

Revolutionizing Pyogenic Granuloma Care: Harnessing the Power of Soft-tissue Diode Laser – A Case Report

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Abstract

The advent of laser technology has introduced innovative approaches to treating a variety of disorders, especially in managing soft-tissue intraoral mucosal growth. The use of lasers in treating conditions such as pyogenic granuloma (PG) has demonstrated significant effectiveness, taking into account both functional and esthetic considerations to enhance patient acceptability. PG is a relatively common benign muco-cutaneous, reactive lesion often arising from local irritation or trauma linked to dental tissues, presents a significant affinity for the gingiva. This case study highlights treatment of recurrent PG in a 19-year-old male on the labial gingiva of the lower anterior incisor region. Which was excised earlier by blade/scalpel, but due to consequent recurrent history, soft-tissue diode laser with wavelength of 970 nm and a maximum output of 4W was used this time to achieve complete excision from the base of the lesion. Remarkably, 2-week post-surgery, complete healing was observed, and the patient was followed up for 1-year postoperatively with no recurrence suggesting that soft-tissue laser could be a better alternative as compared to scalpel excision of granulomatous lesions involving excessive intraoperative bleeding which could be one of the important limitation for achieving total excision in such cases.

Keywords: Laser technology, Pyogenic granuloma, Recurrent lesion.

INTRODUCTION

Pyogenic granuloma (PG) was first described in 1897 by two French surgeons, Poncet and Dor, who named this lesion botryomycosis horminis. PGs and hemangiomas of the oral cavity are well-known benign lesions.^[1]

PG is a common, acquired, benign vascular reactive hyperplasia of the skin or mucosa. It is a non-neoplastic, exuberant, reactive lesion seen in response to local irritation or trauma caused by dental calculus, bacterial plaque, caries, and restorations, with a strong predilection for the gingiva. The most frequent intraoral site for PG is marginal gingiva, but lesions also occur on palate, buccal mucosa, tongue, and lips.^[2] Clinically, an oral PG appears as a tumour-like, painless, exophytic mass with erythematous papules that tend to bleed easily, and sizes ranging from a few millimetres to a few centimetres have been reported.^[3] The color of the lesion may vary according to the level of vascularity. PG also can develop as a result of chronic, local, low-grade trauma, or irritation and due to hormonal factors.^[2]

Conventional surgical excision can be used but some complications such as intraoperative bleeding and post-

operative infection may occur, which can affect the dynamics of healing process.^[2]

Numerous treatment modalities have been defined for PG. However, simple surgical excision of the lesion is the usual treatment. A surgical excision is recommended involving 2 mm of uninvolved healthy margin surrounding the lesion. During the excision, irritant agents such as dental plaque, calculus, foreign bodies, defective restoration, and source of trauma should be eliminated. The recurrence rate after simple excision is comparatively high about 15.8% and requires a re-excision of the lesion in the near future. The recurrence of the lesions could be due to deficient excision, failure to eliminate etiologic factors, or sometimes due to re-injury of lesions. The other causes could be due to multiple deep satellite nodules that

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encircle the site of original lesions (Warner–Wilson Jones syndrome). It was mentioned that the recurrence rate is much higher in gingival cases than any other oral mucosal PG.^[4]

Lasers have carved a niche for themselves in today's clinical dentistry due to its ease of usage, less learning curve for the dentist, stress-free dentistry for the operating dentist with lots of advantages such as minimal or no injections, no bleeding, enhanced visualization of the operating site, minimal pain and swelling postoperatively, less need for pre- and post-operative medication, minimal or no sutures, and uneventful healing.^[1] A number of lasers have been successfully used to treat PG, such as neodymium doped yttrium aluminium garnet (Nd: YAG), carbon dioxide laser, erbium-doped yttrium aluminum garnet (Er: YAG), and the diode laser. In this report, we present the successful application of diode laser in the context of a large PG.^[2]

This article presents a case report concerning a 19-year-old male patient who experienced recurrent PG twice within a span of 1 year. Following excision with laser treatment, no further recurrence was observed. In addition, it underscores the benefits of employing soft-tissue laser technology for both the patient and the dentist.

Laser equipment

A 970-nm diode (K-Laser) laser was utilized for the surgical removal of the pathological lesion as an alternative to conventional excision. Diode surgical soft-tissue lasers fall under class IV lasers, laser fiber is 320 µm for soft-tissue cutting maximum 4w is used and to achieve hemostasis 3w power is used. Necessitating strict adherence to safety precautions, including the wearing of protective gear at the operating site and minimizing traffic within the operatory.

CASE REPORT

A 19-year-old male patient reported in the Department of Periodontology of Peoples Dental Academy, Bhopal, with the chief complaint of growth in his lower anterior tooth region for 1.5 months. He was apparently alright and 1.5 months back then he noticed a growth which was smaller in size and slowly increased to the present size. On further discussion, it was revealed that the patient had undergone surgery for the same 6 months back and it had recurred again. He also gives history of betel nut chewing for past 2 years.

On intraoral examination, a single, well-defined swelling which was oval in shape and a size of 8 × 10 mm was present near the 31 and 32 region. The growth was reddish pink in colour, on palpation the growth was soft in consistency and bleeding occurred while slight touching or probing as shown in (Figure 1). Oral hygiene status of the patient was poor. Based on clinical findings and history of patient provisional diagnosis of PG was made. Intraoral periapical radiograph revealed no bony abnormality.

