СРПСКИ АРХИВ
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SERBIAN ARCHIVES
OF MEDICINE

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Paper Accepted*

ISSN Online 2406-0895

History of Medicine / Историја медицине

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Prof. Dr. Petar V. Simić, pioneer of orthopedic spinal surgery in Serbia

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Received: November 26, 2025
Revised: December 25, 2025
Accepted: December 27, 2025
Online First: January 20, 2026
DOI: https://doi.org/10.2298/SARH251126002Z

*__Accepted papers__ are articles in press that have gone through due peer review process and have been accepted for publication by the Editorial Board of the *Serbian Archives of Medicine*. They have not yet been copy-edited and/or formatted in the publication house style, and the text may be changed before the final publication.

Although accepted papers do not yet have all the accompanying bibliographic details available, they can already be cited using the year of online publication and the DOI, as follows: the author's last name and initial of the first name, article title, journal title, online first publication month and year, and the DOI; e.g.: Petrović P, Jovanović J. The title of the article. Srp Arh Celok Lek. Online First, February 2017.

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Prof. Dr. Petar V. Simić, pioneer of orthopedic spinal surgery in Serbia

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SUMMARY
Orthopedic surgery has a long and rich history. The term "orthopedics" was originally coined in 1700, although its development began much earlier. The origins of spinal surgery can be associated with four historical periods: the Egyptian and Babylonian, the Greek and early Byzantine, the Arabic, and the medieval. The history of orthopedic surgery in Serbia begins with the arrival of Dr. Nikola Krstić in Belgrade in 1904, after his studies in Vienna, as well as with the first X-ray image of the hand taken in 1905. The history of spinal orthopedic surgery in Serbia begins with the work of Prof. Dr. Petar Simić, whose pioneering accomplishments continue to serve as the foundation for the development of spinal surgery at the University Clinical Center of Serbia and throughout the country.
Keywords: orthopedics; spinal surgery; history; Serbia

САЖЕТАК
Ортопедска хирургија има дугу и богату историју. Термин „ортопедија" првобитно је настао 1700. године, иако је њен развој почео много раније. Порекло спиналне хирургије може се повезати са четири историјска периода: египатским и вавилонским, грчким и рановизантијским, арапским и средњовековним. Историја ортопедске хирургије у Србији почиње доласком др Николе Крстића у Београд 1904. године, након студија у Бечу, као и првим рендгенским снимком шаке снимљеним 1905. године. Историја спиналне ортопедске хирургије у Србији почиње радом проф. др Петра Симића, чија пионирска достигнућа и даље служе као темељ за развој спиналне хирургије у Универзитетском клиничком центру Србије и широм земље.
Кључне речи: ортопедија; спинална хирургија; историја; Србија

INTRODUCTION

The development of spinal surgery in Serbia is rooted in the work of Prof. Petar V. Simić, PhD (1927–2004), an orthopedic surgeon and Professor at the University of Belgrade (Figure 1).

Professor Simić was born on February 25, 1927, into a distinguished family from the town of Arilje. In 1938, he was admitted to the Fourth Male Realgymnasium in Belgrade as a recipient of the King Alexander I Karađorđević scholarship, awarded to him in recognition of his father's Albanian Commemorative Medal. Due to the outbreak of World War II, he continued his education at the Užice Gymnasium, where he graduated in 1946. He obtained his medical degree from the Faculty of Medicine, University of Belgrade, on July 29, 1953, with an average grade of 8.75. After graduation, he was employed by state decree at the Orthopedic Clinic (as of 1957 – the Clinic for Orthopedic Surgery and Traumatology), which was headed by Prof. Dr. Svetislav Stojanović (1898 - 1977). That same year, he began his specialist training in

orthopedic surgery. At that time, high-quality orthopedic textbooks were not readily accessible, and the main reference material was the manual "Orthopedics: A Textbook for Physicians and Medical Students", written in 1934 by Associate Professor Dr. Borivoje Gradojević (1894 - 1979) (Figure 2).

