Peripheral giant cell granuloma surgery with diode laser

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Laser surgery has many benefits, such as maintenance of a sterile condition, reduction of bleeding, good possible estimation of cutting depth, precision of cutting, often no need for suturing or bandages, pain reduction, minimally invasive procedure that reduces patient stress, promotion of wound healing and less scaring. Many cases have been reported in the literature regarding the removal of oral exophytic lesions and pain control for aphthous ulcers by laser. In the following, we will present a case of treatment of a peripheral giant cell granuloma (PGCG) and multiple aphthous ulcers in one patient.

Literature

Introduction

A PGCG originates from the periodontal ligament or the periosteum.[1] The lesion is more common in the lower jaw than in the upper jaw and is also more common in females than in males.[2–4] Any region of the jaw can be affected by this kind of lesion,[4,5] and mobility and displacement of the adjacent teeth can occur.[6] Generally, the lesion size varies from about 0.1 cm to 3 cm.[5,7]

The aetiology is unknown, but local irritating factors, such as an ill-fitting prosthesis, poor restorations, dental plaque, calculus, chronic infection and lack of nutrients, may have a role in the aetiology. The lesion may be seen in cases of hyperparathyroidism and after periodontal surgery.[8–11] The presence of S-100-positive cells, which are evidence of Langerhans cells or their precursors, and the presence of fibroblasts, endothelial cells and myofibroblasts points towards a reactive nature of the PGCG.[12–14]

Excision by scalpel, electrocautery or laser, and the elimination of any local irritating factors must be considered in the treatment of such lesions. The recurrence rate for lesions ranges from 5 to 11 %.[5,15]

A recurrent aphthous ulcer (aphthous stomatitis) is a common lesion in the mouth and affects ten per cent of the population. The lesions, based on their morphology, can be classified as minor (3–10 mm in size), major (> 10 mm) and herpetiform. The exact cause of many aphthous ulcers is unknown, but possible aetiological factors include stress, lack of sleep, citrus fruits, trauma, immune system reactions, and deficiency of vitamin B12, iron or folic acid. They also occur in relation with some systemic diseases, such as HIV, Behçet's syndrome, Crohn's disease and other autoimmune diseases.[16–18]

Nowadays, diode lasers are efficiently used for treatment of oral soft-tissue lesions.[19,20]

Case presentation

A 45-year-old male patient with complaints of a mass with a duration of ten months and ulcers at the tongue that had been there for one day was referred for treatment. The mass was not painful, but bled during eating or sometimes even spontaneously. The ulcers were painful.

Medical history

The patient's medical history showed no systemic medical problems, no allergic reaction, no medications or recreational drugs and no history of past surgical procedures; thus, the patient did not have to be referred for medical consultation.

Clinical and radiographic findings

Oral and maxillofacial examination of the patient revealed no temporomandibular joint dysfunction or myofascial disturbances, but poor oral hygiene and an old denture lacking stability and retention.

An exophytic lesion was diagnosed at the ridge of the lower jaw. The lesion was partially firm and red to pink and bled during examination; no pain occurred on probing and the lesion was completely movable. The radiographic examination showed some retained roots in the lower jaw and there was no destructive effect such as bone resorption. There were multiple ulcers at the right side of the tongue. The ulcers were painful and the patient had not been using any medication for pain relief (Figs. 1 & 2).

The case was provisionally diagnosed as denture epulis and multiple aphthous ulcers, and we decided to

