Lasers in Diagnosis, Interception and Management of White Spot Lesions and Dental Caries - A Review

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ABSTRACT

Despite huge developments in oral health, dental caries still remains a community health issue globally. Dental caries is prevalent worldwide amongst adults and school children; nearly 100 % of the population is affected in most of the countries. Caries harms the outer dental structures, eventually reaching the dental pulp, making the teeth undermined and ultimately compromising functional abilities. It is the major reason for loss of tooth. For the management of carious lesions, the tissues which are decayed should be removed and replaced by dental restorations. Increased potential for causing dental anxiety and uneasiness in many patients has been reported with the usage of routine caries removal systems such as diamond and tungsten carbide rotating burs. Moreover, with the use of high and low rotating speed drills, which is used for complete dentin removal, over excavation of caries (when the deeper dentin layers are involved) may happen eventually leading to increased risk of exposing and damaging the pulp irreversibly. These disadvantages have led to exploration of new alternatives such as stepwise, minimal or no dentinal caries removal procedures that illustrate clinical benefit over comprehensive caries removal in the treatment of dentinal caries. Laser technology has reformed the management of dental caries. Laser has been found to be the latest, most recent, conservative, less traumatic and minimally invasive caries removal procedure. The energy of laser is absorbed which is then transformed to heat, leading to microstructural and chemical alterations in the surface of enamel which is irradiated thereby improving enamel acid resistance. Laser also helps to maintain a dry surrounding that improves the dentist's vision of the working field thereby resulting in an improved outcome.

KEY WORDS

Lasers, White Spot Lesions, Dental Caries, Laser Fluorescence, Orthodontic Therapy, Carbon-Dioxide Laser

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BACKGROUND

Despite colossal developments in oral health, dental caries yet remains a community health issue globally. Dental caries is prevalent worldwide amongst adults and school children; nearly 100 % of the population is affected in most of the countries. Caries harms the outer dental structures, eventually reaching the dental pulp, making the teeth undermined and ultimately compromise functional abilities. It accounts as the major reason for loss of tooth. The key aspect which defines the outcome and forthcoming functioning of the restoration is the remaining part of the tooth.¹ For the management of carious lesions, the tissues which are decayed should be removed followed by the placement of dental restorations. Increased potential for causing dental anxiety and uneasiness in many patients has been reported with the usage of routine caries removal systems such as diamond and tungsten carbide rotating burs. Even though pain could be minimised by LA, fright of the needle and the vibration and sound of machine-driven preparation still persists as major causes of anxiety and discomfort. Moreover, with the use of high and low rotating speed drills, which are used for complete dentin removal might result in over excavation of caries (when the deeper dentin layers are involved) eventually leading to increased risk of exposing and damaging the pulp irreversibly. These disadvantages have led to exploration of new alternatives such as stepwise, minimal or no dentinal caries removal procedures that illustrates clinical benefit over comprehensive caries removal in the treatment of dentinal caries.

Since modern dentistry is centred on the practice of minimally invasive procedures, laser could be a constructive substitute to the drilling procedure causing minimal pain, sound and vibration. Laser technology has reformed the management of dental caries. Laser has been found to be the latest, most recent conservative and less traumatic minimally invasive caries removal procedure.

Various studies proved the usage of lasers in prevention of caries on the enamel surface.² The wavelengths of CO2 lasers are attuned by absorbing peak of carbonated hydroxyapatite (HAP) because they demonstrate noteworthy inhibition of enamel demineralisation (50 – 98 %).^{3,4,5} The energy of laser is absorbed which is then transformed to heat, leading to microstructural and chemical alterations in the surface of enamel which is irradiated thereby improving enamel acid resistance.^{3,4} Laser also helps to maintain a dry surrounding that improves the dentists vision of the working field thereby resulting in an improved outcome.

The present review article assesses the logical evidence in supporting the cutting out of carious tissues using lasers.