Dr. Petar Simić passed his specialization exam with honors in 1958, becoming the twelfth orthopedic surgeon in the history of Serbia [1]. In the same year, he was appointed Teaching Assistant for the Surgery course at the Faculty of Medicine in Belgrade. In 1965, he defended his habilitation thesis, which at the time was one of the requirements for being promoted to a higher academic title. The title of his thesis was: "Injuries of the Thoracic Spine." He was appointed Assistant Professor for Surgery in 1966 and Associate Professor in 1970. He defended his doctoral thesis, "Problems in the Diagnosis and Treatment of Hyperextension Injuries of the Cervical Spine," in 1975. The following year, he was promoted to Full Professor of Surgery at the University of Belgrade Faculty of Medicine [2].

Prof. Simić became a full member of the Academy of Medical Sciences of the Serbian Medical Society in 1978. He also served as Head of the Department of Postgraduate Studies in Orthopedic Surgery and Traumatology at the Faculty of Medicine in Belgrade. From 1978 to 1983, he was Director of the Clinic for Orthopedic Surgery and Traumatology at the University Clinical Center of Serbia in Belgrade and is on record as the first director to resign from the position.

He was fluent in English and had working knowledge of French and German.

Professor Simić's surgical work

The origins of spinal orthopedic surgery in Serbia date back to 1964, when the Department of Neuroorthopedics was established within the Clinic for Orthopedic Surgery and Traumatology – an institution now known as the Department of Spinal Surgery (Figure 3). This department was founded through the perseverance, enthusiasm, and vision of Prof. Simić, who at the time recognized the need for a specialized center devoted exclusively to spinal pathology. Prof. Simić remained the Head of the department until his retirement in 1993. During that period, patients with tuberculous spondylitis – Pott's disease – presented a particular challenge, as did patients with spinal cord injuries, whose numbers were steadily increasing each year, primarily as a consequence of traffic-related trauma.

Prof. Simić was the first in our country and the region to introduce into surgical practice – and personally perform – a number of operative procedures on the spinal column, having carried out more than 6,000 complex spinal surgeries. Considering that the surgical microscope was introduced into spinal surgery only in 1977, computerized tomography in 1973, and discography and magnetic resonance imaging in 1980, one can only imagine the level of courage and determination that Prof. Simić demonstrated when he began performing spinal surgery, a discipline that is still regarded as exceptionally demanding. He made a significant contribution to advancing the diagnosis and surgical treatment of various pain syndromes associated with the spinal column. For several surgical procedures, he refined operative approaches, facilitating their easier and faster execution.

Pain syndromes of the spine are today the leading cause of morbidity among the working-age population and are the reason for the existence of numerous associations and organizations. Sessions on spinal pain syndromes are among the most attended and most engaging at all major international congresses. We are increasingly witnessing adolescents seeking medical attention

for cervical or lumbar syndromes, while spinal stenosis remains the predominant problem among the elderly population.

Prof. Simić designed and patented an implant for the stabilization of unstable spinal injuries in cases of vertebral fractures and dislocations, which is still known worldwide as the 'Simić Apparatus'.

In diagnosing spinal diseases, he relied primarily on clinical examination—a practice that has become quite rare today, as surgeons generally depend on NMRI findings and radiologists' opinions. The importance of the clinical examination is best illustrated by a quotation from Prof. Simić's book: "… *certain physicians neglect the classical clinical examination and hesitate to perform certain tests, disregarding the well-known fact that more errors have been made due to inadequate examination than for any other reason. This should be emphasized, because there is a tendency to overlook the taking of anamnesis and classical clinical examination, in the hope that some of the modern diagnostic methods, such as NMR and other techniques, will resolve the diagnosis*."

