



Lasers in Medicine

Presented by

Lec. Rusul Kadhim Aljader

Department of Medical Physics,
Al-Mustaqbal University College,
Babil, Iraq

Email: rusul.kadhom@mustaqbal-college.edu.iq

Third year students



Laser surgery

Laser surgery is a type of surgery that uses special light beams instead of instruments for surgical procedures. LASER stands for "Light Amplification by the Stimulated Emission of Radiation."

Lasers were first developed in 1960.

Newer laser modifications continue to have a large impact on medical and surgical practices. A large part of their impact has been seen in the treatment of various skin lesion and diseases.

What types of surgeries use lasers?

There are many indications for the use of lasers in surgery.

The following are some of the more common indications:

- To remove tumors

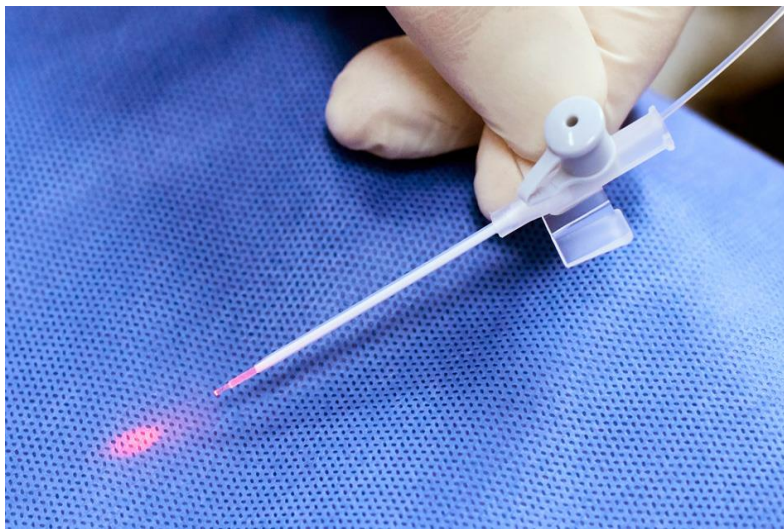
- To help prevent blood loss by sealing small blood vessels

- To seal lymph vessels to help decrease swelling and decrease the spread of tumor cells

- To treat some skin conditions, including to remove or improve warts, moles, tattoos, birthmarks, scars, and wrinkles

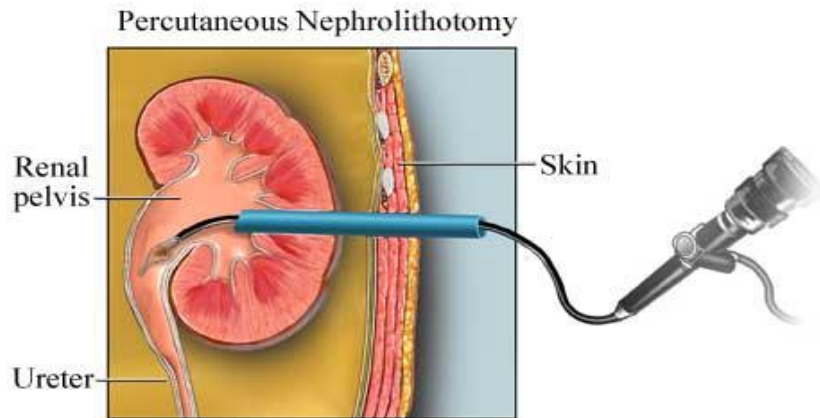
How are lasers used during surgery?

Laser surgery is a type of surgery that uses special light beams instead of instruments, such as scalpels, to perform surgical procedures. There are several different types of lasers, each with characteristics that perform specific functions during surgery. Laser light can be delivered either continuously or intermittently and can be used with fiber optics to treat areas of the body that are often difficult to access.



