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Expedited Excision of Pyogenic Granuloma of the Palate Using 980nm Diode Laser

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Abstract
Pyogenic granulomas are benign inflammatory hyperplastic lesions found on keratinized tissues of the oral cavity occurring as a result of various factors including trauma, infection, dental plaque and restorations, hormonal imbalance or irritation. It is characterized as an exophytic mass with a pedunculated base which is usually asymptomatic but with a tendency to bleed. To minimize the risk of intra-operative and post-operative difficulties such as bleeding, need for sutures, edema and healing complications and to offer a better treatment option as compared to the conventional method, the use of a 980nm diode laser was considered for the excision of a pyogenic granuloma present on the palatal gingiva of an adult female which yielded a favorable outcome highlighting the benefits of using a diode laser of 980nm for the removal of pyogenic granulomas.

Keywords: Granuloma, Pyogenic, Lasers, Diode, Wound Healing

1. Introduction
Pyogenic Granuloma (PG) is a hyperplastic lesion that develops as a result of inflammation [1]. It has various etiological factors such as dental plaque, dental restorations, hormonal imbalances, trauma and infections [2]. PG can occur at any age, but there seems to be a predominance in the second and third decade of life [3]. These lesions are more commonly present in pregnant women due to hormonal imbalances and have a greater incidence in the maxillary gingival region [3].
Pyogenic Granuloma presents as an exophytic mass with a lobed surface, usually a few millimeters to a few centimeters in size and can be pink or red in colour [1]. The lesion in most cases is asymptomatic and is usually diagnosed during routine dental examination [4]. It has a single point of attachment with a pedunculated base and can bleed spontaneously in response to minor trauma [1]. Pyogenic Granuloma predominantly develops on keratinized tissues [4].
There are multiple modalities for the treatment of PG such as surgical excision using a scalpel blade, curettage, radiosurgery, cryosurgery and photodynamic therapy [5]. Pyogenic granulomas are highly vascularized lesions and they have a tendency of profusely bleeding during excision resulting in hematoma formation which can hamper healing and patient health [6].
Diode lasers offer a unique and quick method for minor surgical procedures [6]. They fall in 800-980nm wavelength which provides excellent cutting and simultaneous hemostatic ability at the surgical site [7]. They are small, inexpensive and have a high affinity for hemoglobin making them ideal for minor oral surgical procedures such as gingivectomy, depigmentation, implant exposure and removal of lesions such as mucoceles and epuli [6]. Although different types of lasers such as Nd:YAG and CO2 have been previously used worldwide, it is rarely considered as a treatment method in Pakistan [8]. There is no study that we could find to the best of our knowledge which has used the 980nm diode laser in Pakistan. Diode lasers provide advantages of both counterbalancing their limitations [8].
This study was conducted in MediDent Clinics, Karachi, Pakistan on the 15th of January 2022. For reasons highlighted in literature, this study involved the use of a 980nm diode laser for removal of a pyogenic granuloma in an adult female patient under local anesthesia and assess its advantages as well as effectiveness.

2. Case Report
A 33-year-old female came to the clinic with a swollen mass localized between the upper central incisors palatally. She explained that the swelling was painless, there was no complain of bleeding. The lesion was noticed by the patient 4-5 months ago. Her medical history revealed post-partum a year ago. Clinical examination revealed the lesion to be 1x1cm in size. The lesion had a single point of attachment and was located on the palatal aspect of the maxillary right central incisor (Fig 1).
The patient was explained positive and negative outcomes of different treatment modalities including surgical incision, cauterization and laser excision. The patient opted for diode laser excision. Following the application of topical anesthetic,

(lignocaine) palatal infiltration with 1:20, 00, 000 lidocaine was achieved. The lesion was excised using 980nm Lasotronix smart M PRO Laser with an activated tip in continuous mode and a power of 2.3W. The entire lesion was held with tissue forceps and excised from the point of attachment. There was no bleeding post-operatively hence no hemostatic measures such as sutures were required (Fig 2). Immediate post-operative bio-stimulation was done using 100mW laser for 40 seconds. The use of Chlorhexidine based gel was advised along with analgesics and no antibiotics were necessary. One week follow up showed uneventful complete healing, the patient also reported lack of pain and discomfort (Fig 5).

The specimen was removed as a whole followed by immersion in 10% formalin and was sent for histopathologic evaluation. Hematoxylin and eosin staining revealed multiple engorged blood vessels with intense chronic granular inflammatory cell infiltrate and areas of fibrous connective tissue. These features further confirmed the diagnosis of Pyogenic Granuloma (Fig 4).

