

# Guiding Un-Erupted Maxillary Incisors into Occlusion Using Diode Laser: A Report of Two Cases

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## ABSTRACT

Un-erupted maxillary incisors can have a major impact on dental and facial aesthetics and when they don't erupt at the expected time it is prudent for the clinician to determine the etiology and formulate an appropriate treatment plan. Lasers such as the argon, diode, Nd: YAG, CO2 and erbium have enabled dentists to reduce patient stress and fear during dental treatment and hence lasers represent a phenomenal change in pediatric dentistry. This article provides an overview of the diode laser in guiding the un-erupted upper incisors into occlusion in mixed dentition.

**Keywords:** Diode Laser, Operculectomy, Un-Erupted Tooth.

## INTRODUCTION

Modern concepts of dentistry today are based on minimal invasive dentistry. Among the various advances laser technology has set the stage for a revolution in dental practice. The word Laser stands for "Light Amplification by Stimulated Emission of Radiation". Today, laser has found myriad uses in dental practice replacing the scalpel and the whine of the hand piece in dental surgery. The main principle in the application of laser is the use of light energy instead of rotation forces and sharp blades.<sup>[1]</sup> Laser-supported dental treatment is an excellent approach from the tissue preservation point of view and, as reported by Martens and reiterated by Gutknecht,<sup>[2,3]</sup> "children are the first in line to receive dental laser treatment".

Un-erupted maxillary incisors can have a major impact on dental and facial aesthetics and when they don't erupt at the expected time it is prudent for the clinician to determine the etiology and formulate an appropriate treatment plan.<sup>[4]</sup> Traditionally the fibrotic gingiva over the un-erupted teeth was removed using surgical scalpels. The use of scalpels produces discomfort and prolonged healing. The introduction of soft tissue laser provide simple and safe alternative to traditional methods as they allow blood less field and at the same

time reduce the chances of infection, swelling, discomfort besides fear and anxiety.

### Management:

Delayed eruption of maxillary incisors requires monitoring or intervention when:

- There is eruption of contralateral teeth that occurred greater than six months previously;
- Both central incisors remain un-erupted and the lower incisors have erupted greater than one year previously
- There is deviation from the normal sequence of eruption (eg lateral incisors erupting prior to the centrals).

### Causes of delayed eruption

Delayed eruption can be classified into two causative groups.

### Hereditary

Supernumerary teeth, cleft lip and palate, cleidocranial dysostosis, odontomes, abnormal tooth/tissue ratio, generalised retarded eruption, gingival fibromatosis.

### Environmental

Trauma, early extraction or loss of deciduous teeth (with or without space loss), retained deciduous teeth, cystic formation, endocrine abnormalities, bone disease.<sup>[5]</sup>

### Treatment modalities:

Wait and watch,

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Surgical removal of overlying tissue by scalpel,  
Electrocautery and  
Use of laser.

### CASE REPORT

Two children aged ten years and 11 years child were referred to our department with the chief complaint of un-erupted upper right lateral incisor and central incisors respectively. Complete history pertaining to un-erupted tooth was taken. It was noted that the contralateral tooth was erupted 12-15 months before year before. The treatment modalities were explained to the parents and they were convinced that the treatment to be carried by diode laser. We used 810nm diode laser to remove the overlying fibrotic tissue. Local anesthetic gel was applied for one minute after which local anesthetic infiltration was given. Initially laser settings were started from 0.5W and then slowly increased to 1.5W to complete the procedure. Photographic recordings were done before during and after the procedure. The Patients were recalled after 24 hours, 1week, one month and 3 months.

#### Case 1:



Pre-operative view



Immediate post-operative view



One month follow up



Three month follow up

#### Case 2:



Pre-operative view



The irradiation was done using 1.5 W in pulsed contact mode



Immediate post-operative view



One month follow up



Three month follow up

## DISCUSSION

Missing upper incisors are regarded as unattractive this may have an effect on self-esteem and general social interaction and it is important to detect and manage the problem as early as possible. The incidence of unerupted maxillary central incisor in the 5–12 year-old age group has been reported as 0.13%. In a referred population to regional hospitals the prevalence has been estimated as 2.6%.<sup>4</sup> An intra-oral examination should be carried out to identify the presence of retained primary teeth beyond their normal exfoliation dates. For a detailed assessment of position it has been shown that the use of a horizontal parallax technique is better than vertical radiographic technique. More recently, cone beam computed tomography technology has become available for imaging the maxillofacial region and this can be used for the localisation of impacted teeth, including incisors.<sup>6</sup>

The tooth eruption is considered to be delayed when there is significant deviation of the emergence of tooth into the oral cavity from what is considered to be normal for the person's sex and ethnic background. Usually a permanent tooth should erupt no later than six months after natural exfoliation of its predecessor but a delay of 12 months is considered to be of little or no importance. Therefore the eruption is considered to be delayed only when the interval extends to more than one year. The two cases discussed in this article were exact indication for removing the overlying tissue so as to expose the un-erupted tooth.

Diode is manufactured from semiconductor crystals using some combination of aluminum or indium, gallium and arsenic.<sup>7</sup> This diode laser has the optical resonator mirrors directly attached to its ends, and an electrical current is used as the pumping mechanism. The available wavelengths for dental use range from about 800 nm for the active medium containing aluminum to 980 nm for the active medium composed of indium, placing them at the beginning of the near-infrared portion of the invisible nonionizing spectrum. Each machine delivers laser energy fiberoptically in continuous wave and gated pulsed modes and is used in contact with soft tissue for surgery or out of contact for deeper coagulation. The energy is delivered through a fiberoptic system in contact or

noncontact mode. Diode lasers get absorbed into the hemoglobin-melanin like chromophores or organic compounds. Thus diode lasers are good for treatments involving pigmented soft tissue and are absorbed by hemoglobin in blood and therefore are effective hemostatic devices.<sup>8</sup>

When only soft tissue is to be removed only topical anesthesia is required in most of the times without the need of local anesthesia. Er-YAG laser with 30hz,45mj and ; Er,Cr:YSGG with 20 hz,70 mj setting is used in both contact and noncontact mode.<sup>9</sup> As this laser also affects hard tissues, so in order to prevent any etching in the adjacent tooth, the laser beam should be held parallel to the tooth surface. However when Nd-YAG or diode laser is used there is no danger of etching the adjacent tooth as these lasers do not affect hard tissues.<sup>10</sup> Diode laser with 1-2W power in continuous mode can be used to expose the tooth for orthodontic purposes.

## CONCLUSION

Soft tissue lasers reduce pain, bleeding, infection and postoperative complications. Today, laser has found myriad uses in dental practice replacing the scalpel in dental surgery and has set the stage for a revolution in dental practice.

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