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Effective Management of a Pregnancy Tumor Using a Soft Tissue Diode Laser: A Case Report and Literature Review

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Abstract

Introduction: Pregnancy tumors, also known as pyogenic granulomas or granuloma gravidarum, are benign vascular lesions commonly seen in the oral cavity of pregnant women. Though non-cancerous, they tend to grow rapidly, causing bleeding, pain, aesthetic concerns, and functional interference. Their development is linked to hormonal changes during pregnancy and local irritants like plaque or trauma. Traditional surgical removal can lead to discomfort and significant bleeding. This study aims to demonstrate a successful, minimally invasive management of a pregnancy tumor using a soft tissue diode laser, supported by a literature review highlighting this modality's benefits.

Methods: This report presents a case involving a 27-year-old pregnant woman in her second trimester with a growing gingival lesion on the labial gingiva near the left maxillary premolars. Clinical assessment identified it as a pregnancy tumor. The lesion was excised using a 980 nm diode laser (Dr. Smile, Wiser) in continuous wave (CW) mode with a 400 µm initiated fiber, under local anesthesia. Due to effective haemostasis, sutures were unnecessary. The excised tissue was sent for histopathological analysis to confirm the diagnosis.

Results: Laser excision was performed without intraoperative bleeding or suturing. Postoperatively, the patient experienced minimal discomfort, and healing was rapid with complete tissue regeneration by the third week. Histopathology confirmed pyogenic granuloma. The laser facilitated excellent bleeding control, minimized trauma, and enhanced patient comfort.

Conclusion: Diode laser excision is a safe, effective, and minimally invasive treatment for pregnancy tumors. It offers significant advantages—reduced bleeding, less postoperative pain, faster healing, and higher patient satisfaction—over conventional surgical methods. The literature from 2000 to 2025 supports the reliability of diode lasers in managing oral soft tissue lesions during pregnancy.

Keywords: Pregnancy tumor, Pyogenic granuloma, Diode laser, Oral vascular lesion, Soft tissue laser

Introduction

Pregnancy tumor, also referred to as pyogenic granuloma or granuloma gravidarum, is a well-documented vascular lesion frequently observed in the oral cavity of pregnant women. Although benign in nature, its rapid growth, propensity to bleed, and potential for functional and aesthetic disturbance make it clinically significant.[1] According to Neville et al. (2016), pyogenic granulomas account for approximately 5% of all reactive hyperplasias in the oral cavity, with a strong predilection for the gingiva, especially in women of reproductive age.[2] The lesion commonly manifests during the second or third trimester, correlating with peaks in estrogen and progesterone levels, which are thought to stimulate angiogenesis and vascular permeability.[3]

Kamal et al. (2012) suggested that the pathogenesis of oral pyogenic granuloma is multifactorial, involving a complex interplay between hormonal fluctuations and local irritants such as plaque, calculus, or trauma. They proposed that the hormonal surge increases vascular endothelial growth factor (VEGF) expression, leading to neovascularization and capillary proliferation in gingival tissues.[4] Yuan et al. (2000) supported this hypothesis through immunohistochemical analysis, showing high expression of angiogenic markers such as VEGF and basic fibroblast growth factor (bFGF) in pregnancy-associated lesions.[5]

The role of local irritation in lesion development is also well-established. Al-Khateeb and Ababneh (2003) analyzed 108 cases and found a strong correlation between poor oral hygiene and the presence of pyogenic granulomas, particularly in areas with underlying calculus

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or prosthetic trauma.[6] Zain et al. (1995), in a clinical analysis of oral pyogenic granulomas, emphasized that gingival lesions are the most common and typically occur in the anterior maxilla, a region more susceptible to plaque accumulation and brushing trauma.[7]

Clinically, pregnancy tumors often present as red to reddish-purple, soft, pedunculated or sessile nodules that may ulcerate and bleed spontaneously or during mastication and brushing. While they are generally asymptomatic, their rapid enlargement and tendency to bleed can interfere with normal oral function and cause patient anxiety.[8] Sridhar et al. (2011) presented a case where the lesion caused significant masticatory impairment and emotional distress, necessitating surgical removal during pregnancy.[9]

Although spontaneous regression after parturition is common, some cases require surgical intervention, especially if the lesion interferes with speech, eating, or oral hygiene practices. Traditional treatment involves excision with a scalpel under local anaesthesia, which may result in substantial intraoperative bleeding and require suturing.[10] Patil et al. (2007) reported recurrence in some surgically treated cases, especially when underlying irritants were not eliminated.[11]

