



Evaluation Study

## DIODE LASER 980 NM: A GOOD MODALITY FOR EXPOSURE OF IMPACTED PERMANENT TEETH

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### ABSTRACT

This study aims to demonstrate how laser technique could positively assist in exposing impacted teeth for orthodontic reasons. This study was comprised of 30 patients who were treated for impacted teeth exposed to a 980 nm diode laser for orthodontic reasons. Treatment was conducted from May 2013 to May 2016 in the University Dental Clinic in Tirana. The follow-up period was one week, two weeks, and six months for the evaluation of the results. The brackets were placed immediately after surgery due to the good coagulation. The intraoperative advantage of using a 980 nm diode laser was less chair-side time and the complete absence of bleeding, allowing immediate bonding of the bracket in dry enamel. None of the patients reported other post-surgical side effects, with no bleeding, pain, swelling, or discomfort one to two weeks after the treatment. Diode laser is effective and safe for soft tissue. In conclusion, a 980 nm diode laser is a promising modality for the exposure of impacted teeth for orthodontic reasons. This method provides good operative and postoperative results without any side effects.

**KEYWORDS:** *Diode laser 980nm, tooth exposure, wound healing*

### INTRODUCTION

An impacted tooth has completed development and cannot and will not come out in its normal position for various reasons. Therefore, it needs observation or treatment (1, 2). The standard and essential reasons for delayed eruption are usually insufficient space, early loss of primary teeth, and some hormonal and metabolic disorders (3-10). The diagnosis may be obtained after a thorough clinical and radiographic examination. Impacted teeth have become the field of study and action in many specialties of dentistry. Various treatment modalities for the treatment of impacted teeth are available: surgical extraction, transplantation, prosthetic replacement, surgical exposure, and expectation of spontaneous eruption or surgical exposure, accompanied by orthodontic treatment (11, 12). Many studies have demonstrated that combined orthodontic surgical treatment can produce good results. Various treatment modalities have been proposed to avoid the complications associated with impacted canines, such as using a scalpel, caustic agents, electrocautery, and diode lasers. However, diode laser therapy is an effective and non-invasive treatment option for exposure of impacted teeth without bone covering the tooth. But in most cases, it first requires orthodontic preparation of

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the maxillary and mandibular arches to create adequate space before surgical exposure. Laser offers different wavelengths like 450nm/810nm or 980nm. 450nm can be used in non-contact/contact mode, whereas 810nm and 980nm are used in contact mode.

Diode laser therapy is a noninvasive treatment option for exposing impacted teeth (14-16). This study aims to demonstrate how laser technique could positively assist in exposing impacted teeth for orthodontic reasons.

## MATERIAL AND METHOD

This study comprised 30 patients (12 males and 18 females) aged 10 to 24 who were treated for exposure of impacted teeth for orthodontic reasons with a diode laser 980 nm. Treatment was conducted from May 2016 to May 2019 at the University Dental Clinic in Tirana, Albania.

The diagnosis of teeth impaction was based on both clinical and radiographic examinations. The amount of space in the dental arch, morphology, position of the adjacent teeth, and contours of the bone were considered—the radiographic examinations including panoramic radiographs, CT, and the CBCT.

Informed consent was obtained from all subjects involved in the study. The treatments were performed under local anesthesia. The mucosa covering the teeth was excised with a diode laser 980 nm, CW, 3 w. The follow-up visits were scheduled for one week, two weeks, and six months after the treatment to evaluate early and long-term results. All teeth exposure was photographically documented at all stages of treatment and healing.

## RESULTS

This study comprised 30 patients treated for impacted tooth exposure for orthodontic reasons. Impacted teeth were: 20 maxillary canines, 4 maxillary incisors, 3 mandibular canines, 3 mandibular premolars (Fig. 1a).

