Lasers in Orthodontics

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Introduction

The Laser was first demonstrated in 1960 by Theodore H. Maiman after the pioneering theoretical work by Basov, Prokhorov, and Townes[1]. Laser devices produce a very strong, coherent, unidirectional, and monochromatic light beam, which can be controlled to perform special functions Although the laser offers many advantages over other modalities of treatment, probably the greatest impact it has made, is its ability to be used for both hard and soft tissue, often without the need for anaesthesia. The word 'Laser' is an acronym for **Light Amplification by Stimulated Emission of Radiation**. The energy generated by the laser is in or near the optical portion of the electromagnetic spectrum which is nonionizing. It does not produce the same harmful effects attributed to xrays and other forms of ionizing radiation The advantages of lasers over conventional surgery are that there is minimal bleeding; it maintains a sterilized field; there is no oedema and minimal pain. The working time while using lasers is also reduced as compared to conventional method. Depending on power settings and mode of delivery they can vaporize, coagulate or cut tissue. One of the greatest advantages of laser use in dentistry is a high rate of patient's acceptance. With the use of lasers, pain is reduced to absent 90% of the time, probably due to the sealing of the nerve fibres .The other 10% of the time , patients will have pain of various intensities and durations .In some procedures, such as the maxillary midline frenectomy, it is almost certain that there will be no postoperative pain. Lasers offer little chance for mechanical trauma, they cause minimal scarring and sutures are rarely needed. The disadvantages of lasers are that they are expensive and produce foul odour during surgery.

The most commonly used lasers in dentistry include CO_2, Nd:YAG and Er:YAG. Among these, Er:YAG shows promise for hard tissue and soft tissue wall treatment.

Historical Perspective

The principle of the laser was first known in 1917, when physicist Albert Einstein described the theory of stimulated emission. However, it was not until the late 1940s that engineers began to utilize this principle for practical purposes. At the onset of 1950's several different engineers were working towards harnessing of energy using the principal of stimulated emission.[2]

The Nobel Prize for the development of the laser was awarded to Townes, Basov and Prokhorov in 1964[4]. The early 1960s witnessed the beginning of dental laser investigations, with attention devoted to developing the basic laser parameters as related to dental hard and soft tissues. Many of these early investigators used ruby laser, as it was the only material to be used routinely as active medium in laser in those days. In time other laser wavelengths, like CO_2, Neodymium) Nd (: YAG, Argon, Holonium) Ho (:YAG and Erbium) Er (:YAG were investigated[3].

In 1989, the experimental work by Keller and Hibst using a pulsed Erbium YAG 2,940nm (laser, demonstrated its effectiveness in cutting enamel, dentine and bone. This laser became commercially available in the United Kingdom in 1995, shortly followed by a similar Er, Cr:YSGG) erbium chromium : yttrium scandium gallium garnet (laser in 1997, which amounted to a laser armamentarium that would addressthe surgical needs of clinical dentistry in general practice[4].

Application of Lasers in Orthodontics

Laser Welding

Today, most orthodontic appliances are fabricated by joining of different individual components together. However, inoffice fusion of wires or other attachments to orthodontic appliances is still a common procedure for construction or repair of appliances during orthodontic treatment to achieve optimal treatment results.

Soldering

In soldering, the metal parts are joined by heating them at temperatures below the solidustemperature of substrate metal. A filler metal with liquidus temperature not more than 450 degree C is applied.

Brazing

In brazing, the liquids temperature of filler metal is above 450C and below the solidus temperature of the base metal. Similar to soldering, the filler metal melts and flows, joining metal parts together without affecting the dimensions of the joined structure.

Welding

Welding defines the joining of two metal pieces by applying heat, pressure, or both, withoutthe use of an intermediate alloy.
There are three ways of welding in dentistry.

Pressure Welding

Pressure welding is achieved by applying a sufficiently large force to the metal parts to be joined. Pure gold foils can be pressure welded by hand or mechanical condensers.

Spot (Resistance) Welding

Welding at a spot is called spot welding. This process is used to join flat structures, such as orthodontic bands and brackets and also to join some types of orthodontic wires.

Laser Welding

Another method employed for joining metal frameworks is laser welding. To weld dental alloys, Nd:YAG laser is mainly used

References

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3. John G Sulewski: Historical survey of laser in dentistry: DCNA 2000 44)4(:717752.
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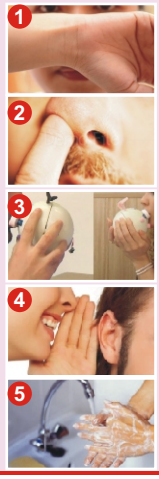
Germ Stoppers



01. If you need to touch you face. The **BACK OF THE HAND** is the place.
02. Keep bad germs from getting inside you- **NO FINGERS**, hands or things in your mouth, nose, eyes of ears.
03. **THINGS THAT TOUCH MOUTHS** are not for sharing.
04. Make sure you **KEEP YOUR DISTANCE** when someone is sick. No hugging of kissing until everyone is better.
05. Wash your hands and face with **SOUP & WATER** sing the ABC song.