

High-power laser for oral excisional biopsy in an oncologic patient with pancytopenia

ABSTRACT

Oral surgical procedures are a great challenge in cancer patients, especially those with pancytopenia, given the risk of both hemorrhage and opportunistic infection. Thus, we report herein a case of a patient with refractory acute myeloid leukemia, severe pancytopenia, and some episodes of febrile neutropenia, who presented asymptomatic, bilateral lesions on the tongue, requiring excisional biopsy. Considering the high risk of bleeding, surgical intervention was proposed with a high-power laser (HPL) at the bedside. There was no considerable bleeding and stitches were not needed. Within 48 h postoperatively, the patient reported neither pain nor further bleeding and her tongue presented normal function. The patient was under a follow-up period of about 8 months, with no lesion relapse. The HPL seems to be of great value for preventing excessive bleeding and late infection in patients with pancytopenia submitted to minor oral surgeries.

Keywords: Case report, laser therapy, oral surgical procedures, pancytopenia

INTRODUCTION

Pancytopenia, an unspecific laboratory finding present in several diseases, is characterized by a reduction in the number of red and white blood cells and platelets.^[1] The etiology of pancytopenia is multifactorial, including aplastic anemia, megaloblastic anemia, leukemia,^[2] splenomegaly, sepsis, lymphoma, multiple myeloma, myelodysplastic syndromes, alcoholic diseases, viral infection, autoimmune diseases, and endocrine diseases.^[1] Immune dysregulation following allogeneic stem cell transplantation is another important cause of immune-mediated pancytopenia.^[3]

Patients with pancytopenia generally present a weak response to microorganisms, poor healing, and prolonged bleeding time due to the reduction in the major cellular elements of the blood.^[4] In severe cases, life-threatening infections and bleeding may occur,^[5] the main reasons why invasive dental procedures can be challenging in these patients.

Considering this complicated background, the present study reports a case in which a diode high-power laser (HPL) was used for oral excisional biopsy in a patient with pancytopenia.

CASE REPORT

A 17-year-old female patient diagnosed with refractory acute myeloid leukemia was admitted to the Brazilian Cancer Control Institute (São Paulo, Brazil) for a second allogeneic stem cell

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transplantation. The patient presented pancytopenia and some episodes of febrile neutropenia while inpatient and, therefore, it, was empirically administered meropenem, vancomycin, polymyxin B, voriconazole, amphotericin B, and daptomycin.

Before the second transplantation, she complained of difficulty chewing and speaking because of two growths on her tongue. Intraoral examination revealed the presence of two bilateral tumor-like pedunculated lesions, with normal color, measuring approximately 1 cm², and protruding from both lateral surfaces of the tongue [Figure 1a and b]. A complete blood count analysis indicated platelet counts at 54,000/mm³, erythrocyte counts at 3,06 million/mm³, and leukocyte counts at 2,170/mm³.

Based on the diagnostic hypothesis of fibroma (differential diagnosis: pyogenic granuloma) and considering the patient's systemic health status, an 808-nm-diode laser (Thera Lase Surgery™, DMC Ltda, São Carlos, Brazil) was used instead of the conventional scalpel technique for excisional biopsy procedures. At the bedside, after local anesthetic infiltration with lidocaine in association with epinephrine, both lesions were grasped with Allis clamps, and then the HPL was delivered in continuous-wave mode with a 400-µm optical fiber and an output power of 1W [Table 1]. There was no need for sutures, the

surgical time did not exceed 10 min, and bleeding was controlled adequately [Figure 1c and d]. The histopathological examination confirmed that the lesions were granulomas; however, the prognosis and treatment planning were not modified.

Forty-eight hours postoperatively, the patient reported neither pain nor bleeding [Figure 1e and f] and her tongue presented normal function. Within a week, wound healing was at an advanced stage [Figure 1g and h]. The patient was followed up for approximately 8 months and had no relapse.

Informed consent was obtained from the patient for the collection, analysis, and publication of personal and clinical data. This manuscript was written in accordance with the CARE guidelines.^[6]

DISCUSSION

In the past two decades, HPLs have been gaining popularity in oral surgery as they provide shorter operating timing, fewer postoperative complications, and reduced intraoperative bleeding. These advantages are especially relevant for the care of patients suffering from dental anxiety and those with vascular lesions or under anticoagulant therapy.^[7] Moreover, laser devices have seemed to be effective for local disinfection^[8] and reducing the risk of cross-infection during surgical procedures.^[7]

The current paper reports a successful case in which a diode HPL was used for oral excisional biopsy procedures at the bedside in a patient with leukemia-related pancytopenia.



Figure 1: (a) Initial clinical presentation – left side; (b) Initial clinical presentation – right side; (c) Immediate postoperative presentation – left side; (d) Immediate postoperative presentation – right side; (e) Postoperative presentation after 48 h – left side; (f) Postoperative presentation after 48 h – right side; (g) Postoperative presentation after 1 week – left side; (h) Postoperative presentation after one week – right side

Table 1: Laser parameters

Specifications	Unit
Type of laser	Diode
Emission mode	Continuous
Time on/time off	-
Delivery system	Optical fiber
Energy distribution	480 J - total
Peak power	1 W
Average power	1 W
Spot diameter at the focus	-
Focus spot area	-
Spot diameter at the tissue (µm)	400
Focus-to-tissue	-
Spot area at the tissue (µm ²)	125.600
Peak power density at spot area (W/µm ²)	0.0079
Peak power density at the tissue (W/µm ²)	0.0079
Average power density at spot area (W/µm ²)	0.0079
Average power density at the tissue (W/µm ²)	0.0079
Beam divergence	No
Water irrigation	No
Air and aspirating airflow	No

Several studies have shown excellent results using HPLs for oral lesions under different conditions.^[7-12] However, to the best of our knowledge, this is the first report of oral surgery in a patient with pancytopenia with no need for a surgical center setting.

Patients with pancytopenia commonly experience anemia, thrombocytopenia, and leukopenia, with hemorrhage and infection being the major threats to them.^[4] The rationale for selecting the technique reported herein was based on the photothermal properties of HPLs, which were proven to have antibacterial (evaporation/destruction/denaturation of microorganisms or elimination/inactivation of microbial toxic substances)^[13,14] and hemostatic effects.^[14] Moreover, some authors have reasoned that the postoperative pain following HPL-assisted surgeries is less intense because of the photobiomodulation effect on adjacent tissues of the laser light scattering.^[15]

Regarding the study limitations, case reports are ranked at the lowest levels of scientific evidence since they may quite be affected by the publication bias.^[16] This kind of study, however, is still highly desirable for conditions poorly addressed in the literature as well as novel therapeutic approaches, as reported herein.

To sum up, based on the current case report, diode HPL seems to be of great value for preventing excessive bleeding and late infection in patients with pancytopenia submitted to minor oral surgeries. Moreover, further systemic medications or therapies can be avoided in the perioperative management of these patients.

Ethics statement

Patient anonymity was assured.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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