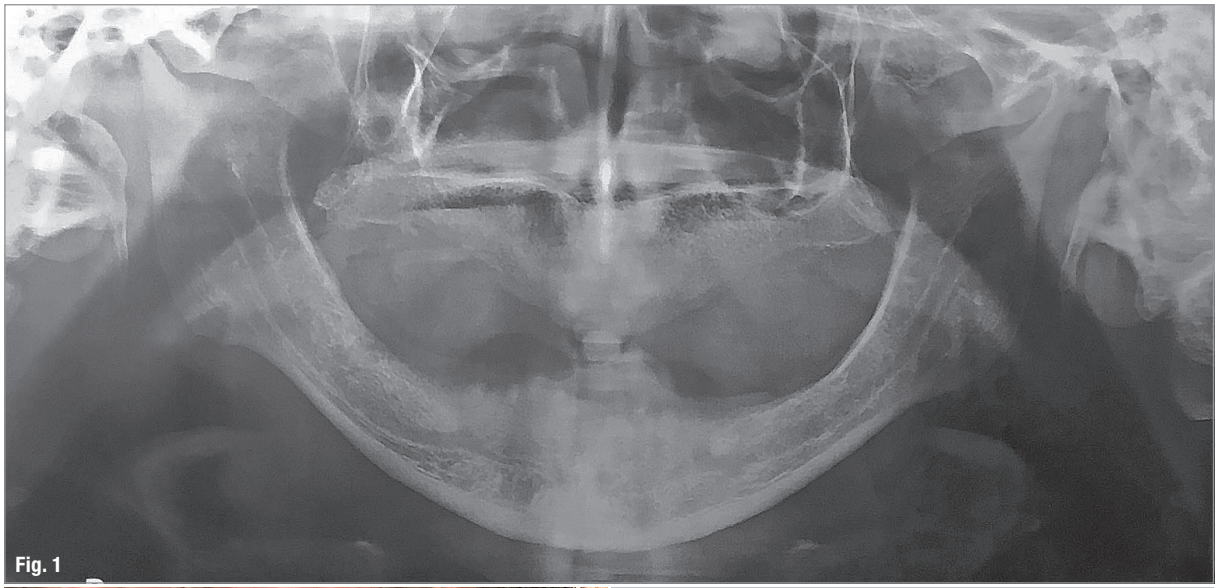


Fig. 1

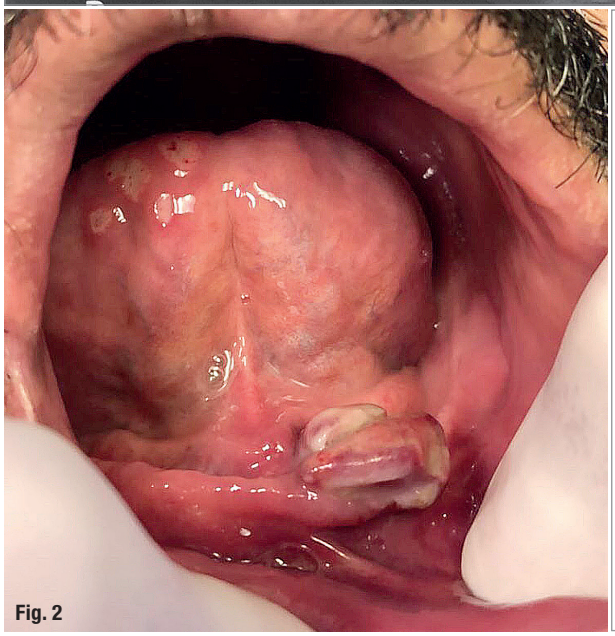


Fig. 2

Patient Name: Sex: male Report No: P-G- 311

Clinician: Dr. Shabani Age: 45 yrs Date: 1396/10/14

SURGICAL PATHOLOGY REPORT

Specimen : gingival lesion
Clinical data:
Operation note:

GROSS DESCRIPTION: Specimen is received in formalin, labeled as gum lesion, consist of a cream colored soft tissue with hemorrhagic areas on its surface 14x10 mm in diameter and 2 mm thickness.

SOS: 1/1 E: 50%

MICROSCOPY: Sections show a lesion with numerous osteoclast like giant cells and a cellular highly vascularized stroma.

Gingival lesion, lesion excision
Peripheral giant cell granuloma (giant cell epulis)

Fig. 3

Fig. 1: Initial radiographic image. **Fig. 2:** Before treatment: PGCG and aphthous ulcers. **Fig. 3:** Histological report.

perform a laser-based excisional biopsy of the exophytic lesion and ulcer photocoagulation by diode laser.