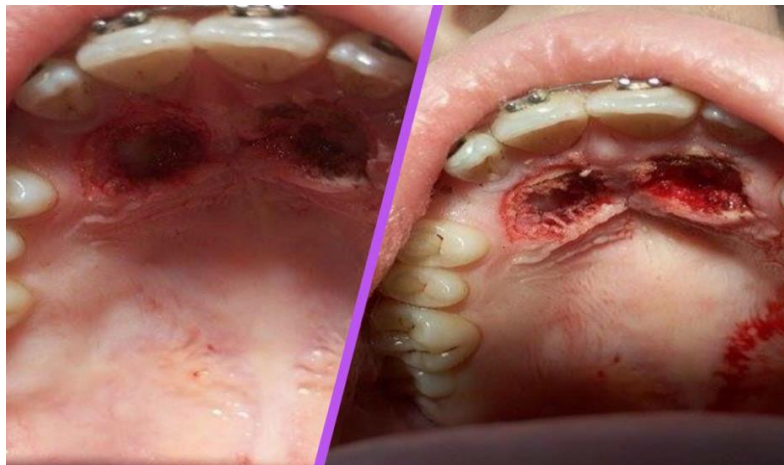
According to the protocol treatment, the teeth were exposed to a diode laser 980 nm, CW, 3 w under local anesthesia (Fig 1b). Immediately after diode treatment, the surgical fields were bloodless (Fig 1c). The intraoperative advantage of using a 980 nm diode laser was less chair-side time, reducing the fear and anxiety during surgical procedures. The impacted teeth were cleaned and scaled to permit bonding, and the orthodontic brackets were bonded to a position immediately in the same session after the surgical procedure. The absence of bleeding allowed immediate bonding of the bracket in dry enamel, preventing the possibility of detaching and reducing the risk of further re-intervention. None of the patients reported other post-surgical side effects, no bleeding, pain, swelling, or discomfort one to two weeks after the treatment (Fig. 1d, e). A fast and good healing process (Fig. 2a-c). Diode laser is effective and safe for soft tissue.



**Fig. 1a.** Panoramic view of two impacted maxillary canines.



**Fig. 1b.** During the surgical procedure. Exposure of the right and left impacted canines in the same session with diode laser 980 nm, CW, 3 w under local anesthesia.



**Fig. 1c.** Immediately after the treatment.



**Fig. 1d.** Two days after the treatment.



**Fig. 1c.** *Four weeks after treatment.*



**Fig. 2a.** *Impacted maxillary incisor*

**Fig. 2b.** *Immediately after treatment.*



**Fig. 2c.** *Two months after surgical exposure.*

## DISCUSSION

The diagnosis of tooth impaction is based on both clinical and radiographic examinations. The clinician must consider the amount of space in the dental arch, the morphology and position of the adjacent teeth, and the contours of the bone. The radiographic examinations include panoramic radiographs and the CBCT.

There are 3 main options in the management of impacted teeth: extraction of an impacted tooth, extraction of an adjacent tooth, or non-extraction treatment involving orthodontic space opening and surgical exposure (15, 16). When non-extraction treatment is performed, the orthodontic treatment is often initiated before the surgical exposure to align

the teeth, open the space for the impacted tooth, and enhance the natural eruption process (16-19). A diode laser is a promising modality for the surgical exposure of impacted teeth. Diode laser offers advantages like patient compliance, reduced pain and discomfort, a faster healing process, absence of bleeding, and less chair-side time (20). The most significant advantage is the complete absence of bleeding, which immediately allows bracket bonding in dry enamel.

Our postoperative no-pain and swelling results coincide with the authors' observations (21, 22). The surgical exposure of impacted teeth with a diode laser makes the placement of the brackets immediately after surgery possible due to good coagulation. These findings correspond with other reports (23-25).

## CONCLUSIONS

Laser surgery for exposure of impacted teeth is a modality with beneficial effects and advantages. The intraoperative advantage is the perfect coagulation; the surgeon has a good visualization of the operative field, and the operative time is very short, making possible the minimization of fear and anxiety in the patient during the procedure. The postoperative period is without complications or discomfort. The use of lasers in orthodontics, particularly diode lasers, has made it possible for orthodontic clinicians to address the daily challenges faced in an orthodontic practice more efficiently.

### Conflicts of Interest

There are no conflicts of interest or financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings.

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