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Nikolay Ivanovich Pirogov (1810–1881): A pioneering Russian surgeon and medical scientist

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Abstract

Nikolay Pirogov qualified as a physician from Moscow University in 1828 and then studied surgery and anatomy at University of Dorpat. He developed new surgical techniques, including the eponymous osteoplastic foot amputation. His application of scientifically based techniques extended surgery from a craft to a science. During the Crimean War he initiated the deployment of women as nurses and used triage for dealing with mass casualties. His textbook on field surgery became the standard reference on the subject and his principles remained virtually unchanged until the Second World War. Pirogov died on 5 December 1881 at his estate in Vishnya.

Keywords

Pirogov, surgery, field surgery, foot amputation, applied anatomy, topographical anatomy, Russia (pre-1917)

Introduction

Nikolay Ivanovich Pirogov[1] (Figure 1) was one of the most talented Russian surgeons and medical scientists of the 19th century and among the greatest military surgeons of all times. He devised a number of surgical operations, of which the eponymous osteoplastic foot amputation is the best known. He was passionate about the importance of anatomy for surgeons. His work on topographical anatomy laid a firm foundation for that field with great practical significance for surgery and enhanced his reputation as a distinguished surgeon

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Figure 1. Portrait of Nikolay Ivanovich Pirogov, 1836, by an unknown photographer. Military Medical Museum, Saint Petersburg, Russian Federation (OF 21290, reproduced with permission).

and anatomist. Several anatomical structures are named after him, including the Pirogov angle (the junction of the internal jugular and subclavian veins), the Pirogov aponeurosis and the Pirogov triangle, an area located between the mylohyoid muscle, the intermediate tendon of the digastric muscle, and the hypoglossal nerve. He extended surgery from a craft to a science, equipping doctors with scientifically based techniques of surgical intervention.

From childhood to professor of surgery

Nikolay Ivanovich Pirogov was born on 13 November 1810[2] in Moscow. From an early age, he showed evidence of exceptional talent. A family friend, Efrem Osipovich Mukhin, Professor of Anatomy and Physiology at the Medico-Surgical Academy and later Professor of Physiology, Forensic Medicine, and Medical Police at the Moscow University, was aware of his interest in medicine and suggested that he enter Moscow University as a medical student.[3,4]

Young Nikolay passed the university entrance examination and began his studies a few weeks before his 14th birthday, when the accepted admission age was 16 years. One teacher who inspired Pirogov was the anatomist, Professor Loder, who encouraged him to study anatomy seriously. The physician Professor Mudrov also made a deep impression; he taught students to treat not only the disease or the causes of disease but also the whole patient. Putting the patient's interest central became the cornerstone of Pirogov's approach to his patients throughout his professional career.

Pirogov qualified as a physician in May 1828, only 17 years old.[3] Professor Mukhin, then dean of the faculty of Medicine, encouraged him to enter as a candidate for the prestigious postgraduate international institute of the Baltic-German University of Dorpat (now Tartu in Estonia).[3,5] Only 20 Russian students, from all disciplines of the five Russian universities, were admitted to Dorpat each year. Pirogov passed the entrance examination and, on a scholarship sponsored by the Russian Government, began his training in Dorpat in July 1828. His first choice of subject, physiology, was not available in Dorpat so instead he chose to specialize in surgery and anatomy under the mentorship of Professor Johann Christian Moier, a student of the famous Italian anatomist Antonio Scarpa.

Pirogov combined his practical work as a surgeon with theoretical and experimental anatomical research. In 1829, the Medical Faculty freed him from compulsory attendance at some lectures, so that he could work on his doctoral thesis, the feasibility of treating aneurysms of the inguinal artery by ligation of the abdominal aorta.[3,6] Pirogov realized that a detailed knowledge of the anatomy of the region, in particular of the vascular system, would be essential for his investigation, and conducted a series of animal experiments to determine the topography of the relevant blood vessels, with particular attention to the abdominal aorta. He then investigated how animals responded to a gradual tightening of a ligature around the aorta, stimulating the development of an improved collateral circulation. He was the first to prove the feasibility of this technique, which achieved a gradual obliteration of the aorta while avoiding paralysis of the hind limbs and pelvis. Finally, he carried out a number of operations in which he ligated the abdominal aorta of patients with aneurysms of the inguinal artery. He completed his studies at Dorpat and received his doctorate after defending his thesis on the 27 August 1832 (Figure 2).[7] His thesis was shortly thereafter published in German.

In May 1833, Pirogov went to Berlin to broaden his knowledge of anatomy and surgery at the Charité University Hospital. Among his tutors were Friedrich Schlemm, professor of anatomy and Johann Friedrich Dieffenbach, professor of surgery specializing in skin transplantation and plastic surgery. Pirogov spent the summer of 1834 at the University of Göttingen where

