

ISSN 1477-9315



JOURNAL OF
**ENVIRONMENTAL
HEALTH RESEARCH**

Journal of environmental health research. Volume 3 Issue 1 2024

ISSN 1477-9315 <http://www.jehr-online.org/>

[Researchbib impact factor 9](#)

Journal of environmental health research. ISSN 1477-9315

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Journal of environmental health research.

ISSN 1477-9315 <http://www.jehr-online.org/>

36 Victoria Road London N59 7LB

THE HISTORICAL TIMELINE OF SURGERY

Oybek Bakhodirovich Khamidov

As-Sulayyil General Hospital, Kingdom of Saudi Arabia

Nafosat Azimboyevna Madrakhimova

Assistant Urgench branch of Tashkent Medical Academy, Uzbekistan

Abstract: Surgery as we know it today wasn't truly invented until the late 1800s; even then, infection was common, and outcomes were generally poor. Early techniques were primitive—even barbaric by today's standards. Anesthesia was not used until the mid-1800s

Keywords: surgery, operation, medical procedure, surgical intervention, anesthesia,

Surgery is a profession defined by the authority to cure via physical invasion. The harshness and hazards of opening a living person's body have long been clear, with the advantages only gradually and haltingly realised. Nonetheless, surgery has been dramatically more successful over the last two centuries, and its brutality has been significantly decreased - improvements that have proven critical to the evolution of humanity's ability to cure the ill.

Surgery before the advent of anaesthesia. A New Era of Anaesthesia and Anti-Sepsis Professionalisation, Minimisation, and Routing Notes Supplementary Material References Figures and Tables Information and Authors Metrics and Citations View Options References Media Share Interactive Graphic Advances in Surgery, 1812-2012 Surgery is a profession defined by its authority to cure by means of bodily invasion. The brutality and risks of opening a living person's body have long been apparent, the benefits only slowly and haltingly worked out. Nonetheless, over the past two centuries, surgery has become radically more effective, and its violence substantially reduced — changes that have proved central to the development of mankind's abilities to heal the sick.

Surgery, however, remained a confined profession. Pain and the constant threat of infection limited a surgeon's reach. For example, entering the abdomen was frowned upon since previous efforts had nearly always resulted in death.¹ The chest and joints were also beyond reach. Surgery was consequently primarily responsible for the therapy of outward problems, whilst medicine dealt with interior ones. Even for illnesses that looked to be outwardly accessible, surgical stories frequently emphasised failure rather than heroism.

¹ Richardson RG. The story of surgery: an historical commentary. Shrewsbury, United Kingdom: Quiller Press, 2004

The limits of patients' tolerance for pain forced surgeons to choose slashing speed over precision. With either the flap method or the circular method, amputation could be accomplished in less than a minute, though the subsequent ligation of the severed blood vessels and suturing of the muscle and skin over the stump sometimes required 20 or 30 minutes when performed by less experienced surgeons.² No matter how swiftly the amputation was performed, however, the suffering that patients experienced was terrible. Few were able to put it into words. Among those who did was Professor George Wilson. In 1843, he underwent a Syme amputation — ankle disarticulation — performed by the great surgeon James Syme himself of his experience³:

Before anaesthesia, operating rooms were filled with the sounds of patients writhing and screaming. As a result, spectators were impressed by the quiet and hush that came with surgical anaesthesia from the beginning. In London, Liston dismissed ether anaesthesia as a "Yankee dodge" after witnessing fads like hypnotism come and go, but he attempted it nevertheless, conducting the first anaesthesia-assisted amputation on a 36-year-old butler with a septic knee two months after Bigelow's report was published.⁴

It would take some time for surgeons to realise that using anaesthesia allowed them to be more precise. Despite the benefits of anaesthesia, Liston, like many other surgeons, continued in his typical lightning-fast and bloody manner. Spectators in the operating room gallery would still pull out their pocket watches to clock him. The butler's procedure, for example, took only 25 seconds from incision to wound closure. (Liston worked so quickly that he once mistakenly removed an assistant's fingers and a patient's leg, according to Hollingham. The patient and the helper died of infection, and a spectator allegedly died of shock, making this the only known surgery with a 300% death rate.

