



Treatment of Oral Pyogenic Granuloma by 810 nm Diode Laser

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Abstract: Pyogenic granuloma is one of the inflammatory hyperplasia seen in the oral cavity. The present study included 10 patients with pyogenic granuloma, involving 4 males and 6 females with 1:1.5 male to female ratio. Patient ages ranged from 5 to 85 years (mean, 30 years) and half of the lesions had pedunculated base, with surface ulceration in 10% of cases. Treatment consisted of resection, using 810 nm diode lasers. Eight patients were anesthetized during the surgical operation by local infiltration of anesthesia. Only three patients reported mild post-operative pain within the first 24 hours of the healing period. During the surgical operation there was no significant bleeding so clear surgical field. There was no bleeding postoperatively. There was mild edema appear in first 2 days after the surgery, and then it subsided gradually. There was no infection in all the patients treated. One day following the operation the intra oral examination showed dark-brown necrotic tissue, friable with red inflamed line around the edges. After five days, the observation revealed that the sloughs tissue was completely changed to white color and was easily removed by gauze. Wound healing was excellent after only one week. All the samples were diagnosed histopathologically as pyogenic granuloma.

Introduction

Pyogenic granuloma can develop at any age, but it predominantly occurs in the second decade of life in young females (Hamid *et al.*, 2007). Clinically, oral pyogenic granuloma is a smooth or lobulated exophytic lesion manifesting as small, red erythematous papules on a pedunculated or sometimes sessile base, which is usually hemorrhagic (Eversole, 2002). From the initial discovery of the ruby laser in the 1960s, medical applications of the system lasers were developed and approved for soft tissue procedures (Lewis *et al.*, 1997; bsten, 1990).

Lasers can now be regarded as practical and economical tools with unique properties that have been utilized effectively in several

applications in different fields. Medical, dental, biological and various chemical and physical investigations utilize lasers due to their advantages (O'shea, 1978; Beesly, 1978). In oral & maxillofacial surgery, lasers provide new powerful tools that is characterized by a bloodless and less pain field and applied in both soft and hard tissues treatment (Strauss, 2000). Pyogenic granuloma is one of the inflammatory hyperplasia seen in the oral cavity. This term is a misnomer because the lesion is unrelated to infection and in reality arises in response to various stimuli such as low-grade local irritation, traumatic injury or hormonal factors (Greenberg, 2003; Neville, 2003).

Clinically, oral pyogenic granuloma is a smooth or lobulated exophytic lesion manifesting as small, red erythematous papules

on a pedunculated or sometimes sessile base, which is usually hemorrhagic. The surface ranges from pink to red to purple, depending on the age of the lesion. Although excisional surgery is the treatment of choice for it, some other treatment protocols such as the use of Nd:YAG laser, flash lamp pulsed dye laser, diode laser, cryosurgery, intralesional injection of ethanol or corticosteroid and sodium tetradecyl sulfate sclerotherapy have been proposed (Meffert *et al.*, 1998; Ishida, 1998; Moon, 2005). Because of the high frequency of pyogenic granuloma in the oral cavity, especially during pregnancy, and necessity for proper diagnosis and treatment, complete information and investigations about this lesion, in addition to knowledge about new approaches for its treatment is presented (Ojanotko-Harri, 1991).

Materials and Methods

The study consisted of 10 oral pyogenic granuloma lesions that underwent diode laser (810 nm) excision, during a 3 months period from Sep. 2007 to Dec. 2007 in maxillofacial department in the hospital of specialized surgeries. Contact mode laser used in this treatment with a continuous 5 W power.

The most frequently involved site was the gingival (no= 5, 50%) other sites were the upper lip one case, tongue one case, buccal mucosa one case, and palate two cases. Gingival pyogenic granulomas were more prevalent in the maxilla than in the mandible, with the anterior region of both jaws being more commonly affected. The labiobuccal gingiva of both jaws was more commonly affected

Eight patients were anesthetized during the surgical operation by local infiltration of anesthesia (Lidocaine) 2%, containing adrenalin1:80000 concentration. Only two patients managed to complete treatment without the administration of a local anaesthetic.