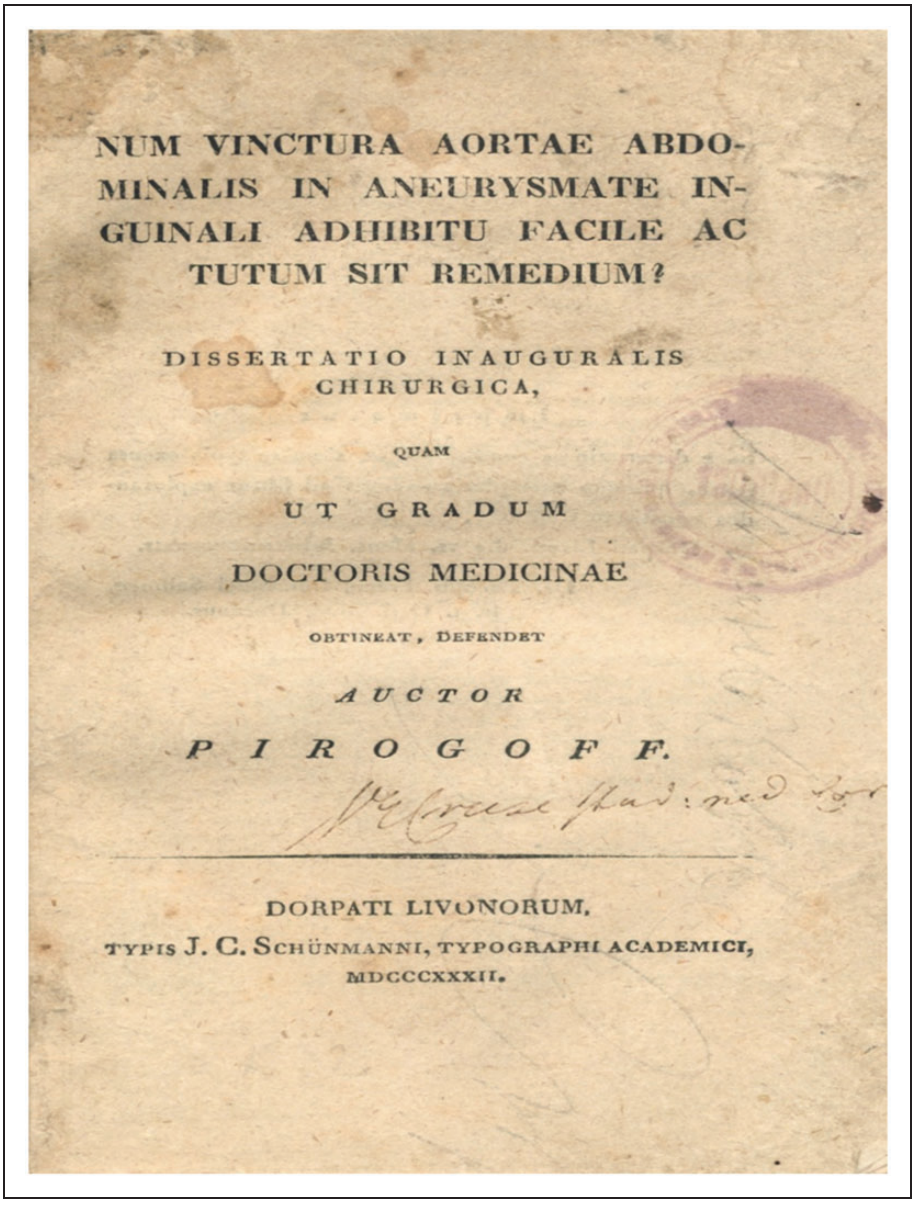
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Figure 2. The front cover of the doctoral thesis by Nikolay Ivanovich Pirogov, University of Dorpat, 1832.

he attended lectures by Konrad Langenbeck, famous for his speed and precision as a surgeon. He taught Pirogov how to achieve the most efficient movements during surgery and how to use a scalpel "*...do not pressure the scalpel but move it slowly, playing it as a bow over the violin...*"[3]

From his time in Berlin and Göttingen, Pirogov was amazed to discover that even the great German surgeons had little knowledge of anatomy or physiology. Fortunately, Professor Schlemm of the Charité Hospital in Berlin was convinced of the importance of anatomy for a surgeon and gave Pirogov the opportunity to dissect hundreds of cadavers for his anatomical research. For Pirogov knowledge of anatomy was essential for a surgeon "... *It is advisable that only someone who is familiar with the body, the position of the organs in their unaltered state and the painful changes, should operate on a person...*"[7] and without a thorough knowledge of anatomy and physiology, surgery could never rise to the level of a science but would remain a craft.[6,7]

Pirogov left Berlin in May 1835 to travel to Saint Petersburg, but during the trip, he contracted typhus and was forced to stay in Riga until September of that year. On his delayed journey to Saint Petersburg, he visited his former mentor, Professor Moier, in Dorpat, from whom he learned that the chair of surgery at Moscow University had gone to a former fellow student, Fedor I. Inozemtsev. This was a bitter disappointment for Pirogov who had hoped that he might be

