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SURGICAL EXTIRPATION OF GIANT CELL FIBROMA OF THE TONGUE USING A COMBINATION OF 450NM AND 650NM DIODE LASER WAVELENGTHS: A CASE REPORT

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ABSTRAK

Latar Belakang: *Giant Cell Fibroma* (GCF) adalah lesi jinak jaringan fibrosa pada rongga mulut yang umumnya ditemukan di gingiva atau lidah. Terapi utama adalah ekstirpasi bedah. Penggunaan teknologi laser dioda menawarkan pendekatan invasif minimal dengan kenyamanan pasien yang lebih baik dan proses penyembuhan yang lebih cepat. Laporan kasus ini menggambarkan keberhasilan ekstirpasi *GCF* pada lidah dengan menggunakan kombinasi panjang gelombang laser dioda 450 nm (biru) dan 650 nm (merah). **Presentasi Kasus**: Seorang wanita berusia 27 tahun datang dengan keluhan benjolan tidak nyeri yang tumbuh perlahan di tepi lateral lidah, dengan ukuran sekitar 4 cm. Pemeriksaan klinis mengonfirmasi diagnosis *GCF*. Prosedur ekstirpasi bedah dilakukan menggunakan laser dioda kombinasi: 450 nm digunakan untuk pemotongan jaringan secara presisi dengan kerusakan termal minimal, sedangkan 650 nm digunakan untuk efek biostimulasi dan hemostasis pasca ekstirpasi bedah. Prosedur dilakukan di bawah anestesi lokal tanpa perdarahan signifikan dan tanpa memerlukan jahitan. **Hasil**: Penyembuhan pascaoperasi berjalan baik tanpa komplikasi, nyeri, maupun kekambuhan pada evaluasi minggu ke-4 dan ke-12. Pasien merasa sangat puas dengan kenyamanan dan hasil estetik yang didapat. **Kesimpulan**: Penggunaan kombinasi panjang gelombang laser dioda 450 nm dan 650 nm merupakan pendekatan efektif dan ramah pasien untuk penanganan bedah *Giant Cell Fibroma*. Teknik ini memberikan pemotongan yang presisi, perdarahan minimal, penyembuhan lebih cepat, dan kenyamanan yang lebih baik bagi pasien.

Kata kunci: Ekstirpasi bedah, *Giant Cell Fibroma*, laser dioda, lesi lidah.

ABSTRACT

Background: *Giant cell fibroma (GCF)* is a benign fibrous oral lesion typically occurring on the gingiva or tongue. *Surgical extirpation is the treatment of choice. The use of diode laser technology offers a minimally invasive alternative with enhanced patient comfort and improved healing outcomes. This case report describes the successful extirpation of a GCF on the tongue using a combination of 450 nm (blue) and 650 nm (red) diode laser wavelengths.* ***Case Presentation****: A 27-year-old female presented with a painless, slow-growing nodular lesion on the lateral border of the tongue, measuring approximately 0.8 cm in diameter.Patient declare no chronic systemic condition. Clinical and histopathological findings confirmed the diagnosis of giant cell fibroma. A combination diode laser device was employed, utilizing the 450 nm wavelength for precise cutting with minimal thermal damage, and the 650 nm wavelength for its biostimulatory effects and hemostasis. The procedure was completed under local anesthesia with minimal bleeding and no sutures required.* ***Results****: Postoperative healing was uneventful, with no complications, pain, or recurrence observed at 4-week and 12-week follow-ups. The patient reported high satisfaction regarding comfort and esthetic outcomes. Histopathological examination confirmed complete excision of the lesion.* ***Conclusion****: The combination of 450 nm and 650 nm diode laser wavelengths represents an effective and patient-friendly approach for the surgical management of giant cell fibroma. This technique offers precise cutting, reduced intraoperative bleeding, faster healing, and enhanced patient comfort.*

Keywords*: Diode laser, Giant cell fibroma, surgical extirpation, tongue lesion.*