The laser system: A diode laser (Diomed 15) was capable of delivering up to 119 J/cm² of pulsed radiation via a fiber optic hand piece or 15 W of continuous wave radiation via an optical fiber coupled to the laser aperture. Diomed 15 lasers consist of a Class IV GaAlAs (Gallium Aluminium Arsenide) diode laser with a wavelength of 810 ±20 nm and a visible light (aiming beam) 5 mW Class IIIa diode laser with

a wavelength of 635- 655 nm. The Diomed 15 surgical laser is classified as a class IV laser product. Diomed supplies laser safety glasses. Appropriate eyewear is supplied with the Diomed surgical laser for protection from continuous wave laser radiation, in the wavelength range of 790-830 nm (GaALAs) diode laser. A smoke evacuator had been used to capture the plume. Placing reflective materials such as glass, metals and polished plastic must be avoided in the way of laser beam. The optical fiber that was used in this study had a bare/flat end fiber. It was used in contact mode. The optical fiber was first inserted down in a hand piece, until the fiber "tip" protrudes approximately 2 mm from the distal end of the hand piece. The laser dose parameters are listed in Table (1).

Table (1): Laser dose parameters

Lesion	Mode	Power	Power density
Pyogenic granuloma	CW Contact	5W	17.68 W/mm ²

Prior to surgery, medical history and history of present illness had been taken, after that the patients were examined. The surgical procedure was started with infiltration of the surgical site with local anesthesia Lidocaine 2%, containing adrenalin1:80000 concentrations. Only two patients managed to complete treatment without the administration of a local anesthesia. After the anesthesia was given the mass grasped with tissue forceps “non polished plastic” and raised from its base. The laser knife “optical fiber tip” was handled perpendicular to the surgical site.

The excision procedure started from the periphery of the mass neck toward the centre, and from all the directions by this maneuver, the mass was completely separated from the surrounding tissues. The specimens were inserted in 10% Formalin solution for histopathological examination.

Results

The result of this study depends on the clinical observation, patient complaints during operations and in the follow-up period (Table 2).

Ten cases were treated, two of them operated without the need for local anesthetic infiltration. Neither sutures nor anti-inflammatory medication were required. Wound healing was excellent after one week.

Table (2): Clinical observations and evaluation of results

Clinical sign and symptom	Evaluation	No. of patients	Patients %
Pain	Mild	3	30
Bleeding	Not Significant	0	0
Edema	Mild	5	50
Infection	Negative	0	0
Necrosis	Positive	6	60

Pain: Eight patients were anesthetized during the surgical operation by local infiltration of anesthesia (2% Lidocaine), containing adrenalin 1:80000 concentrations. Only three patients reported some post-operative pain within the first 24 hours of the healing period but this was not severe enough to disrupt sleep or eating patterns.

Bleeding: During the surgical operation there were non significant bleeding which gives us clear surgical field, this was very useful. There is no bleeding following the operation.

Edema: There was mild edema appeared in 5 patients in first 2 days after the surgery, and then it subsided gradually without need for anti-inflammatory medication.

Infection: There was no infection in all the patients treated, although all the patients covered with antibiotic post surgery. The antibiotic used was Amoxicillin cap. 250 mg, 4 times daily for 3 days.

Necrosis of the Operation Site: One day following the operation the intra oral examination showed dark-brown necrotic tissue, friable with red inflamed line around the edges in 6 patients. After five days, the observation revealed that the sloughs tissue was completely

changed to white color and was easily removed by gauze.

Local analgesic properties: Eight patients out of ten required local anesthesia before treatment could be completed. Only two patients managed to complete treatment without the administration of a local anesthesia.

Time taken: The time taken for the treatment ranged from 5 to 15 minutes with an average of 10 minutes.

