

Surgery in the 1700s

Overview

Surgery has a long history in the healing arts. Its history dates back thousands of years to the great seats of early civilization in Athens, Rome, and Alexandria. However, amputations and invasive wound-healing procedures can even be traced to Upper Paleolithic peoples living tens of thousands of years ago, who, with apparently considerable knowledge about human anatomy, practiced bone-setting as well as minor surgical procedures.

The years between 1700 and 1799 stand out as important to medical history and surgical advancement because surgeons were willing—as must have been the patients—to attempt amputations as well as complicated and often heroic surgeries on major organs of the body, all without benefit of anesthesia, which did not come along until the nineteenth century. Eighteenth-century surgeons prided themselves on fast amputations, as well as procedures such as removing bladder stones, cancers, and even cataracts from the eye.

Not only were more hospitals established in England and Europe during the 1700s, their conditions vastly improved toward the end of the eighteenth century as reformers made strides in sanitary practices.

Background

By the eighteenth century, anatomists had long been practicing with cadavers to learn more about the body and its organs. In the developing hospitals and medical schools, anatomists instructed medical students in how the human body functioned, what could go wrong with the major systems, and how surgery might be used to correct bodily malfunctions or treat a variety of wounds, including those inflicted in war.

Amputations were by far the most frequent surgeries, practiced by surgeons who prided themselves on speedy procedures as patients, without benefit of anesthesia, were held down by the surgeons' strong-armed assistants. The great amputators controlled bleeding and infection as best as they could, and developed unique antiseptics.

The historical list of surgical advancements in the eighteenth century progresses organ by organ and system by system as surgeons in England and in Europe, particularly in France, developed new techniques to control bleeding, drain and close surgical wounds, or repair wounds that resulted from military combat—especially those from explosives and gunshot wounds. Surgeons also increased their abilities to repair malfunctions in the urinary system and the intestinal tract, perform Cesarean sections, amputate limbs, remove cataracts from the eyes, remove gall stones, do radical surgeries to cancerous tissue, remove glands and organs (such as the thyroid or spleen), and develop antiseptics.

During the eighteenth century, anatomists and surgeons not only perfected surgical techniques but published books that made a significant impact not only on the practice of surgery in their century, but in the next as well.

Impact

Advancements in the art and science of amputation top the list of surgical achievements in the eighteenth century. In 1718, French surgeon Jean Louis Petit (1674-1750) developed a tourniquet to stop bleeding during an amputation. Petit's tourniquet worked by twisting a screw compressor device that clamped down on the patient's leg and on the lower abdomen. It could stop the blood flow in the main artery and provide for higher leg amputations. Petit's tourniquet is considered by many sources to be one of the "most important surgical advancements before the advent of anesthesia."

Even with the Petit tourniquet to stop bleeding, quick amputations were desirable to spare unanesthetized patients prolonged agony. Speed became a source of pride for early surgeons. French surgeon Jacques Lisfranc became known for his ability to amputate at the thigh in 10 seconds. Scottish surgeon Benjamin Bell was able to cut through all but the bone in six seconds. It was said that James R. Wood, of New York, could amputate at the thigh in nine seconds. Other amputations, such as at the shoulder joint, may have taken longer. Many surgeons constantly practiced on cadavers to get the speediest amputations possible.

Quick and clean amputation was but one step in the art of surgery, however. What to do with the open wound once the amputation was finished and the tourniquet removed was yet another question facing eighteenth-century surgeons. If the patient were to live, wounds, whether caused by the surgeon's knife or the enemy's sword or gunshot, required cleaning and closing. How to clean and whether to close the wound were the subjects of great debate.

Although closing wounds by sewing them developed centuries earlier, closing wounds with sutures was not a standard practice in the eighteenth century. As far back as the sixteenth century, surgeons used percutaneous stitches to close amputations, but often with disastrous results from subsequent infection. Many surgeons preferred to let a wound, even an amputation, heal without drawing the edges of flesh together. Leaving the wound open to provide drainage, but keeping it somewhat covered, was often made possible by using an adhesive tape placed around the wound edges. Packing the wound with a porous lint-like material also allowed drainage.

Whether amputations actually saved lives was the subject of popular debate among surgeons. Many military surgeons preferred not to interfere by further amputation if a limb was amputated cleanly by gun or cannon shot. A large number of military surgeons advocated immediate amputation for gunshot-caused fracture, but even that procedure was debated. Some surgeons simply delayed amputation to see how well the fractures healed.