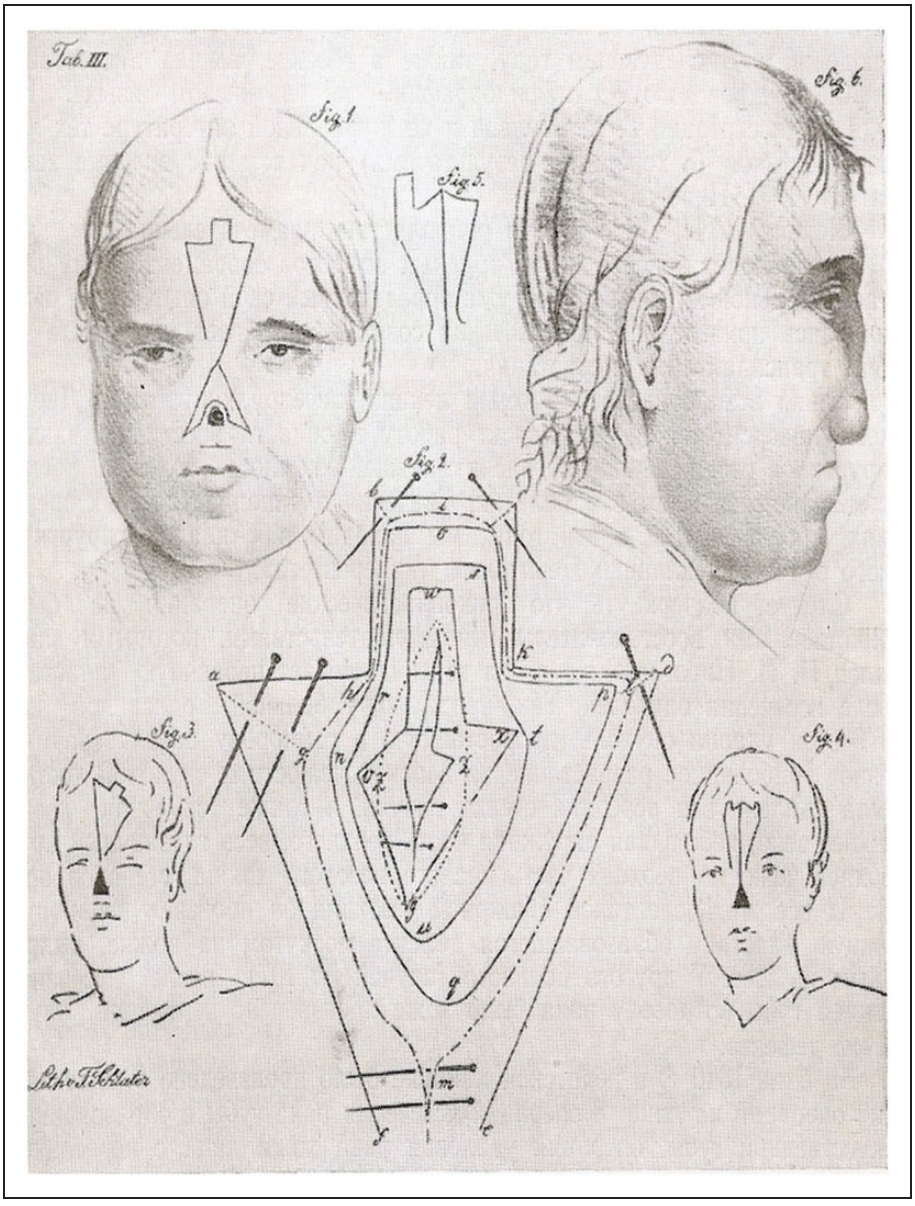

Figure 3. A series of drawings showing stages in the restoration of the nose by a skin graft taken from the forehead following rhinoplasty, according to the method of N.I. Pirogov. Figures 1 and 6 illustrate the final result; Figures 3–5, the technique of forming the skin flaps; and Figure 2, how the flaps are attached using pins. From the Doctoral thesis *Quaedam ad rhinoplasticen*, Dorpati Livonorum, 1836 of G.H. Schultz, a student of Pirogov.

appointed as professor at his Alma Mater. He decided to remain in Dorpat and Professor Moier, who was now rector, appointed him as Ordinary Professor and Director of the Surgical Clinic.

In April 1836, Pirogov was appointed as a full professor of theoretical, operational, and clinical surgery at Dorpat University and successor to Professor Moier. Before taking up his appointment, he visited Saint Petersburg, where he gave a lecture to the Academy of Sciences "*About plastic surgery in general, and about rhinoplasty in particular*."[8] He used a face made of papier mache to demonstrate the Indian rhinoplastic method as modified by Dieffenbach (Figure 3). The original Indian methods for total rhinoplasty remain the basis for most reconstructive rhinoplastic procedures to the present day.[9] During his career, Pirogov carried out forty rhinoplasties.

Pirogov encouraged his students to become actively involved in his research projects. Between 1836 and 1841, he supervised the preparation of 12 scientific theses by students in Dorpat. He continued to encourage his students when he moved to Saint