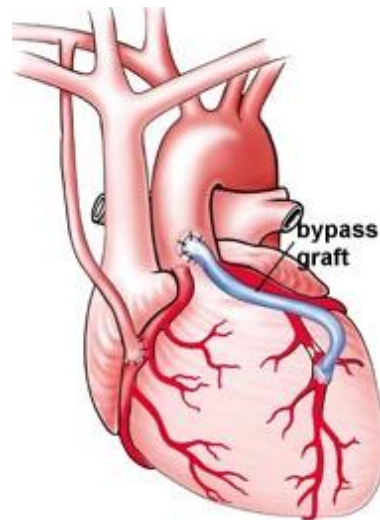
Laser surgery in urology

Lasers obtained from various lasing mediums producing amplified light of different wavelengths have been tested for urological applications. Today, these lasers are most commonly used in the surgical management of benign prostatic hyperplasia and as intracorporeal lithotripters. Other uses include ablation of various urologic tumors and incising strictures of the upper- and lower urinary tract. A continuous process of evolution of this technology is taking place, resulting in surgical lasers becoming ever safer, more effective, and more affordable.



Laser surgery in cardiology

Like every other organ or tissue in your body, the heart muscle needs oxygen-rich blood to survive. The heart gets this blood from the coronary arteries. But in patients with coronary artery disease (CAD), the coronary arteries are clogged and diseased and can no longer deliver enough blood to the heart. The heart's lack of oxygen-rich blood is called ischemia. Not getting enough oxygen to the heart muscle increases the risk of heart attack and may cause a painful condition called angina. Most of the time, the best treatment for angina is coronary artery bypass surgery. But for some patients with very serious heart disease or other health problems, bypass surgery may be too dangerous. Also, some patients may have had many coronary artery bypass operations and be unable to have more bypass operations. For patients who cannot have bypass surgery, there is a procedure called trans myocardial laser revascularization, also called TMLR or TMR. TMLR cannot cure CAD, but it may reduce the pain of angina.



Laser surgery in neurology

Lasers generate unidirectional beams of monochromatic, and temporally and spatially coherent electromagnetic radiation that are capable of vaporizing and coagulating biological tissue. Specific physical characteristics of laser energies of different wavelengths impart to each form of surgical laser specific potentials for clinical use in neurological surgery. The major advantages of surgical lasers appear to be improved precision, reduction of surgically related mechanical trauma, reduction of blood loss, and decreased operative time. Improvement of operative mortality and morbidity and increased longevity that might result from its use would make the laser cost effective.



Lasers have been used in dentistry since 1994 to treat a number of dental problems. Yet, despite FDA approval, no laser system has received the American Dental Association's (ADA) Seal of Acceptance as an alternative to more traditional treatment

How Do Lasers Work in Dentistry?

All lasers work by delivering energy in the form of light. When used for surgical and dental procedures, the laser acts as a cutting instrument or a vaporizer of tissue that it comes in contact with. When used in teeth-whitening procedures, the laser acts as a heat source and enhances the effect of tooth-bleaching agents.



What Are the Pros and Cons of Using a Laser in Dentistry?

Pros

Compared to the traditional dental drill, lasers:

- May cause less pain in some instances, so reduces the need for anesthesia
- May reduce anxiety in patients uncomfortable with the use of the dental drill
- Minimize bleeding and swelling during soft tissue treatments
- May preserve more healthy tooth during cavity removal

Cons

The disadvantages of lasers are that:

- Lasers can't be used on teeth with fillings already in place.



- Lasers can't be used in many commonly performed dental procedures. For example, lasers can't be used to fill cavities located between teeth, around old fillings, and large cavities that need to be prepared for a crown. In addition, lasers cannot be used to remove defective crowns or silver fillings, or prepare teeth for bridges.
- Traditional drills may still be needed to shape the filling, adjust the bite, and polish the filling even when a laser is used.
- Lasers do not eliminate the need for anesthesia.
- Laser treatment tends to be more expensive -- the cost of the laser is much higher than a dental drill. Compared to about \$600 for a standard drill, lasers can cost anywhere from a few thousand dollars to over \$100,000 for one that can be used for tooth cutting,