While between 45 and 65% mortality was average for hospital amputations, the Royal Infirmary at Edinburgh, Scotland, however, under the skills of the father-and-son duo Alexander Monro *primus* and *secundus*, boasted an 8% mortality rate during much of the eighteenth century.

It was widely known at this time that keeping wounds and amputations clean and draining freely helped lower surgical mortality rates. Military records show that in the next century, Napoleon's field surgeons introduced maggots, or fly larvae, into the soldiers' wounds. The maggots were allowed to eat the dead flesh and leave the healthier tissue. The maggots were then removed.

Surgeons, especially those who attended gunshot wounds, perfected several techniques for "debridement," the process of removing dead skin from a wound. This procedure was advocated by French surgeon Pierre Joseph Desault (1744-1795), who also coined the term. Debridement, taken from the French verb "brider," meaning to check or curb, removed dead skin in order to curb unhealthy wound closing and prevent infection. Desault debrided with a trimming blade.

Surgeons also practiced "preventive debridement" by dilating, or opening, gunshot and sword wounds wider to promote drainage. This technique was controversial in its time. The great British surgeon John Hunter (1728- 1793) preferred to let a wound heal "under a scab." His French counterparts and some of his fellow Englishmen disagreed, preferring to open wounds wider.

A variety of antiseptic preparations were available during the 1700s. The word "antiseptic" is first thought to appear in a British pamphlet from 1721 in a discussion on how to prevent the putrefaction of flesh. In 1752, British physician John Pringle (1707-1782) used the term when discussing the use of mineral acids in his experiments at stopping decomposition in freshly killed animals. So interested were French surgeons in antiseptics that the Academy of Sciences and Arts and Fine Letters of Dijon offered a prize for the best essay on the use of antiseptics. The winner discussed applications of turpentine, alcohol, benzoin, and aloe. With the success of antiseptics, many surgeons preferred to postpone amputations in favor of treatments with antiseptics.

The art of amputation was not restricted to limbs and war wounds. Surgeons in the 1700s grew increasingly adept at amputations in an attempt to prevent the spread of gangrene or cancer. The treatment of cancers by the removal of tumors and diseased organs occupied many eighteenth-century surgeons.

As early as 1756, British and French surgeons were performing "glossectomies," the removal of the tongue, to cure cancer of the tongue. Earlier surgical approaches to cancer of the tongue was tumor removal and the excitation of lesions. Surgeons also tried to "strangulate" tumors by ligations, tying off the tumor's blood supply. Glossectomy became the treatment of choice and through ligation the surgery became bloodless and wound cauterization was accomplished by the use of hot iron.

Breast cancer was also treated surgically in the 1700s. Jean Louis Petit, the one who developed the Petit tourniquet, set the standards for mastectomy for breast cancer. He correctly believed that removing the breast and the nearby enlarged lymph glands prevented further spread of breast cancer.

The first hospitals devoted to treating cancer were opened in France in 1740, and in England in 1792. British surgeons treated breast cancer by removing the entire breast, pectoral muscles, and glands, as Benjamin Bell perpetuated Petit's views on mastectomy in his *System of Surgery*, published in 1784.

Ear surgeries led to early and usually unsuccessful attempts at brain surgery. The earliest ear surgeries were for an infected "mastoid," a boney area just behind the ear. In 1736, Petit drained an infected mastoid on a patient, who made a full recovery. This surgery was risky because of the mastoid's close proximity to the brain.

Treating the internal organ surgically was difficult, but early eighteenth-century surgeons made serious and successful attempts. In 1710, Parisian surgeon Alexis Littre experimented on a cadaver, making an artificial anus by resectioning the bowel out the abdominal wall. While intestinal resections were carried out as early as 1732 in London, in 1757 a Paris surgeon reconstructed part of the intestine. By the 1790s, surgeons were treating cancer of the colon by removing sections of the bowel and redirecting the anus to the abdomen (colostomy). The first recognized successful colostomy was performed in 1793 when French surgeon C. Duret attended a three-day-old infant with a perforated anus. Duret performed a colostomy and the patient lived to be 45 years old.

Renal surgery (surgery of the kidneys) progressed in the 1700s, thanks to British surgeon Charles Bernard—who was removing kidney stones as early as 1700—and the French surgeon Lafitte, who performed nephrectomies in 1753. Other internal organs drew the surgeon's knife as well. The first successful removal of the spleen (splenectomy) was reported by English surgeon John Ferguson, who attended a man who was stabbed in the spleen. Ferguson reported that the spleen looked "quite cold, black and mortified." To save the man's life, Ferguson ligated the organ with a waxed thread and cut away the spleen.