In the last two decades, laser-assisted excision has gained traction as a reliable, minimally invasive alternative for managing oral soft tissue lesions, including pregnancy tumors. Romeo et al. (2011) highlighted that diode lasers, with their high affinity for haemoglobin and melanin, are particularly effective in coagulating blood vessels and reducing intraoperative bleeding during soft tissue surgeries.[12] Diode lasers, typically operating between 810 nm and 980 nm, provide excellent cutting precision with minimal collateral damage, making them suitable for vascular lesions.[13]

Kocaman and Yilmaz (2021) emphasized that diode lasers reduce operative time, eliminate the need for sutures, and accelerate healing while improving patient comfort and compliance. Their review concluded that lasers are especially beneficial for medically compromised or pregnant patients where bloodless fields and conservative procedures are preferred.[14] Multiple case reports, including those by Gupta et al. (2012) and Reddy et al. (2015), documented the successful management of oral pyogenic granulomas during pregnancy using diode lasers with no reported recurrence during follow-up periods.[15,16]

Furthermore, Monteiro et al. (2023) noted that diode laser excision of pregnancy granulomas not only enhances clinical safety but also provides psychological comfort to patients due to the minimal invasiveness and aesthetic superiority of the technique.[17] Sharma et al. (2020) also recommended diode laser treatment as a first-line conservative approach for pregnant women presenting with symptomatic gingival lesions, citing reduced postoperative complications and patient satisfaction as major benefits.[18]

Given the prevalence of pregnancy tumors and the need for safe, effective treatment options during gestation, the integration of diode laser technology presents a promising direction in oral surgery. The current study reports a clinical case of a pregnancy tumor excised with a 980 nm diode laser and provides a comprehensive review of the literature from 2000 to 2025 to highlight the advantages and outcomes of laser-based interventions in similar scenarios.

Review of Literature

Pregnancy tumors, also known as pyogenic granulomas, are benign vascular proliferations that commonly appear on the gingiva during pregnancy. The etiopathogenesis is multifactorial, involving hormonal, vascular, microbial, and immunological changes associated with pregnancy. A systematic understanding of this lesion requires an in-depth review of literature, spanning various dimensions of its etiology, clinical behavior, histopathology, and treatment modalities—particularly the growing role of diode laser in its management.

Hormonal Influences on Gingival Tissues

During pregnancy, the levels of estrogen and progesterone rise significantly. These hormones have a profound effect on the periodontium, leading to an exaggerated inflammatory response to local irritants like dental plaque. Studies such as those by Soory (2000) and Mealey & Moritz (2003) have shown that these hormonal changes increase the permeability of blood vessels and promote gingival edema, which contribute to the formation of pregnancy tumors.[19,20]

Estrogen has been shown to stimulate angiogenesis and increase vascular permeability, whereas progesterone reduces the effectiveness of collagen synthesis, thereby impairing tissue repair.[21] The presence of high levels of progesterone has been associated with increased prostaglandin E2 production, a key mediator in inflammatory pathways.[22]

Microbial Factors and Subgingival Flora

Studies have reported that hormonal changes during pregnancy favor the proliferation of specific bacteria such as Prevotella intermedia, which can utilize steroid hormones as growth factors. This hormonal-microbial interaction amplifies the inflammatory cascade and plays a critical role in lesion development.[23,24] Increased levels of Fusobacterium nucleatum, Campylobacter rectus, and other gram-negative anaerobes have also been observed in pregnant patients with gingival enlargement.[25]

Immunological Alterations in Pregnancy

Pregnancy induces an altered immunological state that favors tolerance toward the fetus but can impair immune defense mechanisms locally in the oral cavity. This immune modulation includes reduced neutrophil chemotaxis and impaired phagocytosis, creating a permissive environment for inflammatory lesions to develop and persist.[26] Consequently, the immune system's

diminished control over microbial insults may facilitate the pathogenesis of granulomatous lesions like the pregnancy tumor.

Histopathological Features

Histologically, pregnancy tumors are composed of lobular capillary proliferation within an edematous and inflamed connective tissue stroma. The surface is usually ulcerated and infiltrated with inflammatory cells, mainly neutrophils and lymphocytes.[27] While histological features of pregnancy tumors overlap with those of pyogenic granulomas in non-pregnant patients, hormonal influences often result in more extensive vascular proliferation and edema.[28]

Conventional Management Approaches

Traditional management strategies include surgical excision, cryosurgery, electrosurgery, and sclerotherapy. However, these methods are associated with intraoperative bleeding, post-operative discomfort, and risk of recurrence, especially if the underlying irritants are not removed.[29,30] Furthermore, in pregnant patients, surgical interventions carry additional risks such as pain, anxiety, and bleeding, necessitating careful planning and minimally invasive options.