INTRODUCTION

Giant Cell Fibroma (GCF) is an uncommon, benign fibrous lesion of the oral mucosa,.Unlike conventional fibromas, Clinically, *GCF* typically presents as a small, asymptomatic, sessile or pedunculated nodule, most frequently located on the gingiva, tongue, or buccal mucosa.[1,2]

Although *GCFs* are non-neoplastic and exhibit minimal growth potential, surgical excision remains the treatment of choice to prevent recurrence and to confirm diagnosis via histopathology.[3] Traditionally, excision is performed using scalpel techniques; however, the development of laser-assisted surgery has introduced alternative methods offering significant advantages, including reduced intraoperative bleeding, minimal postoperative discomfort, and improved

wound healing.[4]

Diode lasers have become increasingly popular in soft tissue oral surgery due to their versatility, affordability, and safety. The 450 nm (blue) wavelength diode laser is particularly effective for precise incisions and soft tissue cutting, as it exhibits high absorption in hemoglobin and melanin, ensuring efficient coagulation and minimal thermal damage.[5] Meanwhile, the 650 nm (red) diode laser is often employed for *low-level laser therapy (LLLT)* or photobiomodulation, facilitating improved healing response and reduction in postoperative inflammation.[6]

The combined use of 450 nm and 650 nm diode lasers in oral surgery has not been extensively reported, especially in the context of rare lesions such as *GCF.* This case report presents the clinical management of a *GCF* located on the tongue using a dual-wavelength diode laser technique, highlighting its advantages in soft tissue management, patient comfort, and healing utcomes.

CASE PRESENTATION

A 27-year-old female patient presented to our dental clinic with a chief complaint of a painless growth on the left lateral border of her tongue. The lesion had been present for approximately six months and was slowly increasing in size about 4cm **(Figure.1)**. The patient had no history of trauma to the area, and her medical history was non-contributory. There were no symptoms of pain, bleeding, or ulceration.

Intraoral examination revealed a well-circumscribed, pedunculated nodule measuring approximately 8 mm in diameter. The surface was smooth and pink, with a firm yet compressible consistency. There were no signs of inflammation or secondary infection. Based on the clinical appearance, a provisional diagnosis of fibrous hyperplasia was made.

The procedure was performed under local anesthesia and pre antiseptic solution (*chlorhexidine*) around GCF **(Figure.2)** using a diode laser system capable of delivering dual wavelengths: 450 nm and 650 nm. The 450 nm blue diode laser was employed in continuous mode at a power setting of 1.5 W in 30s, total delivered joule energy were 45j/30s for the excision of the lesion **(Figure.3)**. This wavelength was chosen due to its superior absorption in soft tissue chromophores such as hemoglobin, allowing for precise cutting and effective hemostasis with minimal thermal damage to adjacent tissues.[5,15,16]

Following the excision **(Figure.4)**, the 650 nm red diode laser was applied in *low-level laser therapy (LLLT)* mode (0.2 W, pulsed mode) over the surgical site for 60 seconds with total energy delivered 12joule/m **(Figure.5)**. This procedure we adapt to enhance biostimulation, reduce inflammation, and promote healing.[6] No sutures were necessary due to minimal bleeding and effective coagulation.

Postoperative recovery was uneventful. The patient reported no pain or discomfort, and complete epithelial healing was observed at the two-week follow-up. We were only able to gather the latest condition control at 3 months after with patient personal mobile phone **(Figure.6).** there was no sign of recurrence, and the patient expressed satisfaction with the cosmetic and functional outcomes of the procedure.

This case demonstrates that the use of a dual-wavelength diode laser for excision of giant cell fibroma offers a safe, efficient, and patient-friendly alternative to conventional surgical approaches, with enhanced clinical and esthetic results.