Removing stones from the bladder (lithotomy) was a specialty practiced with good results in the first two decades of the eighteenth century when the surgeons cut open the bladder by making an incision in the abdomen above the pubic bone. Later eighteenth-century surgeons were able to cut open the patient's side to reach the bladder. Famous British surgeon William Cheselden (1688-1752) developed the lateral technique and was known for his low 17% mortality rate with the lateral incision. It was said that he could perform the whole operation in 45 seconds. Using Cheselden's technique, Paris surgeon S.F. Morand was said to be able to perform a lithotomy in 24 seconds. Attempts at removing growth from the bladder were made by the Englishman Warren in 1761 and by French surgeon Desault. Desault twisted off cancerous tumors with forceps while performing lithotomies.

The first book on the surgery of the thyroid was published by Charles G. Lange in 1707. He suggested that a goiter, an enlargement of the thyroid, might be treated by ligation, by tying off its arteries. A German surgeon, Lorenz Heister (1683-1758), performed the first known successful thyroidectomy in 1752. Appendicitis also came under the surgeon's knife, first in London in 1736 and then in Paris 20 years later.

Attending to abscesses and abnormalities of organs without removing them also concerned eighteenth-century surgeons. The first operation to remove abscesses from the ovaries may have been performed in Scotland in 1701 when surgeon Robert Houston successfully drained an ovarian abscess.

Surgical specialization also began to come into its own in the 1700s. Plastic surgery was attempted in the eighteenth century as surgeons tried to heal and re-fashion tissue damaged either by burns or radical surgery by taking skin grafts and getting them to grow over wounds. In 1794, two English surgeons working in India took a flap of skin from a man's forehead to repair his nose amputation.

Surgeons had known for some time that cataracts on the eyes were due to a developing opaqueness of the eye's lens. Removing the opaque cover was a specialty of French surgeon Jacques Daviel (1696-1762), who extracted the covering over the lens rather than moving it aside (couching) as had prior eye surgeons. Daviel, who devised special instruments for his work, in 1747 extracted the lens from a patient's eye through a slit at the bottom of the cornea and cut through the cataract capsule with a sharp needle and squeezed it out. The "spoon" he made for this procedure was still in use in the twentieth century. Daviel, who traveled all over Europe removing cataracts, knew that cataracts could only be removed when they were mature and hard. In 1752 he described his technique to the surgical section of the Royal Academy in Paris.

Eighteenth-century surgery would not have progressed as quickly as it did without great anatomists, surgeons, teachers, hospitals, and academies of surgery. British leadership in surgical studies during the eighteenth century is recognized widely. Among the most famous British surgeon-teachers were Percival Pott (1714-1789), William Cheselden, and John Hunter (1728-1793), who was perhaps the greatest surgeon and teacher of surgical techniques in his era.

At the age of 22, Londoner Percival Pott was admitted to the Barber-Surgeons Company, a guild that included both surgeons and barbers, who also performed minor surgeries. In 1745, Pott became Assistant Surgeon at London's St. Bartholomew Hospital. Pott researched, observed, and wrote many books, the most famous of which was *Injuries of the Head from External Violence*. Pott also wrote on fractures, ruptures, and palsy.

Cheselden published two important books—*The Anatomy of the Human Body* (1713) and *The Anatomy of Bones* (1733). Both books were used as texts for anatomy students for more than a century. Cheselden took an active role in the Barber-Surgeons Company and urged the separation of surgeons from barbers by petitioning the House of Commons. As a result, a new Corporation of Surgeons was formed in 1745, with Cheselden at its

presidency. A skilled lithotomist (a specialist in removing stones from the bladder), it was said that he could perform a lithotomy in 54 seconds. Cheselden was a surgeon lecturer in anatomy at St. Thomas Hospital, where he trained a generation of surgeons, including John Hunter.

Hunter, of Glasgow, Scotland, has been credited with being the father of modern surgery. He went to London in 1748 to assist in the preparation of dissections for an anatomy course taught by his brother William, a famous obstetrician. He studied under William for 11 years and then studied under Cheselden, learning surgery at London's Chelsea Hospital. He became an army surgeon in 1760, returned to London in 1763 where he started his own surgical practice, and, in 1776, was appointed "physician extrordinaire" to King George III. Hunter wrote three books—*The Natural History of Human Teeth* (1771), *A Treatise on Venereal Disease* (1786), and *A Treatise on the Blood, Inflammation and Gunshot Wounds* (1794). His last book, although published posthumously, made surgical history by differentiating between primary and secondary healing. Hunter also advocated enlarging gunshot wounds only if it was necessary to remove bone fragments. He attributed much of a person's infection to surgeons' unnecessary probing of wounds.