Professor Simić's professional development

Professor Simić underwent professional training at renowned clinics in England – the National Spinal Injuries Centre in Aylesbury in 1959 and the Royal National Orthopaedic Hospital in London in 1979. As part of his study visits, he spent time at the Central Institute of Traumatology and Orthopedics (*Национальный медицинский исследовательский центр травматологии и ортопедии имени Н.Н. Приорова – ЦИТО*) in Moscow, in 1964 and 1968; at the Karolinska Hospital (*Karolinska sjukhuset*) and Huddinge University Hospital (*Huddinge universitetssjukhus*) in Stockholm in 1979; and at Northwestern Memorial Hospital

in Chicago in 1981. From each of these visits, he brought back new knowledge and practices, which he applied in the treatment of his patients. He continuously kept up with professional literature and often emphasized that in medicine, one must read and learn constantly. As a long-standing member of the International Society of Orthopaedic Surgery and Traumatology *(Société Internationale de Chirurgie Orthopédique et de Traumatologie – SICOT*), he actively participated in its work, delivering lectures and presenting his papers at nearly all SICOT congresses.

Professor Simić's scientific contributions

Professor Simić was the author of more than 150 scientific and professional papers published in both domestic and international journals, including *The Journal of Bone and Joint Surgery*, *Srpski arhiv za celokupno lekarstvo*, *Acta Orthopaedica Iugoslavica*, the proceedings of the International Society of Orthopaedic Surgery and Traumatology (SICOT), the proceedings of the Yugoslav Association of Orthopaedic Surgeons and Traumatologists (JUOT) congresses, and others. He also wrote several books, the most significant being *Trauma – Local and General Disorders in the Organism* [3] and *Diseases of the Spine* [4], comprising about 750 pages (Figure 4). For the book *History of Surgery*, which he co-authored with his son, Prof. Dr. Aleksandar Simić, he was posthumously awarded the Belgrade City Award in Medicine for 2008 [5].

In addition to his exceptional professional achievements, he was also a talented painter and exhibited his artwork at several solo exhibitions (Figures 5 and 6).

Global development of spinal surgery in the 20th century

To fully appreciate the significance of Prof. Simić's pioneering work and the establishment of the Department of Neuroorthopedics, it is essential to consider the level of development of spinal orthopedic surgery in the world at the time.

Spinal surgery was revolutionized in the 20th century. This was fueled both by a deeper understanding of spinal anatomy and surgical approaches, and by the introduction of new diagnostic techniques and implants [3].

The origins of spinal surgery can be traced back to Hippocrates (460 - 370 BC), often referred to as the "father of spinal surgery." Hippocrates devoted serious attention to spinal deformities, which remain a challenge to treat even today, as differing opinions persist regarding operative versus non-operative management. The Hippocratic bench and ladder form the basis of all modern methods of indirect decompression – spinal traction (Figure 7). This method appears to be more widely used today than ever before in the treatment of various spinal pathologies, yet few practitioners are aware that the concept originated with Hippocrates [6]. One of the most prominent followers of Hippocrates, the Greek physician of the Roman Empire period, Galen (129 - c. 216), was the first to define scoliosis, kyphosis, and lordosis. The French military surgeon Ambroise Paré (1510–1590) was the first to introduce braces in the treatment of these deformities, which remain the foundation of non-operative management even today. The French surgeon Jules René Guérin (1801 - 1886) performed the first official surgical correction of scoliosis in 1865 [7].

Spinal surgery achieved its most significant and rapid advancements in the 20th century, driven by the introduction of the surgical microscope, X-rays, discography, CT scanning, NMRI [8], and implants for internal fixation. The earliest internal fixations targeted the posterior structures of the cervical spine, likely due to anatomical accessibility, with the first successful posterior

cervical fixation at C6-C7 using figure-of-eight silver wiring documented in 1891 [9]. The anterior approach to the cervical spine was introduced in 1890, but the first anterior cervical discectomy and fusion (ACDF) was performed in 1958 by George W. Smith (1916 - 1964) and Robert A. Robinson (1914 - 1990), as well as by Ralph Bingham Cloward (1908–2000), independently of each other. Surgical approaches and instruments for the anterior approach continue to bear the names of these surgeons today [10]. During this period, Prof. Simić also began introducing these procedures at the Clinic for Orthopedic Surgery and Traumatology in Belgrade.