Figure 1. Lesion Growth on left lateral tounge 4cm

Figure 2. Pre Antiseptic delivered before extirpation

Figure 3. Extirpation using 450nm blue laser

Figure 4. Inmediate result after 450nm surgical extirpation

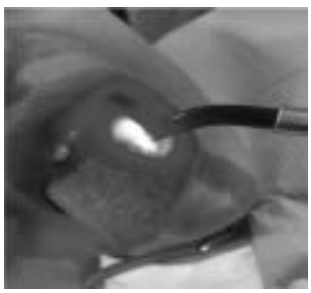

Figure 5. Immediate 650nm diode laser as a LLLT

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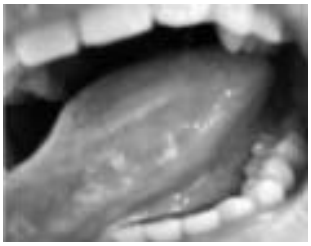

Figure 6. Control post 3 months evaluation (mobile phone)

DISCUSSION

Giant cell fibroma (GCF) is a distinctive benign lesion of the oral mucosa that often mimics other fibrous hyperplastic growths.[9] It is most commonly found in younger individuals and displays a predilection for the gingiva, although occurrences on the tongue, as seen in this case, are well documented.[1,2] While GCF is histologically distinct, it is often clinically misdiagnosed as irritation fibroma or papilloma, underscoring the importance of histopathological confirmation following excision.[3]

The traditional approach to GCF management involves scalpel excision under local anesthesia. Although effective, this method may be associated with intraoperative bleeding, the need for sutures, and a relatively prolonged healing phase.[3,4] In contrast, laser-assisted excision provides a minimally invasive alternative with several clinical advantages.

The 450 nm diode laser, commonly referred to as the blue laser, exhibits high absorption in hemoglobin and melanin, making it well-suited for precise soft tissue surgery with excellent hemostasis and reduced collateral tissue damage.[5,10] In our case, the use of 450 nm laser facilitated a clean, bloodless surgical field and allowed for excellent visibility during excision of the lesion. Compared to traditional diode lasers in the 810–980 nm range, the 450 nm wavelength offers superior cutting efficiency in pigmented tissues and is especially effective in highly vascular areas such as the tongue.[5,15]

Meanwhile, the 650 nm diode laser operates in the red visible light spectrum and is typically utilized for *low-level laser therapy (LLLT)* or photobiomodulation.[12,13] Several studies have demonstrated that this wavelength can promote angiogenesis, modulate inflammation, and enhance fibroblast proliferation, leading to accelerated wound healing and reduced postoperative discomfort.[6,7,11] In this case, postoperative healing was rapid and uneventful, supporting the growing body of evidence for *LLLT's* positive role in soft tissue recovery.

Laser surgery also provides significant psychological and esthetic benefits to patients. The reduced need for suturing, minimal postoperative swelling, and decreased use of analgesics often translate into improved patient satisfaction—an important factor in elective oral surgeries.[4,8,10] Our patient reported no postoperative pain and was highly satisfied with the cosmetic outcome.

To date, there are limited reports on the use of combined 450 nm and 650 nm diode lasers for the surgical management of oral soft tissue lesions such as *GCF*. The synergistic use of these two wavelengths in our case enabled both effective tissue ablation and enhanced healing, which may represent a valuable clinical protocol for similar lesions in the oral cavity.

CONCLUSION

This case report highlights the successful management of a giant cell fibroma of the tongue using a combination of 450 nm and 650 nm diode laser wavelengths. The use of the 450 nm laser allowed for precise excision with excellent hemostasis and minimal thermal damage, while the adjunctive use of the 650 nm laser provided biostimulatory benefits that contributed to accelerated healing and enhanced patient comfort.

The dual-wavelength diode laser technique proved to be a safe, effective, and minimally invasive alternative to conventional scalpel excision. It also eliminated the need for suturing and minimized postoperative discomfort, leading to high patient satisfaction and excellent clinical outcomes. Given these advantages, diode laser surgery—especially with combined wavelengths—should be considered a valuable tool in the surgical management of soft tissue lesions such as giant cell fibroma.

Further studies with larger sample sizes and long-term follow-up are recommended to validate the benefits of this technique and explore its broader applications in oral soft tissue surgery.

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