HISTORY AND CHARACTERISTICS OF LASER

Laser is an abbreviation for light amplification by stimulated emission of radiation. Stimulated emission was centered on Einstein's quantum theory of radiation.⁶ The earliest laser was introduced by Theodore H. Maiman in the year 1960 by means of a synthetic ruby crystal as a lasing medium which was triggered by the use of increased flashes of energy of the intense light.⁷

The first clinical application was for the analysis and management of dermal lesions. Subsequently, was found useful in surgeries and then in ophthalmology,⁸ oral soft tissue surgery was the first dental application of laser.⁸ The energy of laser functioned equally as a scalpel for ablation of the tissue. Stimulating synthetic material in a compartment of light regenerates an intensified light beam which serves as mode of action of lasers. The energy of the light beam is emitted homogeneously and constantly towards the target tissue without making direct contact.⁹ This high-energy beam of laser light has the capacity to exercise chemical, mechanical or thermal effects in the body.⁹

Lasers used in dental practice have fickle wavelengths and tend to run in continuous-wave, pulsed or running pulsed mode. In medicine and dentistry, wavelengths in the array of 193 - 10600 nm are pertinent. Clinical application and type of laser device is determined by the wavelength of laser.⁸ On the basis of their precise uses, lasers are allocated into four chief groups: solid state lasers, liquid lasers, gas lasers and semiconductor lasers.

Gas lasers are known to have a simple design when equated to other kinds.¹⁰ Ability to change their frequency is an important feature of liquid lasers. Characteristics of semiconductor lasers include lightness and increased optical output power explaining their popularity.¹⁰

Characteristics of Laser

The beam is monochromatic, bright, unidirectional and coherent.

A. Monochromaticity

The luminous waves emitted come out with the same wavelength and energy. A single wavelength or a narrow band of wavelengths emitted allows precise targeting within tissue, while sparing adjacent structures.

B. Brilliancy

The light beam emitted is extremely intense and angularly well centred. The brightness or intensity is one of the important properties and can be enhanced by techniques like pulsing and Q-switching where extremely high peak power can be delivered in nanoseconds.

C. Coherency

All the photons emitted vibrate in phase agreement both in space and time. Coherence is a measure of precision of the waveform. Highly coherent laser beam can be more precisely focused.

D. Directionality

All the photons travel in one direction. Directionality of the laser correlates with the emission of an extremely narrow beam of light that spreads slowly. Within the laser apparatus, efficient collimation of photons into a narrow path results in a divergence factor of approximately 1 mm for every metre travelled. Directionality allows the laser beam to be focused on a very small spot size.

CLASSIFICATION OF LASERS AND THEIR APPLICATIONS IN DENTISTRY

Based on its hardness, spectrum of light and material used,¹¹ they are classified as soft tissue lasers and hard tissue lasers.¹¹

Soft Tissue Lasers

They commonly use diodes. Clinical indications include - Healing of localised osteitis, healing of aphthous ulcers, reduction of pain and treatment of gingivitis. Soft tissue lasers used in clinical practice include

1. Helium-Neon (He-N) at 632.8 nm (red, visible).
2. Gallium-Arsenide (Ga-As) at 830 nm (infra-red, invisible).

Hard Tissue Lasers

Surgically they can be used to cut both soft and hard tissues. Newer variety can transmit their energy via a flexible fiber optic cable. Frequently used are

1. Argon lasers (Ar) at 488 to 514 nm
2. Carbon dioxide lasers (CO₂) at 10.6 micrometre
3. Neodymium-doped yttrium aluminium garnet (Nd: YAG) at 1.064 micrometre.
4. Neodymium yttrium-aluminum-perovskite (Nd:YAP) at 1,340 nm.⁷

According to the Spectrum¹²

1. UV light - It has a spectrum of 100 nm – 400 nm and is not applicable in dentistry.
2. Visible light - It has a spectrum of 400 nm – 750 nm and is most commonly used in dentistry (argon and diargon)
3. Infrared light - It has a spectrum of 750 nm – 10000 nm which comprises of most of the dental lasers.

Based on the Material Used¹³

1. Gas: examples of these are Ar and CO₂ lasers.
2. Liquid: Examples of these are Dyes.
3. Solid: Examples of these are Nd: YAG, Er:YAG and diode lasers
4. Semiconductor: Examples of these are: hybrid silicon laser
5. Excimers: Examples of these are argon-fluoride, krypton-fluoride and xenon-fluoride lasers.

Based on the Laser Wavelength Used

Lasers can be classified into three groups based on their different wavelengths¹³

1. The UV range (ultra-spectrum approximately 400 - 700 nm).
2. The VIS range (visible spectrum approximately 400 - 700 nm).
3. The IR range (infra-red spectrum which is approximately 700 nm) to the microwave spectrum.

