Summary

A LASER is a device that produces high intensity light of a single wavelength, and in such a fine parallel beam that it can be focused onto a very small spot. The name is an acronym derived from light amplification by stimulated emission of radiation, and the theoretical bases was first proposed by Einstine in 1917, and in 1960 Mainman produce the first working LASER using a ruby as the lasing medium.

LASER were soon developed to produce light of different wave lengths by using other lasing medums than ruby in different forms as gas, dye and solid LASER, and many uses rapidly developed in dermatology and surgery.

The main effect of LASER is thermal tissue destruction. As the beam heats the target tissue there is local edema, denaturation of the proteins, contraction of the tissue due to alteration of fibrous tissue proteins and then boiling of cell water. There are also pressure and elastic recoil effects of the energy and local intracellular thermal effects. These changes can be used to produce a variety of effects on biological tissue as blocking small blood vessels to produce hemostasis, adding to that effect the heat may thrombose the blood within vessels.

LASER beam can be accurately directed to small target with minimal damage to surrounding tissue, also LASER beam can pass through flexible endoscopes and can selectively destruct particular cells. LASER radiation is potentially dangerous to patients, operators and observers, these hazards affects mainly skin and eyes, so strict safety measures must be followed.

LASER in common use are the C02, argon, and neodymium YAG (Nd:YAG) LASER. Carbon dioxide LASER energy is ideal for cutting and vaporization because it is heavily absorbed by water. Argon LASER light is very heavily absorbed by hemoglobin and is especially useful in non bleeding vascular lesions when precision and minimal depth of penetration (about 1 mm) are required. Although heavily absorbed by blood, argon LASER energy can be transmitted readily through water, gastric fluid, urine, etc. The Nd:YAG LASER has less specific absorption by water and hemoglobin than the preceding two LASER. This results in a depth of thermal injury of approximately 3 mm in most tissues, which is useful for

coagulation of large volumes of tissue such as in palliative coagulation of esophageal and colonic carcinomas.

Current clinical applications of LASER in general surgery are presented in three sections. The first section deals with dermatology and cosmetic surgery. The second section deals with conventional surgical techniques as breast and thyroid surgeries. The third section deals with the vast and rapidly growing endoscopic techniques, or minimally invasive surgery as GIT endoscopes and endovascular surgeries.

The development of the pulsed LASER with selective photothermolysis, makes LASER as magic in treatment of many skin vascular and pigmented lesions with very minimal side effects, also removal of tattoos. More over LASER skin resurfacing that can treat wrinkles, kiloids, hypertrophic scars and other skin disorders which are very difficult to treat in the past.

LASER can be used in endovascular surgery as in endovenous LASER ablation of varicose veins, and for LASER removal of atheroma.

The development of flexible fibers for the delivery of LASER energy led to endoscopic LASER applications in humans. The risks appear to be minimal. The coagulative effect of LASER energy is used to treat gastrointestinal hemorrhage and small, benign mucosal lesions. The ablative effect of the Nd:YAG LASER on tissue is used for palliative therapy for malignant gastrointestinal disorders and incisional therapy for anatomic lesions such as strictures or cysts. New LASER modalities that potentially can be tuned throughout large segments of the electromagnetic spectrum, new fiber-optic delivery systems with specialized tips and new methods of sensitizing tissue to LASER energy ali indicate that the endoscopic LASER should continue to have many new and innovative applications.

LASER therapy uses high-intensity light to treat cancer and other illnesses. LASER can be used to shrink or destroy tumors. LASER are most commonly used to treat superficial cancers (cancers on the surface of the body or the lining of internal organs). Lasers also may be used to relieve certain symptoms of cancer, such as bleeding or obstruction. For example, shrink or destroy a tumor that is blocking a patient’s trachea or esophagus. LASER also can be used to remove colon polyps or tumors that are blocking the colon or stomach.

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