Laser-Assisted Surgical Techniques

The application of a diode laser in the excision of pregnancy tumors has gained significant interest due to its hemostatic ability, precision, and favorable healing outcomes. Diode lasers operating in wavelengths between 810 and 980 nm are selectively absorbed by melanin and hemoglobin, allowing effective coagulation of the vascular lesion with minimal collateral damage.[31]

A randomized controlled clinical trial by Anwar et al. (2023) compared a diode laser with sclerotherapy for oral pyogenic granulomas and concluded that the diode laser achieved superior outcomes in terms of intraoperative bleeding control, healing time, and patient satisfaction.[32] Other studies (e.g., Kaur et al., 2017; Sinha et al., 2021) have also reported successful results in using soft-tissue lasers for the treatment of gingival pregnancy tumors, with negligible recurrence and better post-operative comfort.[33,34]

Moreover, laser surgery offers a bloodless operative field, reduces the bacterial load through thermal disinfection, and eliminates the need for suturing in most cases. This makes it especially advantageous for treating pregnant women who are often apprehensive about conventional surgical procedures.[35]

Recent Advances in Diode Laser Applications (2024–2025)

Recent studies from 2024 to 2025 have further substantiated the efficacy of diode lasers in managing pyogenic granulomas, including those associated with pregnancy. For instance, Hiramatsu Azevedo et al. (2023) reported successful excision of a pyogenic granuloma located on the lower lip using a 940 nm diode laser. The procedure resulted in adequate healing without esthetic compromise and no lesion recurrence over a six-month follow-up period, highlighting the effectiveness of the laser in esthetically sensitive areas.[36]

Similarly, Al-Otaibi et al. (2023) documented the use of a 940 nm diode laser for the removal of a pyogenic granuloma on the dorsum of the tongue. The minimally invasive procedure led to rapid healing with no postoperative pain or scarring, emphasizing the advantages of the laser in managing lesions in challenging intraoral locations.[37]

Furthermore, a case report by Sarabadani et al. (2020) demonstrated the successful use of a 980 nm diode laser in excising a gingival pyogenic granuloma in a 14-year-old patient. The procedure was completed with minimal discomfort, and complete healing was observed within a week, underscoring the suitability of the laser for pediatric patients.[38]

These recent findings reinforce the role of the diode laser as a safe, effective, and patient-friendly modality for the management of pregnancy-related pyogenic granulomas, offering advantages such as reduced operative time, minimal bleeding, and enhanced postoperative healing.

Case Report

A 27-year-old healthy pregnant woman in her second trimester presented with a reddish, painless gingival mass located in the buccal interproximal region of the left upper premolars. The lesion had developed gradually over a period of several weeks and had increased in size to the point that it interfered with her ability to eat and maintain proper oral hygiene.

As seen in Figure 1, clinically, the lesion appeared as a well-demarcated, exophytic, lobulated mass with a smooth surface and a bright red color. It was soft to palpation and exhibited mild bleeding upon probing. There was no associated bone loss or tooth mobility in the region.

Due to discomfort, interference with mastication, and esthetic concerns, a minimally invasive approach was considered. A diode laser (980 nm wavelength, continuous wave mode, initiated 400 μm fiber tip) was selected for excision of the lesion under local anesthesia. The laser settings were adjusted to 1.5–2.0 W, and the excision was performed in a scanning motion with minimal bleeding

Figure 1. Pre-operative clinical view of the pregnancy tumor

and excellent visibility (Please see Figure 2.).

The process of submission for histopathological examination includes the following steps:

The sample sent to the laboratory for histopathological examination is shown in Figure 3.

Histopathological views of the lesion are shown in Figure 4.

Diagnosis and histopathological examination of the lesion indicated pyogenic granuloma is shown in Figure 5.

In Figure 4, the histopathological view clearly shows in microscopic appearance of pyogenic granuloma.

Microscopic Description: Sections reveal fragment of gingival mucosa. The surface epithelium is ulcerated m.