The most frequently used lasers in dentistry comprise holmium yttrium aluminium garnet (Ho:YAG), neodymium-doped yttrium aluminium garnet (Nd:YAG), carbon dioxide laser (CO₂), erbium-doped yttrium aluminum garnet (Er: YAG), neodymium doped yttrium aluminum perovskite (Nd: YAP), gallium arsenide (GaAs diode), erbium-chromium doped yttrium scandium gallium garnet (Er-Cr:YSGG) and argon lasers.

Laser Type	Wavelength	Mode	Application
CO ₂	10,600 nm	Pulse or continuous wave	Soft tissue ablation, gingival contouring for aesthetic purposes, treatment of oral ulcerative lesions, frenectomy and gingivectomy, elimination of necrotic epithelial tissue during regenerative periodontal surgeries
Nd: YAG	1064 nm	Pulse	Root canal therapy helps eliminate pathogenic microorganisms and debris from the root canal, extensive periodontal surgery and scaling, to eliminate necrotic tissues and pathogenic microorganisms and caries removal
Er: YAG	2940 nm	Pulse	Caries removal, cavity preparation in enamel and dentin, root canal preparation, U.S. FDA clearance for use on cementum and bone
Er,Cr: YSGG	2780 nm	Pulse	Enamel etching, caries removal, cavity preparation, bone ablation without over-heating, melting or changing the calcium and phosphorus ratios, root canal preparation
Argon	572 nm	Pulse or continuous	Polymerisation of restorative resin materials, tooth bleaching, elimination of necrotic tissue and gingival contouring, treatment of oral lesions such as recurrent aphthous ulcers or herpetic lesions, frenectomy and gingivectomy
Diode	810 or 980 nm	Pulse or continuous wave	Proliferation of fibroblasts and enhancing the healing of oral lesions or surgical wounds, frenectomy and gingivectomy, correcting the gingival contouring for aesthetic purposes
Ho: YAG	2100 nm	Pulse	Gingival contouring, treatment of oral lesions, frenectomy and gingivectomy

Table 1. Represents Various Types of Dental Lasers and Their Uses¹³

MECHANISM OF LASER-TISSUE INTERACTION

Mechanism of laser tissue interaction¹⁴ depends on the individual wavelength, the laser energy interacts with substances on which action is needed for absorption into soft and hard tissues. Laser-tissue interface is governed by additional irradiation factors as well such as continuous or pulsed emission, repetition rate, pulse duration, pulse energy, beam size and delivery method, spatial and temporal characteristics of the laser beam, and optical properties of the substrate.^{15,16} When the laser energy comes in contact with the concerned site, it can be:¹⁵

1. Reflected - When there is reflection of laser light beam from a surface in a direct or diffuse fashion.
2. Absorbed - There is a reaction which takes place when energy of the laser comes in contact with the atoms of the tissue it is directed at, eventually transforming into heat.
3. Transmitted - The energy of laser traverses through the tissue directly, not instigating any effect, eventually reaching the underlying tissue.
4. Scattered - The energy of the laser fans out to a broader area. If the light gets scattered, it is no more considered to be a coherent beam and therefore does not reach where its required.

The mode of action of laser energy on the target tissue is photo-thermal, while other mechanisms are considered peripheral to this process.

1. Photochemical interaction - It includes bio stimulation, which described the stimulatory effects of laser light on biochemical and molecular processes that normally occur in tissues such as healing and repair. Photo dynamic therapy (PDT), which is the therapeutic use of lasers for the treatment of pathologic conditions and

phosphorescent re-emission or tissue fluorescence, which are used as diagnostic method to detect light-reactive substances in tissues.^{16,17}

2. Photothermal interaction - It manifest clinically as photo ablation by vaporisation and superheating of tissue fluids; coagulation and haemostasis and photo pyrolysis or the burning away of tissues.
3. Photomechanical interaction - It includes photo-disruption or photo-disassociation, which is the breaking apart of structures by laser light. It involves the removal of tissue with shock-wave generation.
4. Photoelectrical interaction - It comprises of photo-plasmolysis which defines how tissue is detached by the development of electrically charged ions and particles that exist in a semi gaseous, high-energy state.¹⁷

