Definition: surgery from Philip's Encyclopedia

Branch of medical practice concerned with treatment by operation. Traditionally, it has mainly involved open surgery: gaining access to the operative site by way of an incision. However, the practice of using endoscopes enabled the development of 'keyhole surgery', using minimally invasive techniques. Surgeons perform operations under sterile conditions, using local or general anaesthesia.

Summary Article: surgery From The Columbia Encyclopedia

branch of medicine concerned with the diagnosis and treatment of injuries and the excision and repair of pathological conditions by means of operative procedures (see also anesthesia; medicine; radiology).

Early History

In prehistoric times, sharpened flints and other sharp-edged devices were used to perform various surgical operations. Circumcision and other ritualistic operations were later performed with similar instruments. There are indications that in Neolithic times saws of stone and bone were used to perform amputations. Nearly all major operations were performed by the ancient Hindus nearly a thousand years before the advent of Greek medicine. Knowledge of the use of soporific potions to alleviate the pain caused by surgery can be traced to remote antiquity.

The early Greeks and Romans practiced surgery with great skill and with such cleanliness that infection of surgical and other wounds was relatively uncommon. Their cleanliness and their use of boiled water or wine for irrigating wounds was probably suggested by Hippocrates, a competent surgeon and diagnostician of that time. Other notable early surgeons were Erasistratus and Herophilus of the medical school at Alexandria, and Galen, whose numerous treatises were long influential.

The surgical and sanitary techniques employed by the Greeks and Romans were lost with the decline of their civilizations. During the Middle Ages in Europe there was a marked regression in surgical knowledge, and postoperative infection was common. Surgical practice soon fell into the hands of the unskilled and uneducated: the barber-surgeon, who performed the usual functions of a barber as well as surgical operations, became a common figure, especially in England and France. It was not until the 18th cent. that surgery began to reach a professional level. There were, nevertheless, notable figures in early surgery, among them Guy de Chauliac in the 14th cent., and in the 16th cent. Ambroise Paré, who developed sutures and ligatures to stop bleeding and sew up wounds.

The Birth of Modern Surgery

With the introduction of antiseptic methods, surgery entered its modern phase. Louis Pasteur established the fact that microbes are responsible for infection and disease. Using this knowledge, Dr. Ignaz Semmelweis reduced postpartum infections (puerperal sepsis) in the wards of Vienna's lying-in hospitals by urging doctors to wash their hands between patients. In the 1860s Joseph Lister introduced the use of carbolic acid as a cleansing and disinfecting agent, and his results in reducing
infection were dramatic. It was found later that the carbolic acid spray that Lister used to cleanse the 
air about the patient was unnecessary, but the antiseptic treatment of instruments and other articles in 
contact with the patient continued until antisepsis was gradually replaced by the aseptic methods 
employed in modern hospitals. Before the discovery of antisepsis by Lister, about 80% of surgical 
patients contracted gangrene.

Ernst von Bergmann is credited with introducing steam sterilization under pressure for treating 
 instruments and all other medical equipment used for a surgical patient. William Stewart Halsted, the 
 famous surgeon at Johns Hopkins Hospital, introduced sterile rubber gloves when the hands of his 
 fiancée became irritated from constant washings and antiseptics. The development of methods of 
anesthesia, especially the discovery in the 1840s of the value of ether, has also been of immeasurable 
value.

**Surgery in the Twentieth Century**

In the 20th cent., surgery has benefited from an improved understanding of the causes of shock and its 
treatment; knowledge of blood group typing and transfusion techniques; understanding of blood clotting 
and the use of anticoagulants; and the development of antibiotics to control infection and analgesics to 
control pain. Surgical instruments have developed along with modern technology and are now 
sophisticated, meticulously designed devices. Electrically powered surgical instruments are invaluable 
for cauterization and for separating hard tissues such as bone with minimal damage. Surgical stapling 
 instruments, first developed in the Soviet Union, can join blood vessels or other tissues in less than half 
the time required by hand stitching. New medical glues, surgical tapes, and even zippers now enable 
surgeons to close some wounds effectively without stitches. With the development of X-ray 
techniques and fluoroscopy and, later, CAT scans and magnetic resonance imaging (MRI), surgery gained 
valuable diagnostic instruments. Some operations are now being conducted inside specially adapted 
MRI devices, allowing the surgeon to have live images for guidance during operations. Holograms can be 
created using data from MRI and other diagnostic instruments and are beginning to be used in the 
operating room to give surgeons a three-dimensional image of the area to be operated upon, and 
models created using 3D printers may be used in preparing for complex surgeries.

Cryogenic, or supercooled, probe beams have been used to precisely remove tissues and abnormal 
growths. Ultrasound techniques, using very-high-frequency sound waves, are used to break up kidney 
stones and are employed in brain and inner-ear operations, which require great precision and control. 
They are also used to scan the pregnant uterus, a process that, unlike X-ray scanning, does not 
endanger the fetus. Medical lasers, which produce amplified monochromatic light waves in a very 
narrowly focused beam, have become useful tools in various forms of surgery, notably that of the eye, 
and are now commonly used to remove or “spot-weld” tissues.

The heart-lung machine made open-heart surgery possible by taking over the blood-pumping and 
breathing functions of these organs during operations. Hypothermia, or cold surgery, by which the body 
is cooled to lower the rate of metabolism, thus reducing the need for oxygen, has made long 
operations, especially those involving transplantation, possible. Other recent transplantation advances 
include procedures involving the liver, lungs, pancreas, bone marrow, and the kidney. The first human 
heart transplant was performed in 1967 by South African surgeon Christiaan Barnard. The usefulness of 
transplantation is currently limited by the fact that drugs must be used constantly to halt the body's 
rejection of foreign tissue.
New techniques in orthopedic surgery (see also orthopedics) have also been introduced, including the use of cementing substances to unite bones destroyed by tumor and the replacement of joints with metal or plastic devices. Plastic surgery and reconstructive surgery have made enormous strides, and microsurgery is making severed or injured limbs usable.

A trend toward less invasive surgery and shorter hospital stays began in the 1980s. By 1995 more than 56% of all surgical procedures in the United States were done on an outpatient basis, without an overnight stay in a hospital. Endoscopic surgery, using small incisions and tiny instruments attached to fiber-optic viewing devices (see endoscope), has been used in place of more traditional procedures for gall-bladder surgery, and it has been used on the fetus in the womb to correct life-threatening birth defects before birth. Angioplasty is frequently used to circumvent or postpone the need for coronary artery bypass.

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