Ignorance is Bliss: The Listerian Revolution and Education of American Surgeons

Harry W. Herr

from the Department of Urology, Memorial Sloan-Kettering Cancer Center, Cornell University Medical College, New York, New York

Purpose: Joseph Lister introduced antiseptic surgery in 1867. American surgeons, entrenched in the old ways of 19th century medicine, failed to adopt Lister's methods.

Materials and Methods: Examples of the hubris and arrogant thinking displayed by early American surgeons are best shown by Thomas Eakins' masterpiece, The Gross Clinic, and by the death of President James Garfield.

Results: Samuel Gross, preeminent American surgeon in 1875 boldly revealed in The Gross Clinic, and the team of distinguished surgeons using outdated methods caring for Garfield in 1881, illustrate American surgeons' woeful disdain and disregard of sterile surgical methods.

Conclusions: Public outcry over the failure of some of America's best surgeons led to widespread adoption of antiseptic surgery by the late 1880s and introduction of basic science into the medical education by the dawn of the new century.

Key Words: history of medicine; anti-infective agents, local; sepsis; iatrogenic disease; education, medical

From antiquity until the end of the 19th century, surgery was hampered by the lack of sterile methods, claiming as many lives to infection as it helped. Nowhere more visible than during the American Civil War, army surgeons witnessed frightening numbers of their victims succumb to wound sepsis caused by the very operations designed to heal. Having no knowledge of bacteria, surgeons amputated limbs using blood soaked knives and probed wounds with their unwashed hands, done out of necessity in filthy makeshift field hospitals where contamination by unseen germs was rampant. All of this would soon improve with the coming Listerian revolution, but American surgeons, wedded to their past experiences from the war, resisted change and refused at first to endorse the new knowledge. Visible examples of the stubborn thinking prevailing among influential American surgeons at the time can be found in The Gross Clinic, painted by the famous American artist Thomas Eakins in 1875, and by the unfortunate but preventable death of President James Garfield in 1881.

THE LISTERIAN REVOLUTION

There were few more fundamental discoveries in medicine than Joseph Lister's brilliant insight in the mid 1860s that to destroy germs on a wound or to prevent their entrance into an injury would lessen the chance of infection. Perceptively interpreting Louis Pasteur's discovery that bacteria cause putrefaction in wine and beer, Lister had shown that similar microbes introduced into the wound at the time of operation caused surgical infections. To prevent contamination Lister soaked his surgical sponges and bandages in a carefully prepared antiseptic solution of carbolic acid and even used an atomizer to spray the liquid over the wound during an operation. More important, he stressed that his antiseptic system must also include instrument washing, hand rinsing and wound cleaning if bacterial contamination was to be lessened. An Englishman, Lister was changing the face of European medicine, yet late in the 19th century many American physicians were not ready to embrace his breakthrough concept.

It was not as if American surgeons were unfamiliar with Lister's work—they simply had little confidence in its soundness. The basis for this lack of faith can be traced to a lecture delivered at the International Medical Congress held in Philadelphia as part of the 1876 Centennial Anniversary of the Declaration of Independence. The congress was a sizable gathering attended by almost 500 doctors, and Lister was the most eminent foreigner present. Lister explained he had performed important missionary work, specifically for the principles of antisepsis, because American surgeons, unlike their European colleagues, had been slow to embrace its concepts. "I should be pleased if the discussion which is about to take place should have the effect of strengthening the belief of the profession in the truth, the value, and practical application of the principles of Antiseptic Surgery."

Lister gave a 3-hour discourse explaining the details of his antiseptic system, concentrating on the relationship of bacteria, pus and wound infection. Before Lister, surgeons regarded the presence of pus as a positive sign of wound healing, believing that wounds, especially gunshot injuries, were lined with dead tissue that was expelled in the form of purulent matter. When a wound healed without an abundant flow of laudable pus it was considered an aberration. Lister would change this millennia-old belief and teach physicians that a healthy wound contained no pus. He explained to the American audience that among the major tenets of
antisepsis was preventing access to infecting organisms at the site of potential infection. Bullet wounds should never be manipulated with unclean instruments and unwashed fingers must never enter a bullet’s track. Lister even gave a practical demonstration of his antiseptic system on an actual patient. But his doubters, including the influential elite among American surgeons in Philadelphia, dotted the audience. The president of the congress had the last word when he stated, "Little, if any faith, is placed by any enlightened or experienced surgeon on this side of the Atlantic in the so-called (antiseptic) treatment of Professor Lister."  