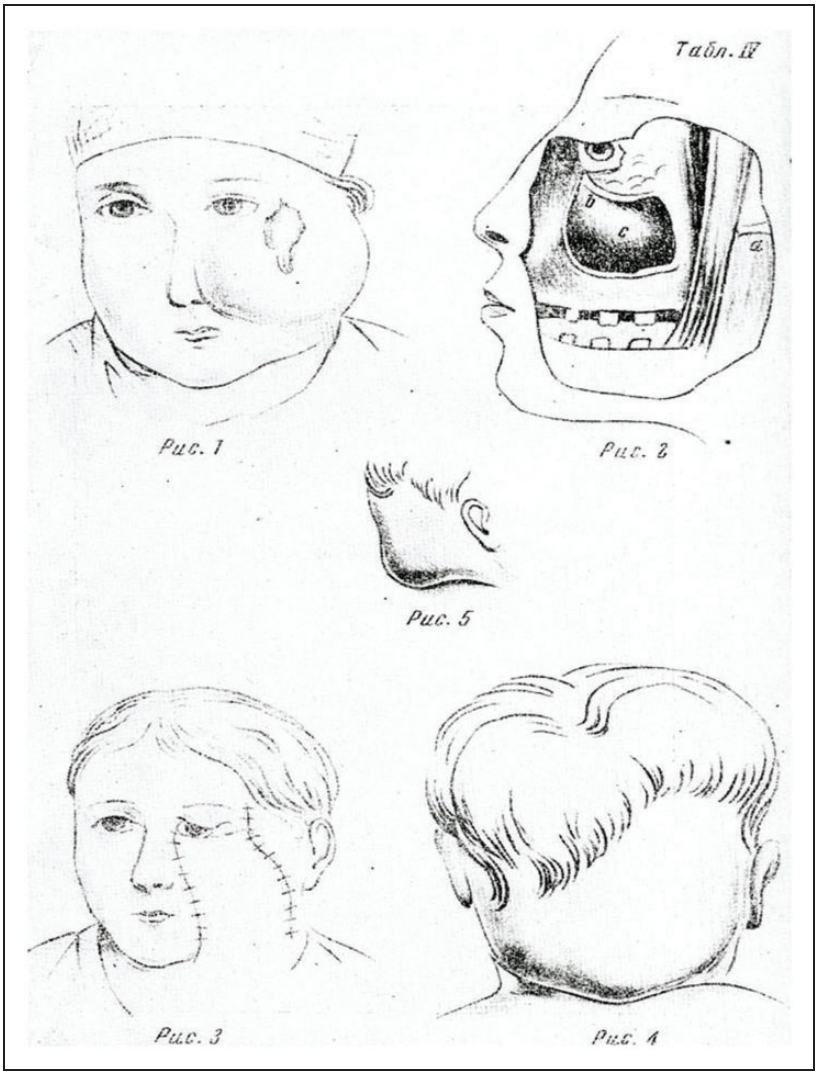

Figure 4. Drawings by N.I. Pirogov illustrating the stages in the resection of a tumour of the maxilla showing how he finished the repair using a skin graft from the neck.

Petersburg, where between 1841 and 1860, he supervised the dissertations of a further ten students. These dissertations belong to the scientific heritage of Nikolay Pirogov.[10]

In addition to his extensive clinical, teaching, and research duties, Pirogov published two volumes detailing the activities of the surgical department.[11,12] In the preface to the first volume, he wrote:

> ...I consider it my sacred duty to openly inform the public about my medical activities and their results. As an always honest man, especially as a teacher, you must have some sort of inner need to disclose your mistakes to warn others of maybe less knowledge...

The work was intended to teach how *not* to act! He also published an extensively illustrated textbook of arterial trunks and fascia in which he stated that: "...*A real anatomical-surgical image must be for the surgeon what a map is for the traveler*...."[13] The book was published twice, first by Pirogov in 1837, and later by Julius Szymanovski in 1860, who re-edited it and added one new drawing for the external anatomy.[14]

Pirogov continued working on plastic and reconstructive surgery, improving on the methods of his teacher Johann Friedrich Dieffenbach. In one patient with an invasive tumor in the maxillary sinus, he removed the entire front wall of the maxilla, the lower eyelid, and a small outer portion of the upper eyelid, the upper part of the right nasal cartilage, and the salivary duct (Figure 4). After this extensive resection, he performed primary skin transplantation using a flap taken from the neck.[11] It is almost impossible to imagine how such a massive procedure was carried

out and how the patient survived in the days before anesthesia. As other surgeons became aware of Pirogov's methods, plastic surgery expanded in Russia.

In 1836, Pirogov performed his first tenotomy on a 14-year-old girl with a club-foot, a procedure he considered as one of the most therapeutically effective operations. He was aware of the work of Stromeyer, Valpeau, and others who had pioneered this new orthopedic procedure.[15] However, before using the technique he investigated the anatomy of the Achilles tendon, the processes involved in the regeneration of a severed tendon and the recovery of its function. He carried out numerous experiments on animals, and developed and perfected the technique of tenotomy on cadavers. He discovered that the Achilles tendon is surrounded by two sheaths, not by one as previously thought, and that a satisfactory regeneration of the tendon following tenotomy required maintaining a blood supply to and a blood clot in the tendon sheath. He performed an Achilles tenotomy on forty patients and published his results in 1840.[15]

The merger of surgery and surgical anatomy

In 1838, the Medical-Surgical Academy in Saint Petersburg[16] was transferred to the Ministry of Defence. This created a new chair of surgery, which was offered to Pirogov. Before accepting the post, he suggested the establishment of a new Department of Hospital Surgery in the Academy.[17] He wanted to combine the didactic teaching of surgery with practical, hands-on experience at the bedside of the sick, and exposure of young students to scientific principles. In this respect, Pirogov's approach to medical education was very much in keeping with the teaching of the Dutch physician, Herman Boerhaave, who had introduced bedside teaching in Leiden in the Netherlands in the early 18th century.[18] Pirogov considered Boerhaave, the English physician Thomas Sydenham and the French barber-surgeon, Ambroise Paré, as medical geniuses. He did not consider himself an equal to these men "...*We are not Boerhaave, nor Sydenham or Paré*..."[12] However, history may judge Pirogov to be at least an equal to these men.

It took some time and much discussion but on 3 March 1841 all Pirogov's proposals were finally accepted and he was appointed as Professor of Hospital Surgery and Applied Anatomy at the Medical-Surgical Academy and chief surgeon of the Second Military Landforce hospital (with 1000 beds) in Saint Petersburg. He also worked as a consultant-surgeon in three other hospitals in the city and ran a busy private practice. His aim was: "...*To assist in raising the medical skills in Russia to a level equal to that of the advanced countries of Europe*..."[3,19] He reorganized medical education, introducing a new curriculum for medical students, which now for the first time included the teaching of topographical and applied anatomy.