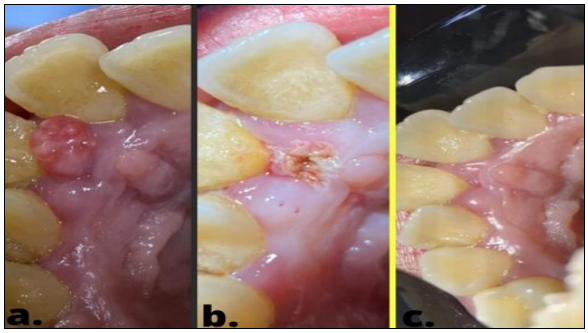

Fig 1a: Shows pyogenic granuloma pre operatively, **b.** Shows immediate post-laser incision, **c.** Shows healing post operatively after one week. Eoithelium growing back with no signs of scar formation. Patient's consent was taken before taking these pictures

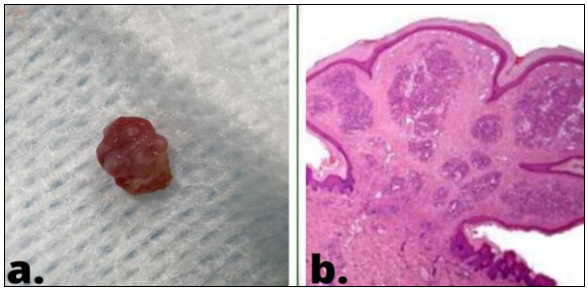

Fig 2a: Shows a gross specimen placed on a gauze, **b.** Shows histopathology of Pyogenic Granuloma

3. Discussion

Pyogenic granulomas are benign vascular lesions that are found on the skin and mucous membranes. It can arise as a consequence of numerous reasons including injury, drugs, hormonal changes and gene mutations etc [5].

The conventional and preferred treatment option for pyogenic granuloma is excisional surgery [4]. A recurrence rate of PG after surgical excision is reported to be 16% [7]. This rate has been reported to be much higher when PG is located on the gingiva [2]. As a standard method an excision needs to be made deep down on the periosteum for gingival lesions and scaling of the nearby teeth is required to eliminate the root of irritation hence surgical excision should not be considered as a conservative treatment of choice [4].

Recent advancement in treatment modalities include cryosurgery, flash lamp pulsed dye laser, injection of ethanol or corticosteroid, sodium tetradecyl sulfate sclerotherapy and excision by laser [4].

Laser excision has proven to be widely accepted by patients due to negligible adverse effects [8]. Promising outcome was observed when diode laser was applied to reduce cutaneous pyogenic granulomas with the exception of slight pigmentation and texture [8]. It was also reported that when a diode laser was used for the management of pyogenic lesions situated on the gingiva of the upper jaw the results were favorable and uncomplicated [9]. Furthermore, no scaring or recurrence was observed as opposed to conventional therapy in which both scarring and recurrence have been noted [9]. The use of laser as a treatment modality for intraoral pyogenic granulomas can therefore be contemplated [7]. In this case, a diode laser of 980nm was used after considering the location and functional aspect of the procedure.

In comparison with conventional therapy, laser is minimally invasive and requires no sutures [9]. The incision made by the diode laser is also relatively quicker, it grants limited use of anesthesia, effortless gingival contouring and leads to little thermal trauma intra-operatively [10]. Other than that laser therapy provided complete photo ablation of the lesion without any stromal damage and dilation of micro blood vessels [9]. Laser therapy is more beneficial considering the lesser degree of postoperative pain the patient experiences as a result of depolarization of the nerves and eradication of pathogens that may lead to infection [6].

Table 1: Comparison between laser and scalpel excision [10]

Laser Excision	Scalpel Excision
1. Better Visibility[25]	1. Visibility is less[25]
2. Hemostasis is immediate[21]	2. Hemostasis is Delayed[24]
3. Less or No Post-op pain[21/24]	3. Post-Operative pain present[21/24]
4. Decreased Scarring[21]	4. More Scarring[21]
5. Healing is faster[22]	5. Healing is slower[22]
6. Greater Post-op patient comfort[22]	6. Lesser Post-op patient comfort[22]
7. Intra-operative bleeding is less[21]	7. Significant high intra-oral bleeding[21]
8. Facial edema is less or not present[21/24]	8. Facial edema is significantly higher[21/24]
9. Least tissue distortion[23]	9. More tissue distortions[23]
10. No need to suture[23/24]	10. Need to suture[23/24]

Since pyogenic granulomas are characterized by profound bleeding, so there is always a risk of bleeding with conventional methods in contrast to the use of laser which minimizes the chances of a intra and post-operative bleeding [10]. Rapid wound healing is the aftermath of homeostasis together with coagulation and sealing of blood vessels which us due to direct vasomotor effects and decreasing local pro-inflammatory mediators triggered by the diode laser [9]. Along with minimal discomfort, edema, inflammation, scarring and shrinkage at the site of operation after the procedure, another advantage of using laser is the elimination of the use of post-surgical dressings [10].

From this vantage point, laser therapy appears to be the best possible treatment option for pyogenic granulomas. Taking certain factors such as conservation of tissues, aesthetics, patient acceptability, post-operative management and functionality into account it offers numerous benefits for the

patient and the operator hence reaching the goal of optimum care laser therapy has made achievable.

4. Conclusion

This case report suggests that application of diode laser is well tolerated by patients, results in optimum healing and minimal post-operative symptoms. Due its numerous advantages including safety, efficiency, immediacy, painlessness and most importantly the decreased recurrence rate observed after removal of pyogenic granulomas with laser and nominal disadvantages makes it a superior treatment approach to any other treatment option.

5. Disclaimer

None.

6. Conflicts of interest

None.

7. Funding disclosure

None.

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