CARBON DIOXIDE LASER IN DENTISTRY

Effect of Carbon Dioxide Laser on Enamel

There is decrease in permeability of enamel with less solubility which occurs due to melting, fusion and recrystallisation of enamel crystallites, that seal off the enamel surface when the enamel tissue is exposed to laser.¹⁸ Additionally, there is formation of a less soluble compost (tetracalcium diphosphate monoxide) which is known to be a constituent of the melting surface and this layer showed decreased content of carbonate.¹⁹ Conversely, a cross-sectional transmission electron microscopy examination revealed that the melting of the surface of enamel was not consistent and frequently happened in restricted areas. Hence, it appears that surface melting and fusion are not necessary to increase enamel resistance to demineralisation, which weakens this theory.²⁰

Another justification to the caries interception action of the carbon dioxide laser is the carbonate loss, that is a solvable mineral which vanishes from the carbonated apatite during particular laser irradiation.²¹ The decreased content of carbonate leads to reduced demineralisation of the substrate, owing to an inferior fitting of carbonate in the lattice, thereby giving rise to a less stable and highly acid-soluble apatite phase. Lastly, the organic matrix in enamel has been proven in reducing enamel demineralisation when exposed to acid attack. Even with decreased energy density (0.3 J / cm²), the laser energy can heat the enamel surface to a temperature lower than 400°C leading to a fractional disintegration of the organic matrix which further could result in blockade of the inter and intraprismatic spaces. As a result, there is a compromised diffusion of ion which leads to decrease in enamel demineralisation. This theory differs from the inorganic block theory, which advocates the melting of hydroxyapatite to block the enamel diffusion pathway.²¹

Effect of CO₂ Laser on Dentin

Kantola advocated that due to irradiation by laser there is preferential deduction of the inherent protein and water which is required to escalate the mineral content of dentin. Because of this, researchers assessed the vulnerability of dentin, which could be reformed by different laser systems

simulating a formation of caries like lesion.²² Nevertheless, there are limited studies regarding the alterations in dentin when radiated by a CO₂ laser. When compared to enamel, dentin has an increased proportion of water and protein, thereby leading to decreased impact of the mineral phase and accentuating the role of water and protein in the light absorption. Like enamel, dentin absorption is low in the visible region, but the light scatters more than that in enamel which may have negative consequences such as subsurface vaporisation, cracking and pulpal necrosis.²³ Kantola advocated the foremost theory that inspected crystallographic changes in lased dentin by a CO₂ laser and showed that re-crystallisation occurred due to laser irradiation. Simultaneously, growth in the crystal size of the crystallites was observed, and dentin of a low order of crystallinity, structurally changed in such a way as to closely resemble the crystalline structure of the hydroxyapatite of normal enamel. On the other hand, no investigation was performed in this study to verify the effects of the crystal growth on dentin resistance to demineralisation.²³

USE OF LASERS IN CONSERVATIVE DENTISTRY AND ENDODONTICS

- For diagnosis of dental caries
- Caries prevention
- Cavity preparation
- Laser desensitisation
- Treatment of tooth erosion
- Etching of tooth surface
- For removal of restorative materials
- Photo polymerisation
- CAD / CAM technology
- Restoration, pit and fissure sealants
- Traumatology and vitality testing
- Preservation of pulp vitality
- Disinfection and decontamination
- Pain-relieving effects, relief of pain and uneasiness
- Pulp capping and pulpotomy
- Cleaning and shaping the root canal system.

WHITE SPOT LESIONS

Decalcification of enamel is considered a sequel to orthodontic treatment that is exaggerated by poor oral hygiene. Incipient enamel caries progresses to subsurface demineralisation under a sound and intact enamel layer. There is reflection of light in a different way from demineralised enamel surfaces in comparison with the contiguous intact enamel, which gives rise to a chalky white appearance.²⁴ White spot lesions (WSLs) are the minor lines that appear surrounding the brackets placed on the tooth; in few patients, they appear as big, decalcified regions with or without cavitation. WSLs are usually detected following the removal of orthodontic appliances.

