

William Stewart Halsted (1852-1922)

William Stewart Halsted was a surgeon at Johns Hopkins Hospital in Baltimore, Maryland, during the late 1800s and early 1900s. In 1894 Halsted described his procedure for treating breast cancer by removing the breast tissue, chest muscles, and lymph nodes in the armpit, a procedure he named radical mastectomy, and that became the standard of care for treating breast cancer until 1970. He also made contributions to other novel medical procedures such as gallbladder surgery, blood transfusions, antiseptic techniques, anesthesia use, and using plates and screws to hold bones in position when setting bone fractures. At Johns Hopkins Hospital, Halsted established a surgical training program in which he allowed medical students and surgical residents to shadow him and perform procedures under his guidance. In the twentieth century, similar training programs spread across the country and informed the standardization of medical training. Halsted devised a surgical treatment for breast cancer and reshaped the way physicians practiced medicine in the twentieth century, which resulted in better health outcomes through more careful surgical methods, especially in women with breast cancer.

Halsted was born on 23 September 1852 in New York City, New York, to Mary Louise Hanes and William Mills Halsted, Jr. He had three younger siblings, Bertha, Mary Louisa, and Richard. Halsted's father owned a textile import business. The family had a home on Fifth Avenue in New York City as well as a summer home in Irvington, New York, on the Hudson River. Private tutors educated Halsted at home until he was ten years old in 1863. After that, Halsted attended a private school in Monson, Massachusetts for a single year. At the private school, Halsted reportedly ran away and traveled more than twenty-four miles to Springfield, Massachusetts, where he was eventually returned. In the fall of 1863, Halsted began attending Phillips Academy in Andover, Massachusetts, where he studied for six years until he graduated in 1869. He spent a year studying at home before enrolling at Yale University in New Haven, Connecticut, in 1870.

At Yale, Halsted focused on social clubs and sports. He played shortstop on the baseball team, rowed on the crew team, and captained the football team his senior year. That year, 1873, Halsted scored the winning touchdown in the first football game played with eleven men on each team, Yale's team versus a team from Eton College in Windsor, England. However, records show that he did not check a single book out of the library during his four years at Yale. According to historian of science Sherwin B. Nuland, Halsted said that in college he devoted himself solely to athletics, before purchasing and reading anatomy and physiology texts in his senior year. He also began attending lectures and clinics at the Yale School of Medicine in New Haven, Connecticut.

In 1874, Halsted graduated from Yale and entered the College of Physicians and Surgeons in New York City, New York, for a three-year program to become a surgeon. Medical education in the late 1800s was not standardized, and at the College of Physicians and Surgeons, first-, second-, and third-year students crowded into the same lecture hall to attend the same lectures every year. Many students turned to outside instructors and their private study groups called quizzes, for more instruction. Halsted joined a study group led by Henry Berton Sands, an anatomy teacher at the college and a surgeon at a New York City hospital.

Halsted studied for two years at the College of Physicians and Surgeons before taking a yearlong break from medical school, during which time he sailed and fished in Block Island, Rhode Island. When he returned to school in the fall of 1876, the beginning of his third year in the medical program, Halsted applied for an internship that was technically only available for graduates of medical school. Despite that restriction, he received the internship and spent eighteen months at Bellevue Hospital Center in New York City, New York, where he worked in the medical wards and assisted in some

surgical operations while still enrolled in medical school.

In 1877, Halsted graduated from the College of Physicians and Surgeons in the top ten of his class of 550 students. Those ten students participated in an essay competition, and Halsted won. After graduation, Halsted worked as a house physician at the New York Hospital in New York City, New York, for one year. During that year, he created a hospital chart that traced temperature, pulse, and respirations, which became a standard practice in hospitals around the world. At the end of his year as a house physician, Halsted traveled to Europe for further study. He remained in Europe for two years, and spent most of his time in Vienna, Austria, and Germany, where he attended surgical operations along with lectures given by leading European surgeons, and worked in research labs where he built a foundation for his later operating procedures. In Europe, Halsted learned about pathology, the study of disease, and embryology, the study of development. In the fall of 1879, Halsted returned to New York City and spent the next six years there working as a surgeon in various hospitals.

