

LASER: Basic Tool Extending the Horizon of Dentistry

Payal Vasudeva

BDS 3rd year (Student at MANAV RACHNA DENTAL COLLEGE)

ABSTRACT

LASER (i.e. Light amplification by stimulated emission of radiation) which is quite frequently used on the eye to correct near and far sightedness, reshaping of cornea and for so much more under LASIK, has now found its way in dentistry.

Here it's used for the diagnosis and treatment of various soft as well as hard tissue pathologies. As a minimally invasive procedure with a good patient compliance and with minimal or no scarring.

INTRODUCTION

Concept of laser is not new to the world. But the mechanics/idea behind its development trace down to the 20th century, when Albert Einstein inspired from Plank's theory proposed the Quantum theory of radiation. The theory proposed that electrons could be stimulated into emitting light (which is electromagnetic radiation) of a wavelength (known as photos), which when amplified lays the foundation for the development of modern days lasers.

Which has become a modern-day weapon in medical as well as dental field, utilizing only light (which is electromagnetic radiation) of different wavelengths for curing vast majority of cases ranging from cosmetics to eye to cancer to dental treatment.

Laser transmit energy to the cells, in the form of photons formed by heating the pump source producing electric current, which causes warming, coagulation, protein denaturation, drying, vaporization, and carbonization of the cells.

TYPES OF LASERS:

Types of lasers based on the medium used, range of wavelengths, and there use on soft and hard tissues are:

SOFT TISSUE LASERS

- Argon - 514nm
- KTP -532nm
- Diode -803, 810, 940, 980, 1064nm
- Nd:YAG -1064nm
- Nd:YAP-1340nm

- CO2 -10600nm

HARD AND SOFT TISSUE LASERS:

- Er,Cr:YSG -2780nm
- Er:YAG -2940nm

LOW-LEVEL LASERS:

- Helium neon -635nm
- Diode -635, 810, 980nm

PHOTOPOLYMERIZATION LASERS:

- Argon -488nm

TOOTH WHITENING LASERS:

- KTP -532nm
- Diode -803, 810-980nm

CARIES DETECTION LASERS:

- Diode -655nm

DENTINE DESENSITIZATION:

- Er:YAG -2940nm
- CO2 -10600nm

As wavelength and penetration are directly proportional to each other, hence lasers of different wavelength perform different function depending upon the amount of penetration required for that procedure.

APPLICATION:

ON SOFT TISSUE-

- Gingival recontouring
- Frenectomies
- Photo Stimulation of aphthous ulcer and recurrent hepatic lesions
- Photodynamic treatment for malignancies
- Removal of inflamed and hypertrophic tissue

ON HARD TISSUE INVOLVE-

- Cavity preparation
- Restoration removal

- Treatment of dental hypersensitivity
- Reduces the probability of recurrent caries
- Bleaching

DIAGNOSTIC APPLICATION-

- Laser florescence detection of dental caries
- Laser florescence detection of subgingival calculus
- Laser dopplerflowmetry to assess pulpal blood flow
- Detection of pit and fissures caries by optical changes
- Even for the analysis of internal tooth structure by terahertz imaging

OTHER MISCELLANEOUS APPLICATION INCLUDE:

- Analgesic effect of laser
- Nerve repair and regeneration
- Post-surgical pain reduction
- Sinusitis
- Sialolithiasis

Hence, now we can list several advantages of using laser in dentistry:

1. It's minimally invasive procedure with minimal postoperative pain and promote rapid healing.
2. Detection of caries by laser offers greater sensitivity than conventional visual and tactile method.
3. Here procedure can be performed without anesthesia, hence they make treatment of pediatric and other anxious patients easier.
4. They have a variety of uses from soft tissues- (frenectomies to destruction of aphthous ulcers, alternative to flap surgery in periodontal procedures) to hard tissue (caries

removal and cavity preparation, it doesn't cut as fast as high-speed handpiece but are much conservative while preparing tooth).

5. With minimum penetration, it can produce excellent coagulation along with precise cut.
6. Promote long term health to the tooth, as more conservative is the procedure, healthier is the tooth.

CONCLUSION

Hence, to sum up the main application advantages that a laser provide are a relative bloodless field, minimal swelling & scaring, and coagulation. It also reduces surgical time, requires no suturing, instantly disinfects the surgical wound as well as allowing non-contact type operative procedure, thereby reducing mechanical trauma to tissues and all these advantages are combined with less or no post-operative pain.

So, here we can conclude that new technologies emerge for the betterment of mankind. But, for that to happen, we must first learn to accept the new, by letting go of the past(traditional).

REFERENCES

- [1] Lasers in Periodontics: A review of the Literature – Cobb – 2006 – Journal of Periodontology.
- [2] Laser and its application in Dentistry – International Journal of Oral Health and Medical research | ISSN 2395-7387 | July-August-2017 | Vol. 4 | Issue 2.
- [3] Laser in Dentistry – An innovative tool in modern dental practice – National Journal of Maxillofacial surgery – 2012 – July-December; 3(2): 124-132.
- [4] Hecht J. Beam: The race to make the laser. New York: Oxford University Press, 2005:191.
- [5] Zaret MM, Breinin GM, Schamidt H, Ripps H, Siefel IM, Salon LR. Ocular Lesions produced by an optical maser (laser). Science 1961;134(3489): 1525-1526.
- [6] Stern RH, Soggnaes RF. Laser beam effect on Dental hard tissues. J Dent Res 1964; 43(5): 873, Abstract 307.