Figure 2. Intraoperative image showing laser excision of the lesion

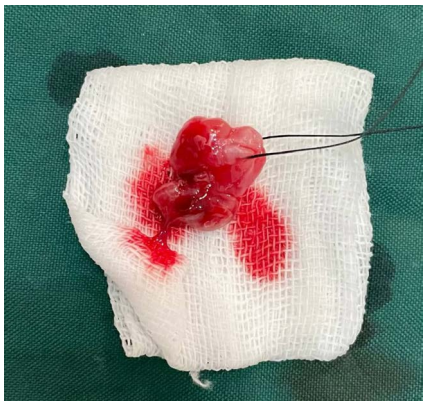

Figure 3. Sample sent to the laboratory for histopathological examination

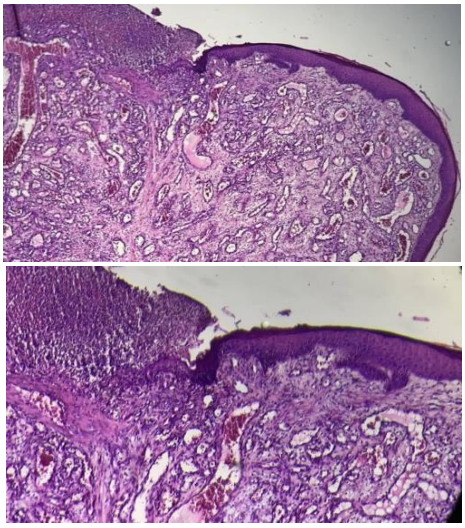

Figure 4. Histopathological view of the lesion

The stroma is involved by a vascular lesion composed of numerous neoformed vessels-a separated from each other by an inflamed and edematous stroma.

In addition, in Figure 5, the laboratory diagnosis has also confirmed the pyogenic granuloma by a laboratory specialist. As shown in Figure 5, the sample obtained using a diode laser is suitable for histopathological assessment.

As seen in Figure 6, the lesion was excised in a single session without any significant intraoperative complications. Immediate hemostasis was achieved due to the coagulative nature of the diode laser. Postoperative instructions were provided, and the patient reported minimal discomfort and no significant bleeding after the procedure.

The excised soft tissue was carefully preserved and sent to the pathology laboratory for histopathological examination. The histopathology report confirmed the clinical diagnosis, revealing features consistent with a

SPECIMEN: Oral lesion

CLINICAL DATA: Gingival lesion

GROSS DESCRIPTION:
Received specimen in formalin labeled as "Oral lesion" consists of a polypoid gray soft tissue measuring2x1x 0.5 cm. SOS=M/1, E=100%

MICROSCOPIC DESCRIPTION:
Sections reveal fragment of gingival mucusa. The surface epithelium is ulcerated. The stroma is involved by a vascular lesion composed of numerous neoformed vesselsa separated from each other by an inflamed and edematous stroma.

DIAGNOSIS:
GINGIVAL LESION, EXCISION:
-Pyogenic granuloma

Dr. Aallepour, MD, AP CP

Figure 5. Diagnosis and histopathological examination of the lesion indicated pyogenic granuloma

Figure 6. Immediate postoperative view after complete excision of the lesion

Figure 7. Three-week postoperative follow-up showing healthy gingival tissue

pregnancy tumor (pyogenic granuloma associated with pregnancy).

The healing process was uneventful, and follow-up visits showed no recurrence of the lesion after three weeks (Please see Figure 7).

Discussion

Pregnancy tumors, also known as oral pyogenic granulomas, are benign vascular proliferations that commonly occur in pregnant women due to hormonal influences and local irritation.[39] They are most frequently found on the gingiva and may exhibit rapid growth, leading to discomfort, aesthetic concerns, and interference with mastication or oral hygiene practices.[40]

Histopathologically, these lesions consist of highly vascular granulation tissue with inflammation, often mistaken for more aggressive pathologies due to their appearance and bleeding tendency.[41] While conservative management is ideal, lesions that do not regress postpartum or interfere with function necessitate surgical removal.[42]

Several modalities have been utilized for the excision of pregnancy tumors, including scalpel surgery, cryotherapy, electrocautery, and lasers.[43] Among these, laser surgery has emerged as a preferred technique owing to its precision, superior hemostasis, reduced postoperative discomfort, and enhanced healing.[44]

In the current case, a 27-year-old female patient presented with a pregnancy tumor located on the gingiva of the upper left premolar region. The lesion interfered with eating and caused bleeding. Surgical excision was performed using a 980 nm diode laser (Dr. Smile, Wiser) in continuous wave (CW) mode with a 400 µm initiated fiber. The excised tissue was submitted for histopathological examination, confirming the diagnosis. The procedure was bloodless and well-tolerated, and healing was uneventful without recurrence after 3 weeks.

