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REVIEW ARTICLE

LASERS IN OROMUCOSAL LESIONS

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ABSTRACT

With the rapid development of technology a range of medical and surgical modalities with lasers are available in various fields of dentistry. Soft tissue lasers are widely used by the clinicians for their potential advantage over conventional surgical methods. Use of laser technology has encroached all the areas of dentistry. The purpose of this article is to provide an overview of the current and possible future of clinical applications of lasers over the conventional surgical methods.

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INTRODUCTION

Laser–Light amplification by stimulated emission of radiation. (Abraham et al., 2014)

History

In the year 1917, physicist Albert Einstein described the theory of stimulated emission (Aoki *et al*., 2004) In the year 1960, 1st scientist who demonstrated the laser function and developed a working laser device known as ruby lasers. (Yamamoto and Sato, 1980) In the year 1970, research began on clinical oral soft tissue uses of medical CO_2 andneodymium yttrium aluminium garnet (Nd:YAG) lasers Yamamoto and Sato, 1980)

There are 4 types of laser tissue interaction: (Coluzzi, 2004)

1) Absorption
2) Reflection
3) Transmission
4) Scatterin

Mechanism of action (Panat et al., 2014)

1. Photochemical interaction
2. Photothermal interaction
3. Photomechanical interaction
4. Photoelectrical interaction

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Types of lasers

Based on power, classified as:

1) High power lasers

These effects include necrosis, carbonization, vaporization, coagulation and denaturation. Power of more than 500mW

2) Intermediate power lasers

Used for therapeutic effects without producing heat. Power - 250 to 500mW

3) Low power lasers

No thermaleffects on tissues
Power –less than 250Mw (Panat et al., 2014)

According to physical construction of the laser

Gas :

ARGON
HELIUM –NEON
CO2 LASERS
LIQUID

Solid :

Nd:YAG
Er:YAG(ERBIUM YTTRIUM ALUMINIUM GARNET)

Semiconductor :

Hybrid silicon laser

Excimer : argon fluoride
Krypton fluoride
Xenon fluoride

Application of lasers in dentistry

Uses of lasers on hard tissues

1) Lasers for caries detection (EL-Housseiny and Jamjoum, 2001)
2) Lasers for caries removal and cavity preparation (Glockner *et al*., 1998)
3) Lasers used for calculus removal
4) Lasers assisted bleaching (Laser assisted bleaching an update, 1998)
5) Surgical procedures (Pick and pecaro, 1987)

Uses of lasers on soft tissues

1) Laser curettage Laser assisted incisional and excisional biopsy (Abraham and Arathy, 2014)
2) Photodynamic therapy (Dougherty, 2002)

Advantages (Panat et al., 2014)

1. Provides dry surgical field
2. Better visualization
3. Tissue surface sterilization and reduction inbacterimei
4. Decreased pain, swelling, edema and scarring
5. Faster healing
6. Operative time is reduced
7. Short hospital stay

Disadvantages (Panat et al., 2014)

1. Increase in cost
2. Requires specialized training
3. No single wavelength will optimally treat all dental disease
4. They are harmful to eyes and skin.

Application of lasers in oral medicine

Disease condition	Author	Journal and year	Type of laser	Type of study	Number of patients	Response to laser therapy	Complication	Reccurence
Leukoplakia	Arudajaa *Et al*	2016, Journal of Dental and Oral disorders	Co2 lasers	Review article	-	100%	Delayed wound healing more than 2 weeks and possibility of scarring Heat generated can also destroy deeper lying dysplastic cells	-
	Alfonsamogedasvegara, *et al*	2015	Co2 laser	Cohort study	65	52	Lesion location in the gingiva showed tendency to be risk factor for malignant transformation.	7 recurrence and 6 malignant transformation
	Tatu r , *et al*	2013	Diode	Case report	1	34%	-	Recurrence 7.7 to 66 %
Oral submucous fibrosis	Janardan b garde *et al*	2016,j.dentallasers	diode	Case report	9	100%	nil	No recurrence
	Ramanupamtripathy *et al*	2014,Archieves of craniofacial sciences	diode	Case report	5	100%	nil	No recurrence
	Harshav.babaji *et al*	2014, j.dental and medical sciences	diode	Experimental study	50	100%	nil	No recurrence
	Zainabchaudary *et al*	2010 Indian journal of dental research	Ercr:ysgg	Case repot	1	100%	Nil	No recurrence