Not easily dissuaded, Lister set out on an evangelistic transcontinental train journey. He was going to explore America and to proselytize to its surgeons. Traveling to San Francisco and back via Salt Lake City, Chicago, Boston and New York, Lister lectured, taught and even operated before crowded audiences of medical students and surgeons attempting to convince American doctors of the importance of antisepsis. Lister stressed the need for cleanliness, especially to bathe one’s hands in an antiseptic solution before touching a patient (rubber surgical gloves had not yet been invented). When he left New York and sailed for London, Lister had good reason to doubt whether his talks succeeded. It had been a decade and a half since he had first introduced the concept of antisepsis, but of all the countries he had lectured in, American doctors seemed the least impressed. While young doctors became imbued with his methods, older doctors listened politely, but few were ready to accept the new teachings, especially the underlying notion that related microorganisms, so-called germs, to pus, infection and disease.

THE GROSS CLINIC

Artists have long left a record of medicine’s triumphs and of its follies, but no one understood the mentality of the doctor as well as the 19th century American artist Thomas Eakins. Eakins’ insight into the vanity of the surgical personality brought his work to the level of genius. One of his paintings, the magnificent work generally conceded to be his masterpiece, is The Portrait of Professor Gross, or, as it later came to be called, The Gross Clinic (fig. 1).

Samuel D. Gross, arguably the preeminent American surgeon in his day, was chair of surgery at Jefferson Medical College from 1856 to 1882. Eakins had studied anatomy at the college in 1874, when he attended surgical lectures and clinics presided over by Professor Gross. Eakins had also traveled in Europe where he heard about Lister and his new methods of antiseptic surgery. Samuel Gross did not believe in the power of germs. He denied they had a significant role in infection and he opposed Lister’s advocacy of antisepsis as a means of destroying them. Gross was the one who had invited Lister to address the congress in Philadelphia, hoping to publicly challenge the Englishman’s theories. The loud debate over Listerism could be heard everywhere, especially to Eakins painting in the precincts of the medical school so familiar to the artist.

Eakins chose to portray Samuel Gross in the midst of an operation for osteomyelitis. While a bloody handed assistant continues to probe the wound of the young patient, the noble browed professor, knife held in his bare, crimson soaked fingers, has paused portentously for a moment to turn to the assembled students in the surrounding gallery to declaim on some aspect of the operation. Although the students can be seen only in shadow, the artist himself is clearly visible in the first row, calmly sketching the scene unfolding before him. There is not an iota of antisepsis in sight. Not only are the surgeon and his 3 assistants bare-handed, but over their shirts, waist-coats and ties they are wearing ordinary frock coats, no doubt the same ones they don before each operation, rarely if ever cleaned of accumulated blood and pus. Unsterile surgical equipment and bandages lie exposed in the foreground, within easy reach of the unscrubbed hands that will use it. Lister be damned, and his germ theory with him.

What was it that Eakins really intended in his masterpiece? Was his purpose, in fact, to glorify Gross and the accomplishments of our nation’s medicine at our centennial, as has universally been thought, or did he have an entirely different motive? Some believe The Gross Clinic is in reality an exposé of the backwardness and smugly misguided self-aggrandizement in which American medicine was then wallowing, as exemplified by one its most renowned professors.  

THE DEATH OF PRESIDENT JAMES A. GARFIELD

Garfield’s term in office was tragically cut short. On July 2, 1881, just 4 months into his presidency, a would-be assassin approached Garfield at the Washington, D. C. railroad depot and fired 2 shots, one of which lodged in his back. Garfield’s bad luck was to have his fate placed in the care of well-meaning but arrogant physicians who did not accept the new theory of antisepsis. Probing the wound with unwashed and manure tainted hands, Garfield’s doctors introduced terrible infections leading to his death 2 and a half months later.
Although Garfield officially died of his wound, many believed his surgeons killed him.