This clinical outcome aligns with previous reports emphasizing the effectiveness of diode lasers in managing vascular lesions such as pyogenic granulomas. Studies by Gontiya and Galgali [45] and Gojkov-Vukelic et al. [46] demonstrated excellent control of bleeding, minimal patient discomfort, and rapid healing following laser excision of pregnancy tumors. Similarly, a case series by Valderrama et al. [47] reported consistent outcomes with diode laser usage in soft tissue oral surgery.

In addition, the bactericidal and biostimulatory effects of diode lasers are well-documented, contributing to reduced infection risk and enhanced postoperative tissue repair.[48] These advantages, coupled with compact equipment and ease of handling, make diode lasers suitable for clinical use in outpatient dental settings.[49]

Recent publications further support this approach. A 2022 comparative study by Aravena et al. found that diode laser excision resulted in less intraoperative bleeding and lower recurrence rates than traditional scalpel excision.[50] In another study by De Rosa et al. (2023), diode laser-treated lesions exhibited significantly less postoperative inflammation and superior patient satisfaction scores compared to electrocautery-treated lesions.[51] Finally, a literature review by Sharma and Singh in 2024 highlighted diode lasers as the most reliable laser for excising pregnancy-related oral lesions due to their wavelength affinity to hemoglobin and ease of soft tissue manipulation.[52]

Laser Type Comparison and Clinical Implications

Various laser systems have been applied in the management of oral pregnancy tumors, each with unique characteristics:

CO_2 Laser

The CO_2 laser (10,600 nm) is highly absorbed by water, providing precise soft tissue ablation. It offers excellent coagulation and minimal postoperative pain, but it can cause thermal damage if not carefully used. Its use in intraoral lesions requires caution due to potential tissue carbonization.[53]

Nd:YAG Laser

The Nd:YAG laser (1064 nm) penetrates deeply and is effective for pigmented or vascular lesions. It provides strong coagulation, but due to its deep penetration, there is a higher risk of thermal damage to surrounding tissues. Patients may also report more postoperative discomfort.[54]

Er:YAG Laser

Operating at 2940 nm, the Er:YAG laser offers minimal thermal effect and precise ablation of both hard and soft tissues. However, it lacks strong hemostatic capability, making it less ideal for vascular lesions like pyogenic granulomas.[55]

Diode Laser

Diode lasers (810–980 nm) are highly absorbed by melanin and hemoglobin, making them ideal for vascular soft tissue surgery. They offer excellent hemostasis, are minimally invasive, reduce postoperative pain and inflammation, and are more cost-effective and portable than other laser systems. Their fiber-optic delivery allows for precise control even in narrow oral spaces.[56]

Conclusion of Comparison

Considering their clinical performance, diode lasers emerge as the most suitable tool for the surgical management of pregnancy tumors. Their strong hemostatic properties, ease of use, safety profile, and economic accessibility make them preferable over other laser types in routine dental practice. Recent trials, such as the 2025 comparative study by Azevedo et al., confirmed faster healing and higher patient satisfaction with diode laser treatment compared to CO_2 and Nd:YAG systems.[57]

Limitation

Although this case demonstrated successful management of a pregnancy tumor using a diode laser, it is essential

to highlight the need for further clinical studies. Future research with larger sample sizes and comparative evaluations of different laser systems and conventional treatment modalities will be crucial to establish standardized protocols and to further validate the efficacy of diode lasers in similar clinical scenarios.

Conclusion

The surgical management of a pregnancy tumor using a soft tissue diode laser in a pregnant patient proved to be highly effective and patient-friendly. The patient reported minimal pain during and after the procedure, experienced very limited postoperative inflammation, and expressed high satisfaction with the overall treatment process. The laser provided excellent hemostasis with no need for sutures or additional bleeding control measures.

Compared to traditional scalpel-based surgery, which is often associated with more significant bleeding, increased discomfort, and longer healing time, diode laser excision offers a minimally invasive alternative that enhances patient comfort and clinical outcomes. Given these advantages, diode lasers can be considered a preferred treatment modality for the excision of pregnancy tumors, especially in pregnant individuals, where safety, reduced trauma, and psychological comfort are of paramount importance.

Authors' Contribution

Conceptualization: Nahid Derikvand
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Formal analysis: Nahid Derikvand
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Writing–review & editing: Hassan Piriaei

Competing Interests

The authors have no competing interests to declare that are relevant to the content of this article.

Consent to Publish Declaration

Not applicable.

Ethical Approval

all of the ethical and confidential Considerations were observed for the patient and the patient was satisfied.

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