Crown Lengthening Using Diode Laser: A Case Reports

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ABSTRACT

The removal of soft tissue or both soft tissue as well as alveolar bone for the restoration of the biologic width may be part of a surgical procedure to extend length of the crown. Scalpel, electrosurgery, and laser methods can all be used to extend the crown length. However, using lasers has a lot of benefits over other approaches. Greater precision, a generally bloodless surgical field and postsurgical course, minimum swelling and scarring, coagulation, vaporisation, cutting, minimal or no suturing, and less or no postoperative pain are some benefits of laser surgery over scalpel surgery. In the current example, a diode laser was used to extend length of the crown in order to restore function.

INTRODUCTION

The foundation of contemporary dentistry is minimally invasive techniques and safety. New tools and materials have been created to help us reach this goal. One of these recently created tools is a laser, which is useful in several areas of dentistry, such as frenectomy, frenotomy, crown lengthening and operculectomy1.

Caries, erosion, tooth deformity, fracture, attrition, severe tooth reduction, eruption disharmony, exostosis, and genetic variation are some of the common causes of short clinical crowns. Therefore, when cavities or fracture borders are sub-gingivally positioned, the crown is too short for restorative retention, there is an excess of the gingiva, or the anatomical tooth crown has partially erupted, this clinical crown length shortfall should be increased. To give a crown is the ultimate purpose of crown lengthening.

The biological width is calculated as the total of the attachments to the supra-crestal connective tissue and the junctional epithelium. The average space occupied by the junctional epithelium and the supra-crestal connective tissue fibres at the human dento-gingival junction, according to Gargiulo et al. (1961), is 2.04 mm2.

Surgery to extend the crown length might be done for cosmetic or masticatory reasons. Scalpel, electrosurgery, and laser methods can all be used to extend the crown. However, using lasers has a lot of benefits over other approaches. One cases of crown lengthening with a diode laser is described in the current case report. The use of lasers offers a different, efficient strategy that yields positive outcomes and patient satisfaction3.

CASE REPORT:

A 42-year-old female patient with a decreased clinical crown height was referred to the department of Periodontics. The patient received an explanation of the diode laser crown lengthening surgery and signed consent documents. The patient was receiving treatment while being free of any systemic illnesses.

The clinical crowns of teeth 35 and 37 were noticeably shorter than the anatomical crowns upon clinical examination. The teeth had undergone root canal therapy two years prior, and the clinical crown height was insufficient to accommodate fixed dental prosthesis. The biologic width measured pre-operative measurement was (4mm) sufficient. Therefore, utilising a diode laser, a crown lengthening and gingivectomy treatment was planned.

The patient, the assistant, and the operator all wore safety eyewear. According to FDA laser safety regulations, plastic tools were used to prevent laser beam reflection. The operative location was given local anaesthesia. In order to remove the tissue, the diode laser unit was operated at 1.5 watts of energy in continuous wave (CW) mode, using short back-and-forth brush-like strokes with deeper progression along the original laser incision. The tip was kept moving continuously. The objective of a gingivectomy was to improve the ability to see the cut edges of the crown before they were replaced with a crown. Using sterile gauze soaked in saline to remove any remaining ablated tissues. Analgesics were prescribed for the patients to use as needed, and post-operative instructions were provided. Neither during the procedure nor in the days following, patients expressed any pain or discomfort.

The prepared borders of the crown could be clearly seen after surgery. Delivery of temporary crowns was done right away. Permanent crown was delivered to restore the masticatory function after two weeks of successful wound healing.

DISCUSSION:

The definition of a laser is "Light Amplification by Stimulated Radiation." The first laser in use was operated by Theodore H. Maiman in 1960. According to how deeply they penetrate the tissue, lasers can be divided into two groups: those that penetrate the tissue deeply (such Nd: YAG and diode lasers) and those that absorb their light in the surface layers (such as Er: YAG laser) 4.

A solid-state semiconductor laser known as a diode commonly combines the elements gallium (Ga), arsenide (Ar), and additional substances like Aluminium (Al) and Indium (In) (In). Its wavelength is between 810 and 980 nm with less pain and edema, less blood loss after surgery and during the healing process, no need any sutures, and the benefits of laser surgery over conventional surgery include better prognosis5, 6.

The tissue responds to laser radiation in a variety of ways, including absorption, transmission, reflection, and dispersion. The tissue undergoes warming (37°C to 60°C), protein denaturation, coagulation (> 60°C), welding (70°C to 900°C), vaporisation (100°C to 150°C), and carbonization (> 200°C) when heated by a laser beam for the first time. Haemoglobin and other pigments are highly absorbent to laser light at 800 to 980 nm, which is little absorbed by water. Surgery can be carried out safely adjacent to oral hard tissues because the diode laser doesn't contact with them7.

Only two primary causes call for crown lengthening. Each category focuses on particular therapies and is both utilitarian and aesthetically pleasing. For aesthetic purposes, gingival symmetry is typically improved, uneven gingival margins are usually corrected, and hyperplastic tissue overgrowth is typically modified. Functionally, it is done when a prosthetic crown cannot be placed at the necessary site because of a clinically short crown8.

In compared to scalpel surgery, laser surgery requires less local anaesthesia because rapid cell vaporisation, loss of intracellular fluid, chemical mediators, and denaturation of intracellular material and protein resulting in a less strong local inflammatory response and less discomfort and oedema9.

Given that there was enough connected gingiva in this case, closed flap crown lengthening was determined to be the best approach. The benefit is that no swelling, trauma, or discomfort is present and no sutures are needed. Although this procedure cannot be used in every case of crown lengthening, it unquestionably aids surgeons in handling minor surgical cosmetic problems11.

To select the proper parameters and get a good prediction, one needs to have sufficient understanding and experience of how lasers interact with soft and hard tissues. Therefore, for the best outcomes, using new technology should be combined with adhering to fundamental therapy guidelines.

In order to classify this method as a standard treatment for crown lengthening, prospective

randomised controlled trials are required to demonstrate the clinical benefits and capabilities of lasers in this sector12.

CONCLUSION:

When compared to the usual procedure, crown lengthening using a diode laser was found to have quicker healing times, tolerable pain, no bleeding, and reduced post-operative problems. There were no signs of infection, discomfort, edema, or scarring during the gingival healing process.

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