In 1880, Halsted joined the faculty of the College of Physicians and Surgeons as an anatomy teacher as well as the faculty of Roosevelt Hospital in New York City, New York. At Roosevelt Hospital, Halsted set up an outpatient center, where he treated patients without admitting them to the hospital, which functioned so well that the trustees of the hospital built a permanent building for it a year later. In addition, Halsted worked as a visiting physician at several other hospitals from 1880 to 1886, including Bellevue Center Hospital where he had interned as a medical student. At Bellevue Center Hospital, Halsted convinced hospital authorities to build a \$10,000, or approximately \$232,558 in 2015 when adjusted for inflation, operating room for his sole use. In that structure, Halsted practiced with the technique of antisepsis, which means using substances to kill bacteria and other microorganisms that can infect open wounds, a technique not practiced by many physicians in the 1800s. He also used silk as a suture material, the first in the United States to favor it over the usual heavy string made from the dried, twisted intestines of sheep or horses. Halsted introduced new surgical procedures of his own, though not always in a hospital. In 1882, Halsted visited his ill mother at her home. On her kitchen table, he performed an operation to remove her seven gallstones, one of the first successful surgeries that removed gallstones and let the patient live.

From 1883 to 1886, Halsted published or presented twenty-one scientific papers of different subjects, many of them on his own surgical procedures. His first paper described his procedure for how to treat carbon monoxide poisoning through blood transfusion. Halsted removed the patient's toxic blood, stirred it to remove the carbon monoxide, and transfused it back into the patient. Halsted had performed one of the first effective cases of blood transfusion a few years later. In 1881, Halsted visited his pregnant sister, who soon went into labor and nearly died of blood loss. To save her life, Halsted drew some of his own blood and injected it into her veins.

During those three years from 1883 to 1886, Halsted also established his own private surgical practice and a private quiz, or study group, for 65 students of the College of Physicians. Halsted ran his quiz differently than had been done before. Instead of only lecturing, Halsted took his students on ward rounds, gave demonstrations, persuaded fellow faculty members to give demonstrations, and asked a doctor he had befriended in Europe to instruct his students in laboratory training. Despite that Halsted's students trained with methods that were not traditional, they consistently ranked highest in their classes.

In 1884, Halsted read a medical report on the anesthetic, or pain-killing, qualities of cocaine and began to experiment on himself, his colleagues, and his students. Those experiments led to the creation of local and regional anesthesia, substances that temporarily desensitize pain and became used in nearly all surgeries in the twenty-first century. Because surgeons had access to anesthesia, or pain-killing substances, they spent more time during procedures and took care to work as attentively as they could. Before the use of anesthesia, surgeons operated as quickly as possible to limit discomfort to the patient, and even after anesthesia became available, many surgeons continued to operate that way. Along with the introduction of anesthesia, Halsted's experiments also led to his life-long addiction to cocaine, a problem with which many of his colleagues also struggled. Halsted's addiction to cocaine was apparent in his 1885 paper in the New York Medical Journal. According to medical biographer Sherwin Nuland, the first sentence of that paper is nonsensical.

Halsted's addiction progressed, and in 1886 he entered a treatment program in the Butler Hospital in Providence, Rhode Island. During the seven months he stayed there, the hospital staff succeeded in substituting his use of cocaine for morphine. In December of 1886, Halsted moved to Baltimore, Maryland, and began working in an experimental laboratory one of his friends, William Henry Welch, a surgeon who researched disease and was later the first dean of the Johns Hopkins University School of Medicine in Baltimore, Maryland. While there, Halsted devised a new technique for stitching the intestinal wall after surgery that allowed the sutures to withstand more pressure without tearing loose. He presented his findings at Harvard Medical School, in Boston, Massachusetts, early in 1887. Despite that success, Halsted continued to struggle with his addiction. Not long after the presentation at Harvard Medical School, Halsted reentered Butler Hospital to further treat his addiction. He stayed there until December of 1887 before returning to Baltimore, where he continued experiments, began to see patients, and performed operations. However, historians speculate whether Halsted ever stopped using drugs, and some credit his cocaine addiction as allowing him to perform surgery for many hours on end.