Due to history of recurrence and vascularity of the lesion, excision of the lesion was planned using soft-tissue diode

laser with wavelength of 970 nm and a maximum output of 8W. Surgery was planned such that excision involved 2 mm of healthy gingival margin surrounding the lesion (Figure 2). The patient was made comfortable on the dental chair and protective eyewear was given. Local anaesthesia (1: 100000 adrenaline) infiltration was given in 31 and 41 region at surgical site. A fiber 320 µm, length 3 m tip was used in contact mode to excise the pathological lesion completely (Figure 3). Hemostasis was



Figure 1: Pre-operative photograph showing recurrent pyogenic granuloma after 6 months



Figure 2: Excision of the lesion using soft tissue diode laser



Figure 3: Photograph showing after excision of the lesion



Figure 4: Post-operative photograph showing no recurrence of pyogenic granuloma with 1-year follow-up

achieved; no sutures were placed and periodontal dressing given. The patient was recalled after 24 h, 1 week, 1 month, and 1 year for post-operative examination of the surgical site. The patient was extremely comfortable during the healing phase and he had not taken any medications and was able to resume her routine daily activities with ease.

Biopsy was done and excised tissue sent for microscopic analysis. It was clearly mentioned that the lesion was excised using lasers to enable the pathologist to eliminate the borders in case of burnt tissue. Microscopic examination revealed connective tissue infiltrated with a plenty of capillaries and blood vessels. A plenty of chronic inflammatory cells especially lymphocytes were also noticed. The overlying surface epithelium is of stratified squamous and is atrophic in nature. Based on histopathology examination, the final diagnosis was suggestive of PG.

Patient was followed up periodically for over a year and there was no recurrence of the lesion (Figure 4).

DISCUSSION

PG is an inflammatory hyperplasia affecting the oral tissues. Hullihen's description in 1844 was most likely the first PG reported in the English literature. It was only in 1904 that Hartzell first ever introduced the term PG.^[5]

PG is an inflammatory response that follows chronic irritation (poor oral hygiene, calculus/plaque, excessive restorations, etc.), trauma or a hormonal change in pregnant women.^[6] The irritating factor can be calculus, poor oral hygiene, non-specific infection, overhanging restorations, cheek biting, etc. Because of this irritation, the underlying fibrovascular connective tissue becomes hyperplastic and there is a proliferation of granulation tissue which leads to the formation of a PG.^[5]

Oral PG is a common reactive lesion that can appear at any age, but is frequently seen in patients between the second and third decades of life. PG's have a strong predilection for the gingiva,

with up to 70% of all cases occurring in this site alone.^[2] The gingival location represents more than 75% of reported cases, with a predilection to the interdental papilla region. It affects more women than men.^[6]

The appearance of PG is usually a color ranging from red/pink to purple and can be smooth or lobulated. Younger lesions are more likely to be red because of the high number of blood vessels. Older lesions begin to change into a pink color size ranging from a few millimetres to centimetres.^[5]

In this case the lesion is painless, pedunculated, pink, and soft in consistency that bleeds at the slightest touch. The poor oral hygiene and trauma or local irritation is responsible for the growth of the lesion. Excising the lesion down to the periosteum and scaling adjacent teeth to remove any calculus and plaque that may be a source of continuing irritation is done. The use of a soft-tissue diode laser in the presented case offered the best treatment option to reduce the risk of post-operative pain, infection, hemostasis, and achieved good healing.

The recurrence rate for PG is said to be 16% of the treated lesions and so re-excision of such lesions might be necessary.^[5] PG occasionally re-occur after excision is a known complication but can be prevented. Microbial agents such as streptococci and staphylococci may play a role in the etiopathogenesis of this lesion as they infect minor trauma sites during the healing process and vascular overproduction and tumor-like hyperplasia appears as a response.^[7]

Lasers, a new technology in surgery dentistry, are both doctor and patient-friendly due to its ease of usage and comfort. Diode lasers are compact and lightweight and are easy to use. The laser energy is easily absorbed by the colored pigments of the host tissue, such as melanin and hemoglobin which are the chromophores. The laser ablation heals as it seals the blood vessels, hence minimizing the bleeding potential of the surgical site. This aids to better visualization of the surgical site. Pain is also not felt by the patient as the nerve bundles are also sealed.^[8] The advantages of laser application are relatively bloodless surgery as it seals the blood vessels and nerve bundles while cutting, and a sutureless procedure with minimal post-operative pain.^[3] In addition, the laser instantly disinfects the surgical wound with consequent less post-operative infection, minimal swelling, and enhanced healing. In areas where esthetics are important, the laser is a less invasive method compared to scalpel and cryosurgery techniques.

CONCLUSION

With the presentation of this paper, it can be concluded that the combinations of various etiological factors might have caused the inflammatory tissue to cross the threshold from regular gingivitis to granuloma formation. Surgical excision with soft-tissue diode laser is a successful treatment of choice. The use of diode lasers minimizes the chances of recurrence, excessive bleeding, post-operative pain, and improves comfort of the patient. Innovative approaches like laser surgery can

obliterate these biological and operative complications and is therefore recommended for routine clinical use.

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