He also made significant improvements in the hospital management. Pirogov also became secretary for the Academy of Science and director of the St. Petersburg technical tool factory. More importantly, he became a member of the Committee under the Ministry of Public Education for the transformation of the medical curriculum at universities, as well as one of the four members of the Medical Council of the Ministry of the Internal Affairs.[20]

During his first years in Saint Petersburg, Pirogov worked on a textbook of Applied Anatomy.[21] It was his wish to form an Anatomical Institute, which would combine practical training on operative surgery with the study of surgical and pathological anatomy. Before this could be, his wife, Ekatarina Dmitrievna Berezina, died after the birth of their second son. To help him get over his grief, the University granted him leave to travel to Europe for several months. On his return, the Academy agreed to the establishment of an Anatomical Institute with Pirogov as its director.[6,22]

When visiting the local meat market, Pirogov noticed that when butchers cut frozen pig carcasses, the positions of the internal organs were clearly seen.[23] He realized he could use a similar method and taking advantage of the cold Russian winters he froze cadavers "to the density of the thickest wood" and cut them into thin plates. This allowed him to describe the topographical anatomy of the human body in a detail never before attempted. After eight years work, he published his atlas of topographical anatomy.[24] The atlas had become a rarity by the beginning of the 20th century but was reprinted in 1997 for a limited edition of 500 copies.[25]

The Caucasian War as a surgical laboratory

In 1847, mountain tribes rebelled against the Russian government and thousands of Russian soldiers were maimed and killed in bloody battles with the rebels. Tsar Nikolas I sent Pirogov in June 1847 to the Caucasus to demonstrate the use of the recently discovered ether anesthesia during surgery, of which he was the leading exponent in Russia. During the war, Pirogov and his team anesthetized 100 wounded soldiers on the open battle field, 47 by Pirogov himself, 35 by his assistant, Peter Y. Nemmert, five under the

supervision of Pirogov by the local physician Dukshinsky, and the remaining 13 under Pirogov's supervision by regimental battalion doctors.[26,27] This was the first time that ether anesthesia had been used on a battlefield. After the war, Nemmert was appointed as an Associate Professor, assistant to Pirogov in 1848, and in 1853, he became Pirogov's successor as Professor of Surgery in St. Petersburg. Because Pirogov wanted to convince other wounded soldiers of the analgesic effect of ether he carried out operations in their presence. This visual propaganda had a profound effect on the soldiers, who now fearlessly came to be operated. During that period, he also performed a number of thyroid resections under general anesthesia, for that time an unusual procedure.[28] In the fortified village of Salty, he organized his headquarters in a primitive field hospital consisting of huts made from tree branches with a straw roof and tables of stones covered with straw. Surgeons had to kneel to perform operations.[27]

Firearms Injuries

Pirogov dealt with over 2000 firearm injuries and the outcome in most cases was either amputation or the death of the victim. Pirogov was determined to find a better surgical approach. The rebels used small and light bullets (12 g), which traveled at high speeds, the entry and exit wounds were small, sometimes barely perceptible. They caused considerably less tissue damage than the heavier Russian bullets (56.8 g), which caused considerably larger exit wounds than entry wounds and with more extensive tissue damage. Pirogov experimented and analyzed the relationship between the velocity of the bullets of different firearms and bullets, and the characteristics of the entry and exit wounds on animal carcasses, guided by observations and his knowledge of anatomy. In this respect, Pirogov can be considered to have laid a foundation for the scientific methods used by forensic pathologists today.[27]

Disarticulation and resection

Pirogov introduced disarticulation of joints and resection of bones as a means of saving limbs, in particular, the upper limbs, instead of amputations, then the only method of surgical treatment for gunshot fractures. Pirogov believed that in selected cases these procedures could save a limb with fractured bones, provided that major blood vessels or nerves were not damaged. In these cases, resection of the shattered bone should be immediately undertaken and the limb should be immobilized. However, amputation was sometimes unavoidable.[27]

Forerunner of the plaster of Paris cast

The choice of treatment for fractures caused by bullets was often immediate amputation or immobilization in the hope that the fracture would heal. The accepted method of immobilization was that developed by the Belgian army surgeon Louis Seutin (1793–1865).[29,30] Seutin's method used cardboard splints and bandages soaked in starch dissolved in hot water and applied wet. Because cardboard was not readily available on the battlefield Pirogov used straw mixed with starch. A major disadvantage of these dressings was that hot water was seldom available on a battlefield, and they took two to three days to dry. Although not quite satisfied with the "fixed bandage", their use together with anesthesia created for Pirogov new possibilities for the development of surgery.[6,27,31] He continued to develop the starched cast and its implementation, because he was no longer willing to amputate when this was not absolutely necessary.