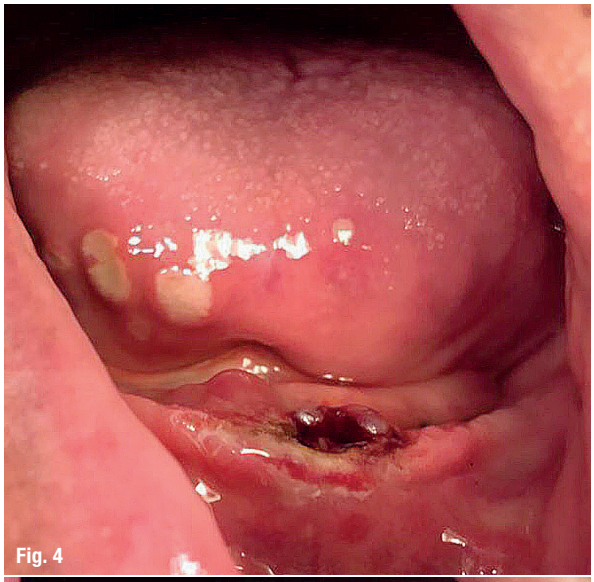
Treatment delivery sequence

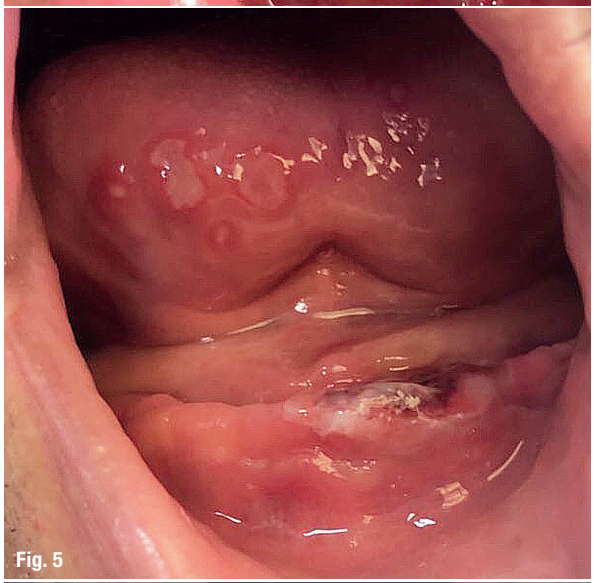
After completion of the patient consent form, the surgical area was anaesthetised by infiltration with 2 % lidocaine with 1 : 100,000 adrenaline (1.8 ml) and then a retraction suture was placed within the lesion. The aphthous ulcer irradiation did not require local anaesthesia for the photocoagulation process.

The pre-operative procedures were as follows:

- defining of the controlled area and proper placing of the laser warning signs to secure the operating room,
- checking the safety of the patient's glasses and eye protection of the patient's guardian and the assistant,
- review of the patient's information (examination sheet, radiograph, consent form, etc.), and
- proper calibration of the laser system: fibre cleaving, beam aiming and initiation of the fibre with articulating paper and test-firing of the laser for the excisional biopsy, but a non-initiated fibre for the ulcer photocoagulation.

The excisional biopsy of the lesion was started with initiated fibre and the incision was performed with the tissue under tension and with tip-to-tissue contact so that the lesion was separated in the proper way. At the beginning of the surgery, we used a 980 nm diode laser, 400 µ fibre, 2 W output power, continuous wave (CW) and contact mode for an irradiation time of 320 seconds.


Fig. 4


Fig. 5

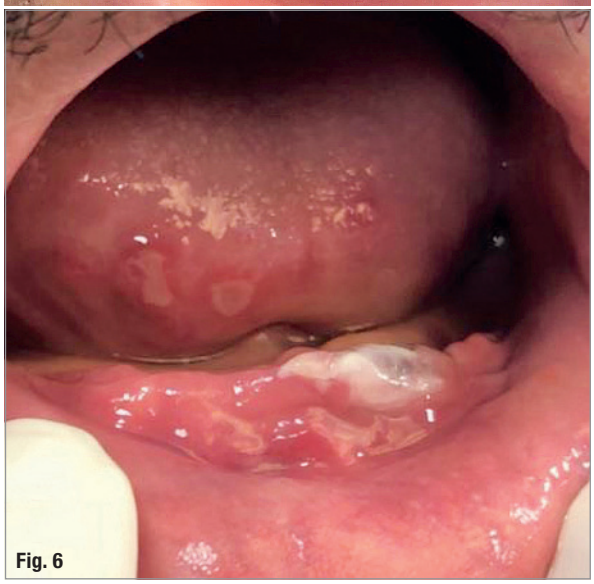

Fig. 6

Fig. 4: Immediately after PGCG surgery and aphthous ulcer photocoagulation. **Fig. 5:** One day after treatment: healing was proceeding well. **Fig. 6:** One week after PGCG surgery and aphthous ulcer photocoagulation.

After removal of the exophytic lesion in order to perform the photocoagulation process for the aphthous ulcers, we changed the laser setting to 400µ fibre, non-initiated, 0.6W, CW, non-contact mode and an irradiation time of 30 seconds per ulcer at 18J and worked in a circular way from a distance of 6mm to the ulcer in defocused mode, advancing towards the lesion (2–3mm away), covering the entire surface of the ulcer area.

After the ulcer irradiation, a pain/feeling test was done by rubbing the lesion with the finger. For one of the lesions, we needed to increase the output power to 0.7W (21J) for the second irradiation and then to 0.8W output power (24J) for the third irradiation to achieve full pain control.

During the treatment, high-volume suction was used to evacuate the vapour plume and objectionable odours at the site of operation. The laser-tissue interaction was respected in order to prevent any unsuitable reaction and consequent damage to the surrounding tissue through the progression of the tissue vaporisation at the base of the lesion and the patient's reflexes. A moistened gauze was used for prevention of unwanted thermal damage to the adjacent tissue for the removal of the exophytic lesion.

Removal of carbonised tissue was done using a micro-applicator brush soaked in a 3% hydrogen peroxide solution. The biopsy was sent in for laboratory examination (Fig. 3).