Herpes simplex virus	Velez gonzalez*et al*	2013, journals of lasers medical science	He-ne	Randomized double blind placebo controlled design	36	NOT MENTIONED	nil	Recurrence
	Sanchez *et al*	2013, journals of lasers medical science	diode	Semi blind study	232	NOT MENTIONED	nil	114
	Marotti*et al*	2013,journals of lasers medical science	diode	Case report	4		nil	1
Lichen planus	Mahdario *et al*	2013,journal dental shiraz university of medical science	Low level laser therapy	Case report	2	100%	nil	No
	Jayachandran *et al*	2012, journal , international medical sciences academy	diode	Clinical study	4	100%	nil	No
Recurrent apthous ulcer	Vishal anand *et al*	2012,indian journal of dental research	diode	Case report	2	100%	nil	No

	Khademi h *et al*	2012,journal of lasers in medical science	diode	Double blind clinical trial	12	100%	nil	No
	HershealAggarwal *et al*	2014, journal of clinical and diagnostic research	diode	Sham controlled split mouth followup study	30	100%	nil	No
Sialolithiasis	v.maljkovic *et al*	2014,journal of laser and health academy	Er:yag	Case report	1	100%	nil	No
Epulis	Levis silviamonteiro *et al*	2012,Brazilian dental journal	Co2	Case report	1	100%	nil	No
Epulisgranulomatosa	Sarah ghadimi *et al*	International journal of case report and images	diode	Case report	1	100%	nil	No
Epulisfissuratum	Amit a agrawal *et al*	2012,international journal of case report and images	diode	Case report	1	100%	nil	no

Myofacial pain disorder syndrome	LuciAnauemoto *et al*	2013, journal of oral science	Low level laser therapy	Randomized control trial	21		nil	No
	Selcenoz *et al*	2010, journal of craniofacial surgery	Diode	Randomized control study	44		nil	no
Mucocele	Lakshmi *et al*	2013,annals of dental research	diode	Case report	1	100%	nil	No
		2015,british journal of medicine and medical research	diode	Case report	1	100%	Minimal swelling and scarring and post operative pain	No
	Laller*et al*	2014,journal advance medical and dental science research	Co_2	Case report	1	100%		No
Traumatic fibroma	Hetalpatel *et al*	2015,international journal of advanced research	diode	Case report	1	100%		No

	Jagadishb.spai*et al*	2016,journal of dental laser	diode	Case series	3		nil	No
Trigeminal neuralgia	Ijima *et al*	2014,journal of dental research dental clinics and dental pospects	He-ne	Case reports	36	55.3%	nil	
	Walker	Journal of dental research dental clinics and dental prospects	He-ne	Case report	26	19 patients	Nil	
	Walker *et al*	Journal of dental research dental clinicsand dental prospects	He ne	Double blind study				
	Eckedral *et al*	Journal of dental research dental clinics and dental prospects	Low level laser therapy	Double blind study	16	-	-	-
	Moore *et al*	Journal of dental research dental clinics and dental prospects	Gallium aluminiumarsenyl diode laser	Double blind cross over trial		74%	Neuralgic pain should be distinguished from chronic pain for effective treatment	

Conclusion

The use of dental lasers are widely been preferred by both dentist and patients. Lasers are useful to help the dentists in giving a better diagnosis treatment of various oral mucosal lesions. Because of unpredictable etiology, immune response and status of individual a complete success has not been achieved. A proper knowledge and training helps us to give safe and effective treatment for the patients. However research in this field is still going on for overcoming its limitation.

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