Surgical developments between the wars

During a trip to Germany and France in 1847, Pirogov observed two patients who had undergone a foot amputation following the Syme method, and who were able to walk without discomfort. He was so impressed that he determined to use this operation on his return to Russia. As always, Pirogov did not immediately use the method on his patients. Because experiments on cadavers revealed several problems with the Syme method, he devised his own approach to amputation of the foot, now known as the Pirogov amputation, and the world's first osteoplastic surgery.[20] Pirogov's method differs from Syme's in that the posterior part of the calcaneus with the insertion of the Achilles tendon remains attached to the posterior flap. The advantage was that there is only a minor shortening of the limb and the patient could walk without needing a prosthesis due to the maintenance of the calcaneal fragment fused to the tibia. This results in a high loading capacity stump not dissimilar to a natural heel. Pirogov described his method in the first volume of his textbooks on Clinical Surgery, a collection of monographs in three volumes.[20] He also published a detailed description of his technique in the medical journal *Voenno-Meditsinskiy Zhurnal*.[32]

Pirogov's surgical method was so innovative that it initially met with harsh and often unfounded criticism by some contemporary colleagues. About these criticisms Pirogov wrote "*...Although Stromeyer doubts the success of my foot osteotomy plastic surgery, Fergusson makes me an apostate and Syme rejects it as an anti-surgical procedure, so it deserves but special consideration on the part of the war surgeons...*"[20] However, in Pirogov's support, Theodor Billroth confirmed that he had applied Pirogov's method to

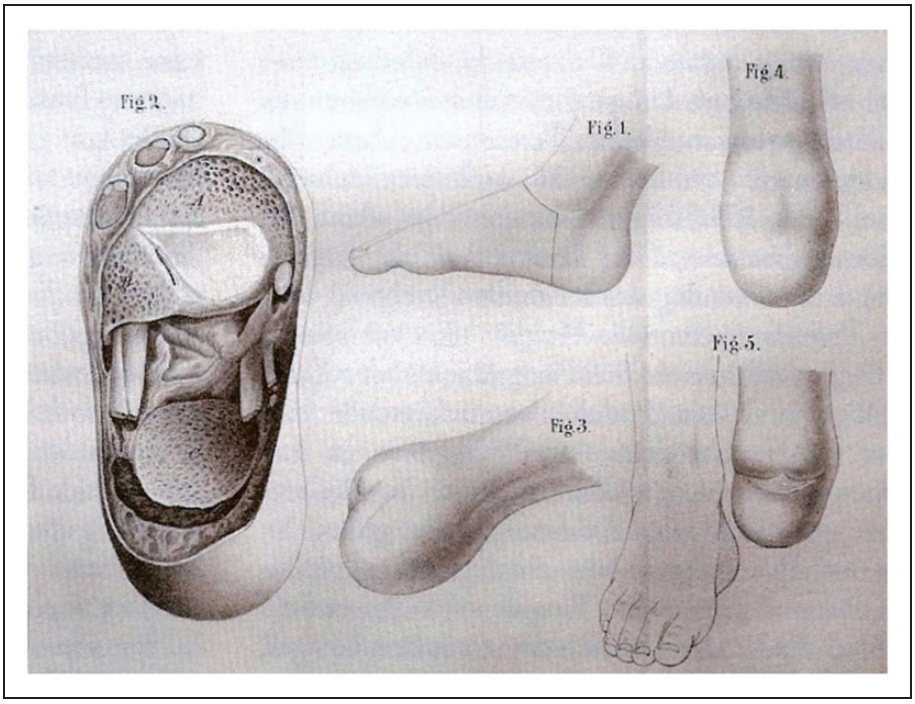

Figure 5. Drawings showing the stages in Pirogov's foot amputation. Figure 1 in the drawing shows the cut surfaces from the side; Figure 2, the surface after disarticulation of the foot; Figures 3 and 4, views of the stump; and Figure 5, the stump as viewed from the front. The difference in length between the two legs is only 1–1.5 inches (5.54–3.8 cm).

the satisfaction of his patients: "*...(They) go admirably on their stumps...*"[33] Pirogov's method is still used today although modifications have been made to improve outcome and reduce risks of complications (Figure 5).[34–36]

Also in volume 1, Pirogov described mistakes and misdiagnoses of tumors using case reports. In his opinion, it was impossible to study a tumor without auscultation for murmurs and the use of a microscope. In patients with tissue tumors, Pirogov carried out palliative operations (Figure 6).[20]

The second volume of Pirogov's monographs on clinical surgery dealt with fractures and dressings.[37] As discussed earlier, Pirogov was dissatisfied with the starched cast based on the method of Seutin. Antonius Mathijssen could also not satisfy him with two layers of bandages pre-impregnated with dry plaster powder stored in sealed containers. This method was also time-consuming and the dressings of the dry plaster crumbled easily.

Returned from the Caucasus to St. Petersburg, Pirogov observed how sculptors used strips of linen soaked in liquid plaster of Paris for making models. Based on this observation, in 1851/1852, he developed his own method for immobilization of fractures, using canvas soaked in a plaster of Paris mixture immediately before application to the limbs, which were protected either by stockings or cotton pads. The preparation of plaster cast required no boiling water, and it hardened immediately and was so hard that splints were not needed, even when large drainage windows were created. Pirogov, as a good manager, was well aware of the treatment costs involved and stated

> ...The simpler, faster and cheaper the creation of such a bandage is as a replacement for the manual action, so suitable and advantageous it is for the hospital practice. Even old rags would not be lost, they could be washed clean...[37]

The Crimean War (1853–1856), a turning point in medical practice

The Crimean War arose from a conflict between the Russians and the Ottoman Turks, the French and the British.[38] Pirogov offered his medical knowledge, clinical skill, experience, and his management insight to the Tsar for this war. His offer was finally accepted, thanks in part to the intervention on his behalf by the Grand Duchess Elena Pavlovna, sister-in-law of Tsar Nikolas I.[39] Pirogov was appointed by decree of the Tsar as the overall head of the army medical services, something completely new in Russian history. He would work not only as a surgeon but also more importantly use his skills as an organizer of medical facilities. Pirogov

