

REVIEW ARTICLE

Role of Laser in Oral and Maxillofacial Surgery: A Review of Literature

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ABSTRACT

Lasers have been used in dentistry for diagnostic and therapeutic purposes for more than 30 years, and are an indispensable instrument in any modern dental surgery. The use of lasers enables new treatment methods to be employed in order to meaningfully supplement traditional therapies. The purpose of this paper is to overview the use of laser as use widely.

In this paper, we are summarized the role of laser in different oral and maxillofacial disease by review of literatures. Oral and maxillofacial surgery is a vast branch of dentistry which includes procedures ranging from simple extraction to pathologies of both the hard and soft-tissues.

Based on extensive review of literature, certain conclusion can be made regarding the use of lasers.

Keywords: Frenectomy, Impaction, Laser, Oral surgery, Ranula.

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INTRODUCTION

The one new development in this millennium that captured the imagination of one and all in dentistry, was the laser.¹ The term 'laser' originated as an acronym for 'Light amplification by stimulated emission of radiation'. A laser is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons.² A laser

differs from conventional light source in three major respects.

Lasers have been used in dentistry for diagnostic and therapeutic purposes for more than 30 years, and are an indispensable instrument in any modern dental surgery. The use of lasers enables new treatment methods to be employed in order to meaningfully supplement traditional therapies. Lasers are highly versatile tools that can be successfully used in a wide range of applications in the treatment of mucous membranes, hard tooth structures and bones. The use of lasers is associated with minimal contact, reduced pain, as well as a reduction in bleeding, leading to a more comfortable overall experience for the patient.

REVIEW OF LITERATURES

There are various use of laser in oral and maxillofacial surgery described in various literatures. In this paper, we are summarized the role of laser in different oral and maxillofacial disease by review of literature Amarillas-Escobar et al³ advocated the use of laser in the postoperative therapeutic management of patients having surgical removal of impacted third molars. Brignardello-Petersen et al⁴ assessed the efficacy and safety of low-level laser energy irradiation for decreasing pain, swelling, and trismus after surgical removal of impacted mandibular third molars and concluded that there was no benefit of laser on pain or swelling and a moderate benefit on trismus after removal of third molar. Kreisler et al⁵ evaluated the efficacy of low level laser therapy on management of pain after endodontic surgery and concluded that low level laser therapy has a beneficial effect on reduction of postoperative pain. Kim and Kratchman⁶ evaluated the efficacy of different laser system in endodontic surgery and concluded that the erbium:yttrium-aluminum-garnet (Er:YAG) laser does not cause any vibration and discomfort while cutting bone and dentin and has minimal damage to soft tissues and bone, as well as less contamination of surgical site. Yazicioglu⁹ concluded that although the rate of healing is delayed in laser but it is superior to the other methods in terms of its hemostatic capabilities on patients undergoing anticoagulated drug treatment. Kaya et al⁷ compared SaliCept patch, alvogyl and laser therapy in

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the management of alveolar osteitis. The use of low-level laser therapy treatment at 7.64 J/cm^2 (0.1 W 60 seconds 6 J) was found to be superior to both SaliCept and alvogyl in managing alveolar osteitis in their study. Zola et al⁹ compared erbium, chromium:yttrium-scandium-gallium-garnet (Er,Cr:YSGG) (Waterlase) laser with conventional surgical modalities for treatment of ranula. Lai and Poon¹⁰ evaluated the efficacy of CO₂ laser in the treatment of ranula and concluded that CO₂ laser excision of ranula is safe with minimal or no recurrence. Pedron et al¹¹ reported two clinical cases of lower-lip mucoceles treated by excision with a high-intensity diode laser in pediatric patients and concluded that diode laser surgery was rapid, bloodless, and well accepted by patients. The postoperative discomfort and scarring were minimal. Ata-Ali et al¹² compared CO₂ laser with cryosurgery and micro-marsupialization for the treatment of mucocele and concluded CO₂ laser as an alternative to these treatment modalities because the CO₂ laser has a high water absorption rate and is well-absorbed by all soft tissues with high water content. Chawla et al¹³ reported a case of mucocele and treated with Er,Cr:YSGG laser and concluded that this treatment as a one of the best treatment for oral mucocele treatment compared to other conventional modalities. Infante-Cossio et al¹⁴ assessed the efficacy of CO₂ laser in the treatment of inflammatory papillary hyperplasia along with implant supported prosthesis and concluded that treatment with carbon dioxide laser, followed by restoration with an implant-supported prosthesis resulted in excellent results in inflammatory papillary hyperplasia.