Post-procedural education

The patient was advised on keeping the area clean, avoiding food and liquids that might cause pain or irritation to the sensitive tissue, and taking over-the-counter analgesics as needed. The laser setting was registered in the patient's file for both stages of gross lesion removal and aphthous ulcer photocoagulation.

Final result and follow-up

Excellent laser excisional biopsy was observed with no bleeding, no char and no pain from the aphthous ulcers. The patient did not experience any discomfort and was satisfied (Fig. 4).

The first visit after laser excisional biopsy was one day after the procedure. Healing was as expected, with the healing progressing well and no swelling or pain from the surgery or the aphthous lesion areas (Fig. 5). After one week, the patient revisited and no problem in the healing process was evident (Fig. 6). Finally, after the one-month follow-up, a successful treatment outcome was observed (Figs. 7 & 8).

Discussion

In comparison with conventional excisional biopsy procedures (scalpel and suturing), laser-assisted excisional



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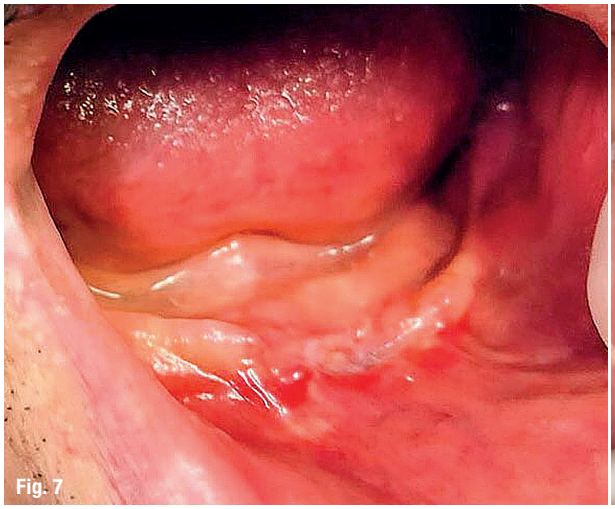

Fig. 7


Fig. 8

Fig. 7: Situation one month after PGCG surgery and aphthous ulcer photocoagulation. **Fig. 8:** Final situation two months after treatment.

biopsy can be performed very quickly, with no bleeding, less or no pain, less or no oedema, and little or no need for analgesics.

Because of the size of the lesion in this case, the procedure is traditionally classified as an advanced laser procedure. Full removal of the lesion is very difficult and a recurrent lesion may occur owing to insufficient extension of the surgical area. In laser surgery, a larger extension into the surrounding tissue leads to an efficient removal of the lesion.

Aphthous ulcer photocoagulation was done successfully and pain reduction occurred very rapidly; thus, the patient did not need to use any medication for aphthous ulcer pain control.

Conclusion

The 980 nm diode laser is a powerful tool for the removal of a PGCG as well as for the pain relief for aphthous ulcers.

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Kurz & bündig

Die Nutzung von Lasern zur Entfernung von oralen exophytischen Läsionen und zur Schmerzkontrolle bei aphthöser Stomatitis wurde bereits in vielen Fällen dokumentiert. Die Laserchirurgie bietet zahlreiche Vorteile, wie die Wahrung steriler Bedingungen, Blutungsreduktion, eine sehr gute Einschätzung der Schnitttiefe, präzises Schneiden, meist keine Notwendigkeit von Nähten oder Verbänden, Schmerzreduzierung, weniger Stress für den Patienten dank minimalinvasiver Prozesse, Förderung der Wundheilung und verringerte Narbenbildung. Heute werden Diodenlaser erfolgreich für die Behandlung von Weichgewebsläsionen eingesetzt.

In dem hier dargestellten Patientenfall behandelten die Autoren ein bereits seit zehn Monaten vorhandenes peripheres Riesenzellgranulom (PGCG) sowie multiple aphthöse Ulzerationen, welche etwa einen Tag vor Vorstelligwerden des 45-jährigen Patienten an der Zunge aufgetreten waren. Während sich das PGCG als nicht schmerzempfindlich erwies, jedoch spontan bei Berührung oder beim Essen blutete, verursachten die Ulzerationen Schmerzen, welche bisher jedoch nicht medikamentös behandelt wurden. Als Ursache für die Beschwerden wurden unzureichende Mundhygiene sowie ein schlecht sitzendes Gebiss diagnostiziert.

Für die Behandlung beider Weichgewebserkrankungen erwies sich der 980 nm-Diodenlaser als erfolgreiches Werkzeug. Das PGCG wurde durch eine großflächige, laserbasierte Exzisionsbiopsie entfernt. Aufgrund der Größe der exophytischen Läsion handelte es sich bei diesem Eingriff bereits um eine fortgeschrittene Laserbehandlung. Für die aphthösen Ulzerationen konnte mittels Photokoagulation eine rapide Schmerzlinderung erzielt werden.



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