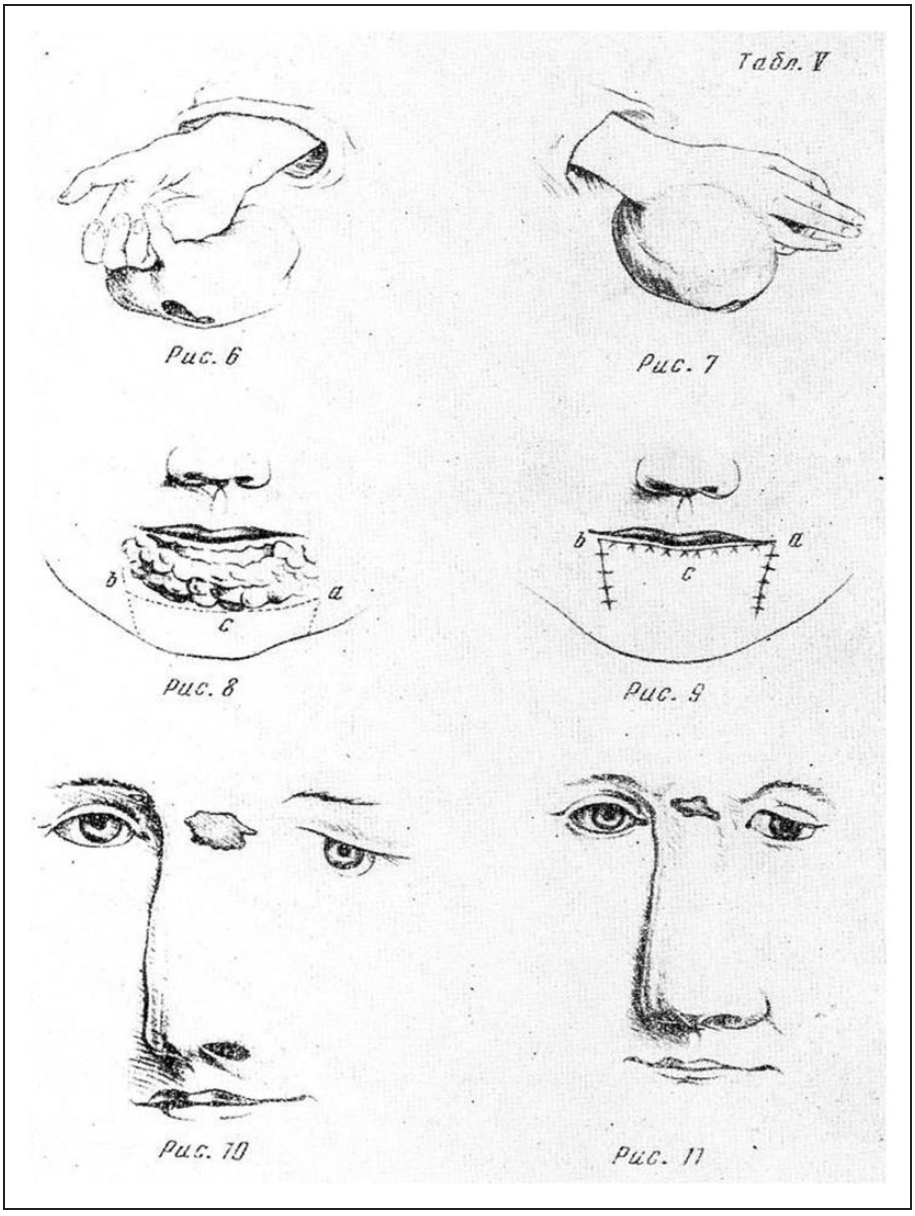

Figure 6. Palliative operations on tumors. Drawings by N.I. Pirogov showing various forms of palliative surgery for tumors.

considered war as a traumatic epidemic and was convinced that successful treatment of mass casualties depended as much or even more on good management as on the skill of the surgeons.[38,39] During the conflict, he was assisted by his senior physician I. Kalashnikov and the surgeons Obermiller and Sokhranichev. Although often thwarted in his attempts to improve the organization of the medical services, he did find substantial support from Admiral Nakhimov (Figure 7) and his naval officers and from the Sevastopol garrison commander Vasilchikov.[31,39]

Before Pirogov was sent to the Crimea, Grand Duchess Elena Pavlovna had outlined her plan to establish a women's aid organization for the sick and wounded on the battlefield, and requested his support. Pirogov was convinced of the great significance of women's participation and he readily agreed to her request and initiated the deployment of women to be trained as nurses and surgical assistants.[39,40] At the expense of Elena Pavlovna, Pirogov also organized a small group of independent physician-surgeons and he was appointed chief surgeon of the besieged city of Sevastopol.[39] In November 1854, the first group of nurses arrived, followed in the succeeding weeks by a regular flow of new female staff. Most were well-educated, speaking several languages, and were able to interpret for the wounded foreign prisoners. During quiet times about 7000 wounded would arrive

Figure 7. N.I. Pirogov and P.S. Nakhimov observing wounded soldiers at the crossing in Sevastopol. Oil on Canvas, by M.F. Verbov, 1943. Military Medical Museum, Saint Petersburg, Russian Federation (reproduced with permission).