Olivi et al¹⁵ conducted a retrospective study to assess the clinical efficacy of Er,Cr:YSGG laser in frenectomy procedure. They concluded that the Er,Cr:YSGG laser led to a considerable reduction in operating time, eliminated or reduced the amount of local anesthetic used during the procedure and made it possible to avoid the placement of surgical sutures.

Clayman¹⁶ compared CO₂ laser with conventional surgical modalities in the treatment of white lesion of oral mucosa and concluded that the CO₂ laser is a useful adjunct to conventional surgery and it should become the treatment of choice for superficial white lesions of the oral mucosa. Chandu and Smith¹⁷ assessed for outcome of oral leukoplakia treated by CO₂ laser. They concluded that laser therapy has been a favored treatment regime for oral leukoplakia. Shah et al¹⁸ used the Opal-5 diode laser in the treatment of oral submucous fibrosis and yielded excellent results in the excision of bands of oral submucous fibrosis. Chaudhary et al¹⁹ used Er,Cr:YSGG laser for the treatment of excision of fibrous bands of oral submucous fibrosis (OSMF) and concluded that

Er,Cr:YSGG laser as an innovative and precise method for treatment of OSMF.

Soliman et al²⁰ concluded that diode laser (980 nm) provides a marked clinical improvement without the need for either local or systemic treatment. Scully and Carrozzo²¹ compared different laser system to treat oral lichen planus (OLP) and concluded that carbon dioxide lasers were used to treat multicentric lesions or difficult areas and low-dose excimer 308 nm laser seems promising but much more evidence is required to show its efficacy in OLP. Frame²² compared CO₂ laser with other conventional surgical methods in the treatment of oral verrucous carcinoma. They concluded that healing following resection of benign lesions using CO₂ laser was excellent, however, long-term follow-up may be necessary. Azevedo et al²³ reported two cases of verrucous carcinoma which were successfully treated with CO₂ laser without recurrences compared to conventional treatment modalities. Crisan et al²⁴ studied photocoagulation with diode laser or Er:YAG laser of hemangioma and vascular malformations. They concluded that, when these techniques are properly applied, they can achieve reduction in size of these lesions without compromising function and cosmetics.

Curtis et al²⁵ compared microsuture, interpositional nerve graft, and laser solder weld repair of the rat inferior alveolar nerve and concluded interpositional nerve graft was least effective compared to microsuture and laser. Bulgaria²⁶ evaluated the efficacy of low power (12 mW) He-Ne laser for local irradiation and laser puncture in the treatment of trigeminal neuralgia and concluded that laser-puncture with local laser irradiation can be successfully used for treatment of trigeminal neuralgia. The treatment course should consist of 10 to 12 daily irradiation procedures. To achieve a new remission after relapse, 5 to 6 daily procedures were usually sufficient.

Alster and Zauyanov-Scanlon²⁷ compared different laser system for the treatment of scar and concluded the 585 nm pulsed dye laser (PDL) remains the gold standard for laser treatment of hypertrophic scars and keloids. Madani M²⁸ evaluated the effectiveness of laser-assisted Uvulopalatopharyngoplasty (UPPP) for the treatment of snoring and mild to moderate obstructive sleep apnea and concluded laser assisted UPPP is a major surgical alternative to conventional surgical procedures that improves upper airway passage and has minimal side effects and complications. Ryan²⁹ evaluated the effectiveness of laser-assisted UPPP for the treatment of snoring and obstructive sleep apnea and concluded that laser-assisted uvulopalatopharyngoplasty (LAUP) has no added advantage over conventional UPPP. Katz et al³⁰ evaluated the effectiveness of lasers (with or without conservative methods) in temporomandibular

joint (TMJ) clicking and concluded the clicks in the TMJ had disappeared or were reduced with the use of laser.

Stringer and Park³¹ proposed a simple method of single-cannula operative arthroscopy with a holmium:YAG laser using a specialized cannula.

CONCLUSION

Oral and maxillofacial surgery is a vast branch of dentistry which includes procedures ranging from simple extraction to pathologies of both the hard and soft tissues. Lasers have been used in surgical procedures involving both the hard and soft tissues of the oral cavity. Based on extensive review of literature certain conclusion can be made regarding the use of lasers.

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