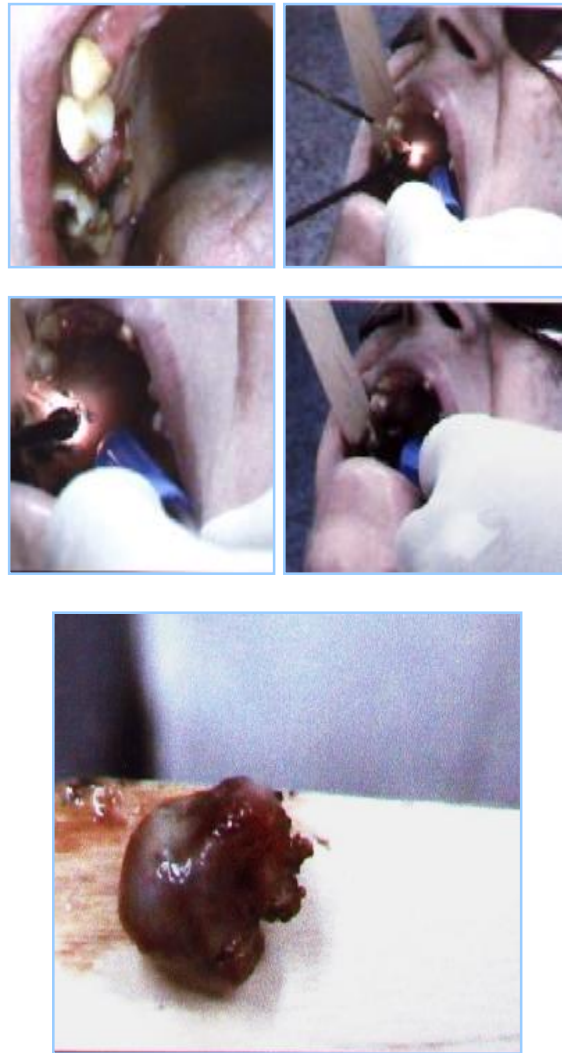


Fig. 1: Sequences of Pyogenic granuloma resection by diode laser

Soft tissue surgery: The laser treatment was completed in all 10 procedures with only one

clinical difficulty. The pyogenic granulomas were confirmed by subsequent histopathology reports. Care was exercised when taking the biopsy to ensure that there was enough 'healthy tissue' which had not been ablated by the laser.

Discussion and Conclusions

Photothermal interaction with tissue is the basic concept of diode surgical laser (810 ±20 nm). In this process, radiant light is absorbed by the tissue and transformed to heat energy changing tissue structure.

Laser light within 810 ±20 nm was converted to thermal energy on contact with the tissue, causing laser tissue interaction, that when appropriately applied, can produce reaction ranging from incision, vaporization, to coagulation (Markolf, 1996).

This wavelength has affinity for melanin or dark pigments, and is strongly absorbed by the blood hemoglobin, which contributes to their thermal effect.

Therefore, this laser works more efficiently when the energy applied in the presence of pigments. This was the reason that homeostasis occurs with this wavelength (Strauss, 2004).

In this study, Diode Surgical Laser creates a wound that can be characterized as thermal injury. The fiber was kept in steady motion and in contact mode that was used directly over the target tissue.

The heated tip of optical fiber was used as a knife to create thermal effects (Guy, 1996). So keeping the fiber in one spot will gradually heat a growing mass of tissue in that spot and will produce a laser wound. The depth of penetration of the laser wound made by a contact probe will vary with the power used and duration of exposure time (Love, 1995).

Local anaesthesia is required prior to pyogenic granuloma (soft tissue) surgery as the laser did not provide adequate analgesia.

Most pyogenic granuloma (soft tissue) lesions could be removed efficiently by the laser.

Laser pyogenic granuloma (soft tissue) surgery was well accepted by both adult and child patients.

Lastly, it can be concluded that the diode laser is a good option for the removal of pyogenic granuloma, and affords multiple intra- and postoperative advantages.