at the field hospitals and first aid stations daily; at the height of battle as many as 13,000 injured soldiers could be received.[38]

To deal with this massive influx of injured, Pirogov introduced the triage system where casualties were classified into four groups depending on the degree of injuries. This was the first ever use of triage in the management of mass casualties. One of his other principles was not to carry out unnecessary amputation. Nonetheless, Pirogov and his team often carried out about 30 amputations a day. To cope with this workload, Pirogov used three teams of doctors, each dealing with only one part of the procedure, rather like a production line, i.e. functionalism of surgery.[39]

The assistance of the nurses under such extreme situations was invaluable, with each nurse caring for 100 to 200 casualties.[38,41,42] Unlike the British nurses under Florence Nightingale, the Russian nurses worked under shellfire in the field and in small field medical units on the Crimean Peninsula.[39,43,44] Seventeen Russian nurses died on duty during the Crimean War, six in the town of Simferopol alone.[45] After the war, the nurses returned to several cities where they continued their nursing work in military hospitals.[42,45] This group of women became the foundation for what later became the Russian Red Cross.[43,46]

During the war, almost all Russian medical students and doctors entered military service, but there was still a shortfall of medical staff and the government was forced to employ foreign doctors from allied countries, mainly Germans and Americans.[38] Long before the Crimean War, America and Russia considered themselves befriended nations. About 30 Americans doctors volunteered to work for the Russian Army. Almost half of the Americans fell victim to typhus fever, cholera, and smallpox, diseases which swept away more human lives than were lost on the battlefield. Ten died in the war and one disappeared without trace. Those who returned to America settled to a peaceful medical practice, or used their invaluable and new-found skills in the hospitals of the Civil War.[47,48]

Pirogov did not publish his experiences and impressions about the Crimean War for several years after it ended. But finally when he became aware of reports from foreign medical services, "*... he decided to recollect the experiences and to analyze the gathered and already neglected material, to remind European and Russian doctors that we were not so behind in science in the Crimean War...*"[6] In 1864, he published his textbook in German which became the standard reference for field surgery.[38] The principles of battlefield medicine established by Pirogov remained virtually unchanged until the outbreak of the Second World War. Pirogov's work during the Crimean War is of such importance that he may be considered the founder of field surgery.

The suffering Pirogov witnessed during the Crimean War profoundly influenced his outlook on life. His way of thinking changed more toward humanitarian goals and education. Because of his liberal views and stubborn personality, he could no longer tolerate intrigues and corruption. Appreciated and respected by the Academy, but tired of the disagreements with the officials, he resigned in July 1856 from the Medical-Surgical Academy. He devoted his latter days to advancing the cause of general and medical education in Russia and actively reported and consulted on European regional conflicts for the International Red Cross. He finally retired to his estate in Vishnya (now Vinnytsia) in Ukraine, where he died on 23 November 1881. Pirogov's body was preserved by the surgeon and anatomist, David Ilyich Vyvodstev, who used an embalming technique he himself developed.[49–51] The body of Pirogov still rests in a glass-lid coffin in a specifically designed mausoleum in Pirogov's former estate, which is now a museum dedicated to his life and works.

In conclusion, Nikolay Ivanovich Pirogov is acknowledged as one of the greatest Russian surgeons and medical scientists of the 19th century. He believed passionately that a thorough knowledge of anatomy was essential for a surgeon. His atlas of topographical anatomy received widespread acclaim and several anatomical structures are named after him. From his work during the Caucasian and Crimean wars, he can be

considered the founder of field surgery. He invented a number of surgical operations, the best known of which, the osteoplastic foot amputation, is named after him. Pirogov extended surgery from a craft to a science, equipping doctors with scientifically based techniques of surgical intervention. But his contributions reached beyond the boundaries of surgery. He was a dedicated teacher who encouraged students to excel clinically and guided them in scientific endeavors. His managerial skills proved invaluable during the Caucasian and Crimean wars.

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References and notes

1. In the text, we have used common English transcription. See, for example, ''Pirogov'' for the Russian surname ''Пирогов.'' Other transcriptions such as ''Pirogoff'' and ''Pirogow'' also occur, 2015.
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Author biographies

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"Academic racism" and the neglected scholarship of the anatomist M. Wharton Young, MD, PhD (1904–1986)

Peter Heywood

Abstract

Moses Wharton Young, MD, PhD (1904–1986), was an African American Professor of Neuroanatomy at Howard University College of Medicine from 1934 to 1973, during which time he authored about 100 publications on topics that included baldness, asthma, glaucoma, and, most importantly, the structure and function of the inner ear and the pathophysiology of blast injuries. Much of Young's research was ignored during his lifetime, raising the question whether this professional neglect was an instance of "academic racism."

Keywords

M. Wharton Young, Howard University, neuroanatomy, asthma, baldness, glaucoma, blast pathophysiology, otology, academic racism

Introduction

During the 20th century African American scholars were underrepresented at most universities in the United States, and those holding professorial positions often faced distinctive challenges within their professional lives. Frequently, they were overlooked in their academic fields with their scholarship neglected.[1] This article describes a possible case of this "academic racism" by examining the scientific work of Moses Wharton Young, MD, PhD (1904–1986), and the citations that his publications received.

M. Wharton Young was an African American Professor of Neuroanatomy at Howard University College of Medicine from 1934 to 1973. This article details his diverse interests in science, his devotion to teaching, his loyalty to Howard University (a historically black university), and his resistance to racial discrimination.

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