



Different Application of Laser in Orthodontics-A Review

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Abstract

In past few years, there is huge improvement in orthodontics. Different innovation in orthodontics made the procedure easier and less time consuming. Application of laser is one of them. Two types of lasers are there. One is hard tissue laser, and another is soft tissue laser. With laser one can do etching, debonding, welding etc. With soft tissue laser one can do gingival recontouring, frenectomies, gingivectomy, exposure of impacted teeth which are necessary parts in orthodontics.

Keywords: Laser; Laser Etching; Laser Debonding; Accelerated Orthodontics; Laser Frenectomy

Introduction

Dentistry is improving very fast. Orthodontics is not lagging behind. There is so much improvement in techniques to reduce treatment time and increase efficiency. Involvement of laser in orthodontics is one of them. The full form of laser is "light amplification by stimulated emission of radiation". Laser was developed by Theodore H. Maiman in 1960 [1]. After that diode laser in gallium, aluminum and arsenide medium was used for soft tissue surgery [2].

Application of laser in orthodontics

Now a day's laser is being used widely in dentistry as well as in orthodontics. There are two types of lasers.

1. Hard tissue laser
2. Soft tissue laser

Both types of laser are used in orthodontics in different procedures.

Laser etching [3]

Application of laser on enamel causes localized thermal ablation and removal of enamel surface [4]. It is due to micro explosion of entrapped water in enamel. It causes surface roughening similar to acid etching by 37% phosphoric acid with a depth of 10-20 micron5. But it should be used at high power output.

Laser debonding [6]

CO₂ and ND: YAG laser is commonly used for laser debonding. Debonding by laser causes decreased adhesive remnant index. Also, the chances of enamel damage are less in laser debonding. In mechanical debonding, there is always chances of enamel micro-fracture. Ceramic brackets can easily be debonded with this technique [7].

There are some chances of increase pulp temperature, but side effect is less.

Laser curing

Laser curing is an efficient technique in orthodontics. It offers extended bracket placement time which fascilate accurate bracket poisoning. Argon laser is widely used in laser curing. The photo initiator system cures in the blue region in the visible light spectrum in 480nm wave length. Talbot, *et al.* found that argon laser can cure composite achieving similar bond strength compare to normal light cure units [8].

Accelerated tooth movements

Low level laser therapy or LLLT causes accelerated tooth movement [9,10]. Tooth movement occurs due to PDL and bone remodeling. LLLT increases this remodeling procedures and decrease treatment duration. Studies have showed that LLLT can

efficiently accelerate tooth movement without noticeable side effect. LLLT is also effective in reducing orthodontic pain [11-14].

Laser welding

Welding is a frequent procedure in orthodontics. Joining two metal surfaces by laser is an efficient procedure. Crystals of YAG with added neodymium is mainly used for laser welding. The advantages of laser welding are small focus point, no corrosion at the point and zero oxidation around welding zone.

Exposure of impacted tooth

Exposure of impacted tooth can be done safely by laser. Soft tissue laser like diode laser can be used for this procedure. It decreases procedural time and creates a bloodless field. The chances of post-operative complications are also less in laser surgery.

Gingival recontouring

It is often needed to contour gingiva after orthodontic treatment to get proper zenith point or before treatment for gaining proper place for bracket placement of brackets. Soft tissue lasers are widely used for this type of procedures [15].

Hazards of laser therapy

Though laser is a good alternative in orthodontics, there are few hazards related to laser therapy.

Like

- a) Ocular hazard
- b) Tissue damage
- c) Fire and explosion
- d) Electrical shock
- e) Combustion hazard

Conclusion

Laser is a good alternative in Orthodontics. When used safely, it can perform a work very precisely and efficiently. So, laser can be a very efficient tool in different procedures in Orthodontics. But a lot of modification has to perform for patient safety and to reduce cost of the treatment.

Bibliography

1. Maiman TH. "Simulated optical radiation in ruby laser". *Nature* 187 (1960): 493.
2. Tracey S. "Light work". *Orthod Products* (2005): 88-93.
3. Serdar U., et al. "Laser etching enamel for direct bonding with Er: YsGG hydrokinetic laser system". *AJODO* 122.6 (2002): 649-656.
4. Brantley WA and Eliades T. "Orthodontic Materials". Stuttgart: Thieme (2001).
5. Von Fraunhofer JA., et al. "Laser etching of enamel for direct bonding". *The Angle Orthodontist* 63 (1993): 73-76.
6. Oztoprak MO., et al. "Debonding of ceramic brackets by a new scanning laser method". *American Journal of Orthodontics and Dentofacial Orthopedics* 138.2 (2010): 195-200.
7. Rickabaugh JL., et al. "Ceramic bracket debonding with the carbon dioxide laser". *American Journal of Orthodontics and Dentofacial Orthopedics* 110 (1996): 388-393.
8. Talbot TQ., et al. "Effect of argon laser irradiation on shear bond strength of orthodontic brackets: v An in vitro study". *American Journal of Orthodontics and Dentofacial Orthopedics* 118 (2000): 274-279.
9. Cruz Dr., et al. "Effects of low-intensity laser therapy on the orthodontic movement velocity of human teeth: a preliminary study". *Lasers in Surgery and Medicine* 35 (2004): 117-120.
10. Limpanichkul W., et al. "Effects of low-level laser therapy on the rate of orthodontic tooth movement". *Orthodontics and Craniofacial Research* (2006): 38-43.
11. Doshi-Mehta G and Bhad-Patil WA. "Efficacy of low intensity laser therapy in reducing treatment time and orthodontic pain: a clinical investigation". *American Journal of Orthodontics and Dentofacial Orthopedics* 141.3 (2012): 289-297.
12. Fernanda Angelieri., et al. "Effects of low intensity laser therapy on pain sensitivity during orthodontic tooth movement". *Dental Press Journal of Orthodontics* (2011).
13. Lim HM., et al. "A clinical investigation of efficacy of low level laser therapy in reducing orthodontic post adjustment pain". *American Journal of Orthodontics and Dentofacial Orthopedics* 108 (1995): 614-622.

14. Fujiyama K., *et al.* "Clinical effect of Co2 laser laser in reducing pain in orthodontics". *Angle Orthodontist* 78.2 (2008): 299-303.
15. Neal D Kravitz and Budi Kusnoo. "Soft tissue laser in orthodontics: An overview". *American Journal of Orthodontics and Dentofacial Orthopedics* 133 (2008): S110-S114.

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