

# Defocused Irradiation Mode of Diode Laser for Conservative Treatment of Oral Hemangioma

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## Abstract:

Vascular lesions rise from abnormalities in blood vessels or endothelial proliferation. Capillary hemangiomas are formed by small capillaries surrounded by a layer of endothelial cells in a connective tissue stroma. Various treatments are used for these conditions like excisional surgery, sclerotherapy, and recently laser irradiation. In this case study, we report successful treatment of intraoral capillary hemangioma by gallium/aluminum/arsenide (GaAlAs) laser. A 29 year old woman with a red lesion on the upper side of the right maxillary premolar was referred to private dental office. The Diode laser with wavelength of 810 nm was selected for treatment of the lesion in defocused mode by output power of 4 W in continuous mode. No bleeding was observed during surgery which provided better vision for surgeon and resulted in a minimally invasive procedure. According to results, Diode laser can be considered as a conservative modality in treatment of oral capillary hemangioma, especially in the esthetic zone.

**Keywords:** diode laser; hemangioma; vascular malformation.

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## Introduction

Abnormalities in blood vessels or endothelial proliferation lead to vascular lesions which are divided into two types including hemangiomas and vascular malformations<sup>1</sup>.

According to Enzinger and Weiss classification, hemangiomas are divided into three types; capillary, cavernous and miscellaneous<sup>2</sup>.

Capillary hemangiomas are formed by small capillaries surrounded by a layer of endothelial cells in a connective tissue stroma<sup>3</sup>. The higher percentage of hemangiomas is seen in the head and neck area but just a small portion belongs to oral cavity. Mostly, it occurs in lips, tongue, buccal mucosa and palate.

Attached gingiva is rarely involved by this lesion. It looks like reddish soft mass, sessile or pedunculated in various sizes. In some condition, bleeding can be observed under pressure<sup>4,5</sup>.

Different treatments including X-ray therapy, sclerotherapy, embolization, excisional surgery, laser treatment are used for managing this problem but clinical guidelines for these treatments are deficient<sup>6</sup>.

Zheng et al. reported that the main treatment choice for capillary hemangioma is laser therapy<sup>7</sup>. Among different laser used for oral surgery, Diode and Neodymium-Doped Yttrium Aluminium Garnet (Nd:YAG) lasers can be beneficial for this purpose due to haemostatic effect provided by more penetration depth and high absorption in hemoglobin<sup>8</sup>. Excisional

or incisional surgical removal of this lesion may be followed by some complications such as pain, bone exposure, extra tissue damage and bleeding, gingival recession which is important in the esthetic zone, delayed healing and infection especially in patients with coagulation disorders and anticoagulant receivers.

Owing to lower cost of diode laser, in this case study we are reporting the successful treatment of intraoral capillary hemangioma by diode laser.

### Case report

A 29 year old woman with a red lesion on the upper side of the right maxillary premolar was referred to private dental office (Figure 1)

In the clinical examination, the patient indicated that she had no systemic disease. The lesion was a reddish mass with sessile base and smooth surface. The size of this mass was about  $0.75 \times 0.5$  cm. In examination, normal pocket depth and bleeding on probing was seen. Bone was completely palpated, so the lesion

was not extended to bone. The patient had no sense of pain in the region. No bleeding was observed during palpation of the lesion and the tooth was vital.

After patient preparation (application of local anesthetic), the gallium/aluminum/arsenide (GaAlAs) laser (Twilight, Biolase Technologies, USA) with wavelength of 810 nm was selected for managing the lesion with power of 4 W in continuous mode. The fiber of 800  $\mu$  was applied in noncontact mode. The entire lesion was coagulated by the laser in a slowly sweeping motion about 4 mm above the surface accompanied by high vacuum suction. (Figure 2). No bleeding and pain was seen after treatment (Figure 3).

In follow up session after 4 weeks (Figure 4, 5), partial healing was observed (Figure 6). The residual lesion in marginal gingiva was coagulated by the same diode laser with output power of 2 W, pulse duration of 20 msec, interval of 40 msec in contact mode. Also, the patient was educated to keep good oral hygiene. After 2 months, complete healing (normal gingiva) was achieved (Figure 7). Also, no problem was detected



**Figure 1.** The view of lesion before treatment



**Figure 3.** Immediately after treatment, no bleeding was observed.



**Figure 2.** Laser irradiation in defocused mode (4 mm above the surface)



**Figure 4.** Follow up session after 4 weeks



**Figure 5.** The residual lesion in gingival margin



**Figure 6.** After second surgery (focused mode)



**Figure 7.** Follow up session after 2 months

after evaluation of tooth by vitality test. The level of gingival margin was the same as adjunct teeth.

## Discussion

One of the common benign tumors of vascular malformation is hemangioma. Despite various techniques introduced for treatment of this lesion,

it is important to choose a suitable modality due to size, location and clinical condition of lesion<sup>9</sup>. Conventional excisional surgery may be followed by some discomfort or bleeding. To alleviate these disadvantages, laser technology can be used<sup>10</sup>. In this case, no postoperative pain was reported by patient. This may be attributed to coagulation of proteins on wound surface or sealing of the end of sensory nerves<sup>11</sup>. During procedure, no bleeding was observed which provided better vision for operator. Other advantages of laser surgery were providing coagulation, excellent healing, no postoperative complication and no need for suturing. So, this technique can be better accepted by patients<sup>12</sup>. The wound healing process can be related to bacterial elimination and minimal scar formation in site of surgery<sup>13</sup> also no gingival recession was observed which is favorable in esthetic zone.

Lambrecht et al. in application of CO<sub>2</sub> laser for treatment of intraoral hemangiomas concluded that laser application produced minimal tissue damage and bloodless operation site<sup>14</sup>.

Conventional surgical procedure may be followed by gingival graft that caused extra cost and treatment and dissatisfaction of patients<sup>15</sup> but laser treatment showed some advantages like non invasive, fast and simple procedure, minimum recession and rapid healing for complicated patients<sup>16</sup>.

Usually, laser treatment is done in focused mode by excision of the lesion that may compromised the esthetic zone by bone exposure accompanied by gingival recession<sup>13</sup>. So, defocused application of laser treatment leads to coagulation of lesion in minimally invasive manner.

More clinical trials are needed to standardize the laser treatment protocol for intraoral hemangioma.

## Conclusion

The application of diode laser in treatment of oral hemangioma as a conservative modality can be beneficial for both patients and clinicians due to less postoperative complications and providing simple surgical procedure with minimal side effects.

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