Prevalence of White Spot Lesions and Risk Factors

When observed clinically in patients, WSLs may progress quickly, in presence of poor oral hygiene, visually seen on the 4th week after the treatment has begun.²⁵ These decalcifications are stated to be a highly common occurrence in patients who are undergoing fixed orthodontic therapy. Though, their occurrence is broadly variable, ranging from 2 % to 97 % in different epidemiological studies.²⁶ This could be described by the techniques used in detecting and characterising them. The techniques include visual inspection, photographs, fluorescent methods and optical modalities (such as diagnodent, quantitative light-induced fluorescence and digital image fiber-optic transillumination). Procedures using quantifiable laser techniques are highly profound, thereby giving a greater incidence rate when compared to the simple routine visual technique. On an average, such decalcifications are found in 15.5 % – 40 % of patients before orthodontic treatment and in 30 % – 70 % during the treatment.²⁷ WSLs are considered to be a risk factor for the progression of new lesions when they occur before the orthodontic treatment. The probable causative / risk factors include poor oral hygiene, excessive drinking, frequent use of fermentable carbohydrates, excess bonding, long etching time (> 15 s), decayed / treated molars, and the duration of treatment being considered as other risk factors.

Formation and Distribution of White Spot Lesions

In the oral cavity, drastic changes in bacterial microflora of the plaque take place after introducing the fixed orthodontic appliances, comprising of increased number of cariogenic and acidogenic bacteria in the plaque, mainly *Streptococcus mutans* and *Lactobacilli*. Some authors stated that high concentrations of bacteria increase the plaque in orthodontic patients to a greater extent compared to that in other patients, resulting in more rapid progression of caries in patients with a full set of orthodontic appliances. WSLs manifest within 1 month of placing the bracket; while normal carious lesions generally require at least 6 months to develop. WSLs usually are seen on the buccal surfaces of teeth surrounding the brackets, particularly in the gingival region, with the labiogingival area of lateral incisors as the most common and the maxillary posterior segments as the least common site for WSL.²⁵

Lasers in the Management of White Spot Lesions

Laser irradiation leading to acid resistance might be an priceless aide to standard routine acid etching at vulnerable areas in patients with increased caries risk, as well as those with rampant caries, and in patients who are unable to follow proper instructions of oral hygiene, or those undergoing orthodontic therapy with appliances on their teeth that retain plaque.²⁸ Laser beams cause increase in micro hardness of enamel surface thereby making it resistant to acid attack. The chief lasers that are being used for prevention comprises of the argon lasers, CO₂, Nd-YAG, and erbium YAG.²⁹ Studies have shown that by irradiating the enamel surface with argon laser beams caused decrease in the extent of demineralisation up to 30 % – 50 %. Some authors stated that lasers help in reducing

enamel demineralisation and are also responsible for lowering the dissolution threshold pH value. When exposed to laser, there are alterations in surface morphology which takes place but at the same time lasers maintain sound enamel surface. The most acceptable theory is based on the micro spaces which form within the enamel surface after it is exposed to energy of laser beams. These micro spaces entrap the ions which are released and function as areas for remineralisation in the surface of enamel.

Application of argon laser beams (488 nm) significantly decreased the mean lesion depth compared to visible light controls, supporting the fact that irradiation with argon laser beams might prevent the development of WSLs during treatment.³⁰ There are differing hearsays on the repercussions of lasers in prevention of WSLs which are linked with orthodontic therapy, which highlights the need for randomised clinical trials.

LASERS IN DIAGNOSIS, PREVENTION AND TREATMENT OF CARIES

As a Diagnostic Tool for Dental Caries

Laser fluorescence (LF) could be cast of as an integration with conventional means for revealing of dental caries on the occlusal surface. The fluorescence which is emitted on the occlusal surface parallels with the degree of demineralisation in the tooth when it was tested with a portable laser system.³¹

Hence, this LF device increases the diagnostic precision of the so-titled hidden caries.³² Moreover, LF has shown to be efficient in diagnosing residual caries.³³

Diagnodent (laser induced fluorescence) - diagnodent aids in detection of caries and calculus. Its mechanism of action comprises of a non-ionising beam of laser at a wavelength of 655 nm (at a 90° angle) which is directed towards a definite darkened groove on the occlusal surface of a patient's tooth where bacterial decay is suspected or along the long axis of a root surface to detect the presence of a bacteria-laden calculus. This diagnostic technology, in which the photons of laser wavelength are absorbed into any existing bacteria in these areas of the patient's tooth, is called laser induced fluorescence. Digital display of the device specifies the load of microbes in sites of concerned tooth which corresponds to the magnitude of decay of the tooth.³²