When the Johns Hopkins Hospital opened in 1889 in Baltimore, Maryland, the trustees appointed Halsted as a professor of surgery. In 1894, Halsted published a paper on his process for surgically treating breast cancer, a procedure called a radical mastectomy. In the study he conducted, only three of the fifty women he operated on suffered from a recurrence of their cancer in the operated-upon area. Only one of those recurrences was inoperable. Other surgeons of the time had recurrence rates as high as 85 percent. The radical mastectomy removed the patient's breast tissue, underlying chest muscle, and the lymph nodes of the armpit. After the surgery, the patient experienced temporary swelling of the arm, but Halsted thought skin grafting prevented any significant loss of function of the arm. Before Halsted's radical mastectomy procedure, surgeons treated patients with breast cancer with salves and internal remedies. However, Halsted demonstrated that breast cancer was effectively treated by radical mastectomy.

In response to Halsted's work, the Chief of Medicine at Johns Hopkins Hospital wrote to the president of the hospital that Halsted was doing remarkable work in surgery, assuaging anxiety over how Halsted's ongoing struggles with cocaine use influenced his performance. In 1890, a year after Halsted joined the Johns Hopkins Hospital faculty, the trustees promoted him from regular surgeon to chief surgeon of the hospital.

Also in 1890, Halsted met Caroline Hampton, the niece of a Confederate States Army general in the American Civil War. Halsted and Hampton married in Columbia, South Carolina, in 1890. In 1899, Hampton joined the Johns Hopkins Hospital staff as a surgical nurse. As a scrub nurse, Halsted's wife had to cleanse her hands in harsh antiseptic chemicals before assisting in operations. The chemicals caused her skin to turn red and blister, so Halsted asked the Goodyear Rubber Company, headquartered in Akron, Ohio, to make especially thin rubber gloves for his wife to wear in the operating room, the first instance of rubber gloves worn during a medical operation.

Two years later, in 1892, Halsted accepted the position of professor of surgery at Johns Hopkins University School of Medicine, later promoted to chairman of the department of surgery in 1893. He worked as chief surgeon at Johns Hopkins Hospital and as chairman of the department of surgery at Johns Hopkins University School of Medicine for 30 years until his death in 1922. While at Johns Hopkins University School of Medicine, Halsted researched and performed procedures in many fields of medicine. He invented an operation to cure a type of hernia, a condition in which organs poke through the surrounding tissues, in the groin area. He also performed the first successful removal of a cancer that occurs in the ducts around the liver and pancreas, called periampullary cancer. Halsted contributed to surgery of the vascular system and the biliary tract, the system of tubing that transports secretions from the liver, gallbladder, and pancreas, and was the first to advocate the use of plates and screws in bone fractures.

In addition to developing new surgical methods, Halsted established a new training program for medical students and graduates serving in the hospital as residents. In 1904, Halsted gave an address at his thirtieth college reunion that described that training program. In the program, interns served for six years as assistants to a resident surgeon and two years as house physicians before they could attain a chief residency position, which put them in charge of other resident surgeons. Halsted also mandated that surgeons in training must take on original research in addition to their

duties tending to patients, clinician-scientists as he called them. In his teaching, Halsted passed his ideas of safe surgery onto his students, encouraging the use of antiseptics to prevent infection and anesthesia to allow surgeons to take their time during procedures.

Halsted's training program spread to other hospitals in Baltimore and later throughout hospitals across the United States. Of the seventeen chief residents that served under Halsted, seven became professors of surgery, one became chief of surgery, others had various academic appointments, and four went in to private practice. Eleven of his seventeen chief residents started residency programs like Halsted's within their university or hospital. From 1904 to 1922, Halsted continued his work at Johns Hopkins Hospital.

In 1914, Halsted became the first US citizen to receive honorary membership of the German Surgical Association. In 1917, Halsted was inducted into the National Academy of Sciences. The National Dental Association gave Halsted a gold medal in 1922 for his work with local anesthesia. Despite his development of many novel surgical techniques, historians of science find it notable that Halsted did not receive many accolades or awards.

After marrying Caroline Hampton, Halsted spent his summers in Europe at his wife's family estate and lived in Baltimore during the other seasons. While living in Baltimore, Halsted ordered his shoes from a Parisian boot maker, and he sent his shirts to be laundered in Paris.

In 1919, Halsted underwent gallbladder surgery, but three years later in 1922, his symptoms returned, and he underwent another surgery in Baltimore. The surgeons found small stones in the duct of his gallbladder and removed them, but Halsted died postoperatively on 7 September 1922 due to a bacterial infection. After cremation, he was buried in his family's plot in Green-Wood Cemetery in Brooklyn, New York.

Sources

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