Surgeons quickly discovered that anaesthesia enabled them to undertake more intricate, invasive, and accurate manoeuvres than they had previously attempted. Within a decade, the first successful hysterectomy and bilateral ovariectomy, which removed large ovarian cysts weighing several pounds^{13,14}, demonstrated that the abdomen could be safely accessed. Additional trials showed more efficient anaesthetics, including nitrous oxide, chloroform, and, finally, halothane and other nonvolatile drugs. Narcotics like laudanum were proven to alleviate postoperative pain. Pain was no longer an impediment to surgical capability.

² Stanley P. For fear of pain: British surgery, 1790-1850. Amsterdam: Rodopi, 2003

³ Robertson, HR. Without benefit of anaesthesia: George Wilson's amputation and Fanny Burney's mastectomy. *Ann R Coll Physicians Surg Can* 1989;22:28-28

⁴ Liston R. *Practical surgery*. London: John Churchill, 1837.

Some surgeons, however, especially younger ones, began accepting the diligence required for aseptic and antiseptic practice. Such practice, along with effective anesthesia, led them to hitherto unimagined treatments and discoveries.

Surgeons become so skilled and confident that they began doing exploratory laparotomies only for diagnostic purposes. Indeed, papers raising concerns about the number of laparotomies began to appear around the turn of the century⁵. The primary impediments to surgical knowledge and creativity were removed. Until this point, surgical discoveries had only made incremental additions to the medical community's capacities.

Surgery had been, one might politely say, a modest contributor to medical progress. Between the mid-1800s and the 1920s, however, the coverage of surgical advances took up half the Journal. Physicians in the Victorian era had few effective drugs, but surgeons began reporting new treatments almost monthly, and the breakneck pace of innovation continued for nearly a century. Surgery became a dominant force in medical advancement.

Surgery began to undergo an increasingly significant process of refining and professionalisation. William Halsted pioneered and popularised the use of rubber gloves to prevent infections. Burns and other wounds are now more easier to treat and less traumatic. Anaesthesia procedures and equipment were becoming more dependable and complex.

Specialisation was also a major force. Historians are still debating whether knowledge growth drove specialisation or specialisation caused knowledge expansion.

The field of surgery, with its ethos of radical action and perfectionist refinement, defined much of medical culture in the early 20th century. By midcentury, however, surgery's outsize role and influence began to subside. Whereas its discoveries had taken up half the space in the Journal in 1922, the proportion declined to one-third during the next decade. By the 1950s, the Journal's pages were dominated by articles about new diagnostic tests, vaccines, antibiotics, and other wet laboratory breakthroughs. Scientists have discovered an even more productive source of discovery than the operating room: the laboratory bench. With the introduction of chemotherapeutics, molecular medicine, and other technologies, surgery was no longer the driving force behind medical advances. Since 1972, hardly a tenth of the Journal's publications have focused on surgical improvements.

The most remarkable aspect of surgery in recent decades has been its firmly established status as a critical instrument for helping people live long and healthy lives. Almost everyone will experience a condition that requires surgery for

⁵ Munro, JC. Needless laparotomies, with a report of eight cases. *N Engl J Med* 1902;146:58-60

successful treatment, such as a significant orthopaedic injury, a cataract, a tumour, obstructed labour, joint failure, or severe heart illness. Currently, surgeons can do over 2500 distinct surgeries. Thus, recent breakthroughs in the area have focused less on expanding the arsenal and more on assuring the efficacy of the medicines we already have.

Meanwhile, surgery will continue to evolve. Prognostication is a dangerous endeavour. However, if the previous quarter century has brought minimally invasive techniques, the future may bring the eradication of invasion. It feels foolish to use terms like nanotechnology — I have no idea what it means or what it can do — but scientists are already experimenting with techniques for combining noninvasive ways of seeing into the body through the manipulation of small-scale devices that can be injected or swallowed. Surgical job will most likely become totally automated. The possibilities are tantalising. A surgeon will narrate the story a century from now, if the planet continues to produce such individuals.

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