Caries Prevention

Resistance offered by the surface of tooth to intrusion of cariogenic mediators play a significant part in preventing caries. Debatable outcomes are established in the researches concerning the demineralisation and the acid-resistance of dental tissues namely enamel and dentin following the Er: YAG laser therapy. An amplified temperature is required in achieving the photothermal effect and the enhancement of the enamel acid resistance. Few authors stated that, the energy density essential in reaching the enamel acid resistance by the use of the Er, Cr: YSGG laser is approximately 8 - 13J / cm². It was anticipated to reduce the solubility of enamel by stimulating the thermal breakdown of the more soluble carbonate HAP into the less soluble HAP, with parallel changes in its crystallinity.^{34,35}

Studies have verified that CO₂ laser at 9600, 9300 and 10,600 nm wavelengths, erbium laser at 2780 and 2940 nm wavelengths and argon laser were capable of conferring resistance to surface of enamel against caries.^{36,37} Several studies have validated added increase in resistance of tooth by synchronised use of laser energy and fluoride therapy. For example, argon laser in combination with acidulated phosphate fluoride (APF) gel resulted in a 50 % reduction in depth of caries when compared to the unaided usage of lasers.^{38,39}

Cavity Preparation

The laser drill has been proven to be efficacious in substituting the conventional traditional bur for cavity preparation. Initially only low-energy settings of the laser were used to help in achieving an analgesic effect on the tooth which is involved. This was followed by the higher-power setting of the laser which was done to aid in removing of the enamel and exposing the infected dentin. Consequently, the low-power setting laser was used once for a second time for removing decayed dentin.⁴⁰ There was difference in ablation rates for carious and sound tissue which led to selective elimination of carious lesions.⁴¹ There is a rise in bond strengths of tooth-coloured materials because smear layer does not form when the tissue is irradiated with laser.³⁷

In cases of carious lesions which are limited proximally having intact occlusal surface, lasers could be used to preparing a box only preparation on the proximal surface without destructing the sound occlusal surface. In cases where the carious lesion extends deep within the tooth, lasers can be used to prepare the cavity, by restricting its initial depth of preparation and selective removal of the superficial layer of dentin without injuring the underlying pulp. The cases which require direct pulp capping treatment due to accidental pinpoint non-carious exposure, Er: YAG lasers can be used in a defocussed mode for partly necrotising the superficial tissue in order to create a defensive barrier surrounding the exposed pulp tissue.⁴²

Laser Assisted Cavity Preparation	Conventional Cavity Preparation
Lasers act by cutting only at their tip	Burs yield coarse grinding from their sides and also cut at the end
Works with up and down motion	Side brushing action is also employed together with end cutting.
Hand instruments such as excavators aid in taking away ablation products.	Produces smear layer
Eliminates smear layer	Not safe during unexpected patient movement
Relatively safer in case of unanticipated movement of the patient	
Table 2: Representing Difference between Laser Assisted and Conventional Cavity Preparation	

Restoration, Pit and Fissure Sealants

Before applying of pit and fissure sealants, lasers can be employed in tooth preparation. Laser can be used for conditioning, cleaning and disinfection of pits and fissures as well.⁴³ For example, after detecting that the pits and fissures

are involved with caries, erbium laser could be used for fissurotomy and removal of caries. In cases of tooth with no caries, only macro-roughening is accomplished by erbium laser at lesser wavelengths.⁴⁴ Research show that applying laser alone, without acid etching for preparing the enamel pits and fissures lead to consequently increased degree of microleakage.⁴⁵ Thus, applying laser do not eradicate the necessity of enamel acid etching. However, few authors stated that applying laser in combination with acid etching caused microleakage in 80 % of samples because enamel cracks and debris are formed at the junction of sealant and enamel. They have suggested that the argon laser can be used for photo polymerisation of the sealant material at the junction of enamel and sealant. This probably causes surge of enamel resistance to acidic attack.

CONCLUSIONS

With the evolution of dental technology, newer approaches of accomplishing certain dental techniques will continue to substitute those which were formerly considered a pinnacle. Earlier, dental treatment presented various explanations for a patient to dodge the specialty facilities: not accepting the need of a therapy, psychological distress and economic and social factors; nevertheless, the fact that the major concern was the fear of pain was barely conversed. Technology aiding the clinicians in early detection of caries like the white spot lesions offers them an upper hand in preventing the further progression of caries eventually saving the tooth. When the awareness of the guidelines which are essential for an ideal treatment is a reality, lasers can be used clinically, providing the dental clinicians with the skill to care for their patients with enhanced techniques and equipment.

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