي 980 نانومتر، مع التركيز على فعاليته في تقليل الالم بعد الجراحة، وتسريع الشفاء، وتحسين النتائج الجمالية. تم استخدام الليزر دايود في وضع الموجة المستمرة وبقوة 2 واط لإزالة الورم الليفي على كلا الجانبين الداخلين للخد من مريض ذكر يبلغ من العمر 65 عامًا يعاني منهم. تم إجراء التقييمات بعد الجراحة في زيارات المتابعة في اليوم الثالث، الأسبوع الأول، الأسبوع الثاني، والأسبوع الرابع، حيث تم تقييم النزيف خلال الجراحة، الألم، التورم، تأثر الوظيفة، التندب ، والشفاء باستخدام مؤشرات سريرية معينة. أسفرت الإجراءات عن عدم وجود نزيف خلال العملية، وعدم وجود تورم بعد الجراحة، وألم خفيف لم يتطلب مسكنات وكان ممارسة الوظيفة سريعًا. أظهرت التقييمات الجمالية عدم وجود تندب على الجهة اليسرى ووجود ندبة طفيفة على الجهة اليمنى، مع مظهر عام ممتاز. تم ملاحظة الشفاء الكامل في موقع الورم الليفي الأيسر في الأسبوع الثاني، بينما استلزم الموقع الأيمن أربعة أسابيع. تظهر النتائج أن ليزر دايود 980 نانومتر هو بديل جيد للمشارط التقليدية في جراحة الأنسجة الرخوة الفموية، مع تقليل المضاعفات، والألم بعد العملية، ووقت شفاء سريع.