In France, Pierre Joseph Desault was Hunter's contemporary and nearly his equal, although they disagreed on key practices, such as debridement. Some sources suggest that it was really Desault, not Hunter, who was the founder of the modern treatment of war wounds. Desault, unlike Hunter, advocated wound debridement and taught it to his students. Desault believed in cleaning (preventive debridement) and "pruning" the edges of a wound with a blade, not simply opening a wound larger and causing a wound to bleed, and then closing wounds and leaving them undisturbed. He also preferred conservative treatments and is reputed to have said: "The sacrifice of a part for the preservation of the whole is the last recourse of the surgeon's art; before deciding on it the possibilities of restoring life and function to the sum total of the organs should be exhausted."

It seems that Hunter and Desault were in competition for the title of "the greatest surgeon in Europe." In 1785, within a few months of each other, both Hunter and Desault pioneered the ligation of the femoral artery to repair an aneurysm.

Desault was chief of surgery at the Hotel-Dieu in Paris from 1785 until his death in 1795. The Paris hospital was internationally famous for surgery, but the surgical preeminence of Paris began to wane with the French Revolution when extremists, aiming at destroying the privileged classes, threw many professions, including the medical professions, open to anyone, qualified or not.

Almost as important as the great teachers of surgery were the places in which they demonstrated their art and science, not only to medical students but often to any citizen who had an interest. Surgical amphitheatres made their debut in the seventeenth century but came into their own in the eighteenth century as most teaching hospitals adopted the amphitheater as a teaching tool.

Eighteenth-century surgery was also improved by hospital reformers who sought to improve the conditions in which patients were kept, thereby improving their chances for survival by providing clean beds and fresh air. Notable among British reformers was John Howard (1727-1790), who had spent most of his career reforming prison conditions before turning his attention to hospitals. Howard criticized conditions in Paris hospitals, including the famous Hotel-Dieu, where he reported seeing five or six patients to a bed.

Jacques Tenon (1724-1816) may have taken Howard's criticism to heart and embarked on an effort to reform and rebuild the hospital. Tenon reported seeing surgeries performed in the same rooms that held other patients waiting their surgeries. In a 1788 publication, Tenon urged that surgeons use separate rooms for surgeries.

The eighteenth century produced surgical giants who extended their expertise and imagination well into the next century, when their students started practices of their own. Their students, with the benefit of anesthesia, better antiseptics, and cleaner, more humane hospital practices—carried surgery to the edge of its modern applications.

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Further Reading

Books

Cartwright, Frederick F. *The Development of Modern Surgery*. New York: Thomas Y. Crowell and Company, 1967.

Meade, Richard Hardaway. *An Introduction to the History of General Surgery*. Philadelphia: W.B. Saunders Company, 1968.

Wangenstein, O.H. and Sarah D. Wangenstein. *The Rise of Surgery*. Minneapolis: The University of Minnesota Press, 1978.

Zimmerman, Leo M. and Ilza Veith. *Great Ideas in the History of Surgery*. New York: Dover Publications, 1967.

THE SEPARATION OF ENGLISH SURGEONS AND BARBERS

In England in the mid-eighteenth century, surgeons and barbers—who performed minor surgeries—were members of the same union, or guild. In 1744 surgeons held a meeting at Court in London and expressed a desire to be separated from the barbers. The minutes of the Court showed that surgeons wanted that "each may be made a distinct and independent body free from each other..." In January 1745 the barbers, who had

organized against the proposal, formally dissented. But the surgeons' proposal was submitted to Parliament, regardless. The committee hearing the proposal was headed by physician Charles Coates. British surgeon William Cheselden, Cotes' father-in-law, was one of the most active physicians campaigning for separation. Deciding that a separate company for physicians would advance the art and science of surgery, the committee under Coates sent a bill to Parliament that was approved in May 1745. With the bill's passage, barbers and surgeons separated. The "Company of Surgeons" held its first meeting in July 1745.

After separation, the surgeons wanted to rent a room in the Barber's Hall for dissecting. They offered a small sum, whereupon the barbers suggested a much larger amount, which the surgeons refused to pay. As a result, the surgeons did not get their own dissecting hall until 1753.

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