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 are 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. 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**

<table>
<thead>
<tr>
<th>Clinical sign and symptom</th>
<th>Evaluation</th>
<th>No. of patients</th>
<th>Patients %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Mild</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Not Significant</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Edema</td>
<td>Mild</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Infection</td>
<td>Negative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Necrosis</td>
<td>Positive</td>
<td>6</td>
<td>60</td>
</tr>
</tbody>
</table>

**Pain:** Eight patients were anesthetized during the surgical operation by local infiltration of anesthesia (2% Lidocaine), containing adrenalin1:80000 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](image)
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

O’shea, D.C; Callen, W.R. and Rhodes, W.T. (1978) "Introduction to Lasers and Their Applications" 2nd Ed. Addison-Wesley, N.Y.
معالجة حالات الورم الحبيبي المقيق باستخدام دايود ليزر 810 نانومتر

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الورم الحبيبي المقيق هو أحد التضخمات الكبيرة التشريحيي التي تحدث في التجويف الفم، ولهذا الخلاقية المصطلح يعبر عن مدى أعراض الورم الداخلي الذي يتسبب في التهابات سطحية. وقد يكون السبب عامل هرموني. إن هذا الأداء يمكن أن يظهر بأي عمر، لكنه يحدث بالدرجة الأولى في العقد الثاني من الحياة. إن الشبات عادة أكثر من الذكور، من المحتمل بسبب النتائج الهرمونية النسبية. سريعا، الورم الحبيبي المقيق يكون على هيئة ورم بارز للخارج قد يكون أسود أو متقلص. أحيانا، الثقب يتشكل تدريجيا، ثم يحدث حديثاً، يكون على رأسه، ويعمل على تطور الورم إلى الخارج. إن هذه الدراسة استغرقت ثلاثة أشهر من أولى إلى كانون الأول 2007. في هذه الدراسة، نستعمل الاستئصال البصري وذلك باستخدام الدايود ليزر خلال عملية استخدام الأطقم لوحظ أن الورم كان ينبعث بحيث يمكن أن يهيل كما أن الورم نظرت في الورم الأول والثاني بكفاءة، تم اكتشاف تدريجيًا، لم يكن هناك أي تهاب، ومع جميع المرضى، يوم واحد بعد العملية لوحظ وجود نخر على السطح الخارجي ولون أبيض إلى الورم والهبوط كان هنا مع اخراج منطقة المحيطة به. بعد 5 أيام، لوحظ وجود غشاء خفيف ولون أبيض تم إزالتها، وتعالج الورم الطبي، النلام الجرح، ويرجع بشكل ممتاز بعد أسبوع واحد. جميع المراجعات لفحص النسيجي وشحنت بعض أعراض الأنسجة كورم حبيبي متقيق.