References

- Absten, G.T. and Joffe, S.N. (1990). "Laser in Medicine: An Introductory Guide" 2nd Ed. Chapman and Hall, London.
- Beesly, M.J. (1978) "Lasers and Their Applications" Taylor and Francis LTD. London.
- Eversole L.R. (2002) "Clinical Outline of Oral Pathology: Diagnosis and Treatment" 3rd Ed. B.C. Decker, Hamilton, pp. 113-114.
- Greenberg M.S., Glick M. (2003) "Burket's Oral Medicine: Diagnosis and Treatment. 10th Ed., B.C. Decker, Hamilton, pp. 141-142.
- Guy A.C., Charles C. (1996) "Laser Applications in Oral Maxillofacial Surgery. W.B Saunders, N.Y. Chap. 1, pp. 8-9.
- Hamid Jafarzadeh, Majid Sanatkhani, and Nooshin Mohtasham (2007) Oral pyogenic granuloma: a review, *J. Oral Sci.* **48**, 167-175.
- Ishida C.E., Ramos-e-Silva M. (1998) Cryosurgery in Oral Lesions. *Int J. Dermatol* **37**, 283-285.
- Lewis R E. and Rizio L. M. (1995) Preliminary investigations on the utility of an Erbium, Chromium Y SGC laser, *Canad. Dent. Asso Journal*, December.
- Love, R.M. (1995). The effects of laser irradiation on the dental tissues: a review. *New Zealand Dental Journal*, **91**, 134-137.
- Markolf, H.N. (1996) "Laser Tissue Interaction" Heidelberg.
- Meffert J.J. , Cagna D.R., Meffert R.M. (1998) Treatment of oral granulation tissue with the flashlamp pulsed dye laser. *Dermatol. Surg.* **24**, 845-848.
- Moon S.E., Hwang E.J., Cho K.H. (2005) Treatment of pyogenic granuloma by sodium tetradecyl sulfate sclerotherapy. *Arch Dermatol* **141**, 644- 646.
- Neville B.W., Damm D.D., Allen C.M., Bouquot J.E. (2002) "Oral and Maxillofacial Pathology" 2nd Ed. W.B. Saunders, Philadelphia, pp. 437-495.
- O'shea, D.C; Callen, W.R. and Rhodes, W.T. (1978) "Introduction to Lasers and Their Applications" 2nd Ed. Addison-Wesley, N.Y.
- Ojanotko-Harri A.O., Harri M.P., Hurttia H.M. Sewon L.A. (1991) Altered tissue metabolism of progesterone in pregnancy gingivitis and granuloma, *J. Clin. Periodontol* **18**, 262-266.

Strauss R.A., Fallon S.D. (2004) Lasers in contemporary oral and maxillofacial surgery, Dent. Clin. North Am. 48, pp. 861-88.

Strauss RA.(2000) Laser application in oral and maxillofacial surgery, Dent Clin North Am. 2000 Oct; 44(4), pp. 851-73.

معالجة حالات الورم الحبيبي المتقيح باستعمال دايود ليزر 810 نانومتر

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الخلاصة
الورم الحبيبي المتقيح هو أحد التضرّخات الكميّة التحريضية التي تحدث في التجويف الفمي . ان هذا المصطلح هو تعبير غير دقيق عن المرض لان الالتهاب البكتيري ليس هو المسبب المباشر له. وفي الواقع انه يظهر رداً على المحفزات المختلفة مثل التهيج او التخديش المباشر ذات الشدة الواطنة أو قد يكون السبب عوامل هورمونية. ان هذا الورد يمكن أن يظهر ويطور بأي عمر، لكنه يحدث بالدرجة الأولى في العقد الثاني من الحياة في الإناث الشباب عادةً أكثر من الذكور، من المحتمل بسبب التأثيرات الوجودية للهورمونات النسائية. سريراً، الورم الحبيبي المتقيح يكون على هيئة ورم بارز للخارج قد يكون امس او متفصص، احمر اللون ، اماقاعده فتكون اما سويقية او قد تكون في بعض الاحيان لاطنة القاعدة. ان هذه الأفة سريعة النزف للتأثيرات الخارجية. في هذه الدراسة الحالية 10 من حالات الورم الحبيبي المتقيح ، يتضمّن 4 ذكور و6 إناث. نسبة الإناث للذكور هي 1:1.5 كما ان اعمار المرضى تراوحت من 5 سنوات إلى 85 سنة (متوسط الأعمار 30 سنة)، وان هذه الدراسة استغرقت ثلاثة اشهر من أيلول الى كانون الأول 2007 . المعالجة شملت الاستئصال النهائي وذلك باستخدام الدايود ليزر خلال عملية استئصال الأفة لوحظ ان النزف كان ضئيلاً بحيث ممكن ان يهنل كما ان الوردية ظهرت في اليومين الاولين وبشكل خفيف ثم اختفت تدريجياً. لم يكن هناك اي التهاب ومع جميع المرضى. يوم واحد بعد العملية لوحظ وجود نخر على السطح الخارجي وبلون يميل الى السواد وكان هشاً مع احمرار المنطقة المحيطة به. بعد 5 ايام، لوحظ وجود غشاء خفيف وبلون ابيض تم ازالته وبسهولة باستخدام الشاش الطبي. التنام الجرح حدث وبشكل ممتاز بعد اسبوع واحد. جميع العينات ارسلت للفحص النسيجي و شُخصت بعلم أمراض الأنسجة كورم حبيبي متقيح .