Garfield was shot in his right flank. The ball had entered his body and a half inches to the right of the spine, fractured the 11th and 12th ribs, passed through thoracic and lumbar vertebrae – without injuring the spinal cord – and lodged deep in the tissues of the president's left back. Damaging no vital organs, it was a non-lethal injury. Garfield consigned his care to a team of prominent physicians, headed by Dr. Willard Bliss, a former Civil War surgeon and a childhood friend of the president (fig. 2). An arrogant doctor set in his ways, Bliss appointed Drs. Reuburn, Barnes and Woodward as his permanent staff. Bliss also declared Drs. Hamilton and Agnew, renowned Professors of Surgery from Philadelphia, as expert surgical consultants on the case. Unfortunately Garfield would not benefit from his surgeon's care. For Bliss and his minions, ancient remedies, old-world philosophies and a stubborn resistance to scientific progress marked their every deed.

Within an hour after the shooting, Bliss and other members of his team probed the wound with dirty fingers and unwashed silver probes to determine the tract and location of the bullet. At first Bliss believed that Garfield would not survive the first night. As it turned out the President lingered for 80 days. Repeated probing of the wound spread infection throughout Garfield's body, causing him to suffer daily fever spikes and rigors. Agnew and Hamilton incised pus pockets and drained abscesses that popped up across Garfield's back. The procedures were done with dirty hands and unwashed instruments. Only Silas Boynton, a homeopathic physician relegated by Bliss to provide only nursing duty, objected to probing of the wound and the unclean operations, and Bliss eventually prevented him from attending to Garfield. Boynton told a reporter, "I think the President had a reasonable chance for recovery, but it was thrown away by the bad management of the case. Pus had through carelessness and neglect been allowed to be in the wound till it rotted and pyemia had done its perfect work." Bliss, on the other hand, promised a full recovery. Garfield knew otherwise. A few days earlier he had whispered to Bliss, "Your anxious watching will soon be over." Garfield died a few weeks short of his 50th birthday.

Before Garfield's body was moved, an autopsy was performed by Daniel S. Lamb, a physician on the staff of the Army Medical Museum in Washington. Agnew, Barnes, Bliss, Hamilton, Reuburn and Woodward assembled in Garfield's room. Multiple pus cavities were found, including a massive one that burrowed down into Garfield's right groin—caused by incessant probing with fingers, surgical instruments and drainage tubes that planted bacteria wherever they poked — but not one vital organ was wounded. Garfield had died of sepsis and starvation (his weight has plummeted from a robust 230 pounds to an emaciated 130 pounds in just over 2 months). Bliss refused to accept the autopsy findings, believing that Garfield had died of a broken back.

LESSONS LEARNED

What can we learn from such riveting history? That the hubris and arrogance of American surgeons had claimed many lives, including an American president. Eakins' stark portrait of Samuel Gross stands alone as a vivid reminder of the backward state of American surgery at the time. Garfield's doctors were criticized for causing his death by introducing infection into the wound because of their probing with unwashed fingers and instruments. They had continued to use traditional medicine at a time when Lister's methods were already well-known.

The overriding reason why American surgeons refused to adopt antiseptics was vast indifference in medical schools to the basic medical sciences. Although it now seems axiomatic that the clinical practice of medicine derives daily sustenance from scientific research, such was not the case in American medicine during the 18th and much of the 19th century. With almost no basic scientific research being conducted until a decade after the Civil War, medical education focused chiefly on getting the patient well, to the exclusion of everything else, especially the less practical basic sciences. Consequently older physicians had little or no understanding of the new sciences of bacteriology and pathology, and it was simply incomprehensible to them that recently discovered microbes could be the cause of so many problems. With poor background in the basic sciences, American surgeons...
could neither appreciate the fundamentals of Lister's theories nor practical implications of his work.

The controversies surrounding Garfield's death became a dividing line between the new and the old in American medicine. Fueled by the Garfield tragedy, an increasing number of positive articles concerning antisepsis brought about the acceptance of Listerism by the late 1880s. Arpad Gerster, a young New York surgeon who would author the country's first surgical textbook based on Listerian principles, noted in his private memoirs that his generation of physicians considered the Garfield case a situation "where ignorance is Bliss." Basic science was introduced into the medical curricula, and by the dawn of the new century, a new era of scientific medicine in American had begun.

REFERENCES