The first official description of lumbar-sacral spine fixation using screws dates back to 1948, when the first fixation through the facet joints was performed (Figure 8). In 1970, Raymond Roy-Camille (1927–1994) introduced the current gold standard for spinal fixation – transpedicular fixation. He also devised a method for posterior cervical spine fixation with lateral mass screws, which also remains the gold standard to this day [11].

Prof. Simić was perhaps most profoundly influenced by the work of Paul Randall Harrington (1911–1980), an American surgeon who introduced the Harrington rod fitted with hooks in 1955 (Figure 9). This system was originally designed for open correction of spinal deformities but came to be used for dislocation fractures of the thoracolumbar spine after 1969, when modified instrumentation combining hooks and transpedicular screws was developed [12]. A modified version of this system is still in use today for the treatment of kyphoscoliotic deformities, although hooks are now employed far less frequently. Modern spinal surgery routinely integrates posterior, lateral, and anterior approaches - something that would have been unthinkable in the 20th century.

During Prof. Simić's era, patients with tuberculous spondylitis – Pott's disease – posed a major therapeutic challenge both in our country and worldwide [13]. Both then and now, the guiding

principle of treatment remained the same: a combination of medication, as the foundation of treatment, and surgery. Interestingly, early surgical management of these patients involved radical (excisional) surgery – a practice introduced in our country by Prof. Simić himself. Among senior orthopedic surgeons who had the privilege of witnessing his pioneering work, the first associations that come to mind are the Dott and Alexander procedures (anterolateral thoracic decompression). Today, the treatment of tuberculous spondylitis is based on the so-called "middle-path regime," which combines antituberculous drug therapy with conservative surgery focused not on removing the pathological substrate, but primarily on preventing deformity and neural damage.

The twenty-first century has brought numerous groundbreaking innovations, all within the realm of minimally invasive surgery. These include integrating diagnostic technologies (the endoscope, the 3D microscope, the exoscope) with instruments for minimally invasive fusion, introducing biologically compatible implants, and incorporating robotics and navigation – advancements that are ushering us into a new, still largely unexplored world of artificial intelligence [14].

After Prof. Petar Simić's retirement, the development of spinal surgery in Serbia continued and has persisted to this day. The department's leadership was assumed by Dr. Slobodan Šljivar. It was later renamed the Department of Acute Spinal Trauma of the Clinical Center of Serbia, initially headed by Dr. Branislav Pešić, alongside Dr. Nebojša Lozo and a group of young orthopedic residents who were increasingly showing interest in spinal pathology and surgery. Today, the department is officially known as the Department of Spinal Surgery, as it treats not only patients with spinal injuries from across the country and the region, but also those with tumors, infections, degenerative diseases, and deformities of the spine (with the exception of

pediatric deformities, for which the Institute for Orthopedic Surgery *Banjica* remains the national referral center).

Over the past ten years, more than 15 new procedures in the domain of spinal surgery have been introduced at the University Clinical Center of Serbia, the most significant of which include: vertebral cementing (vertebroplasty and sacroplasty) for fractures and tumors; minimally invasive surgery (tubular and endoscopic); percutaneous stabilization of the spine and sacroiliac joints; vertebral body replacement (corpectomy); occipito-cervical fusion and C1–C2 fusion; spinopelvic stabilization; cervical and lumbar disc prosthesis; intrathecal and intralesional administration of BMAC (bone marrow aspirate concentrate, mesenchymal stem cells) in patients with spinal cord injury; and radiofrequency tumor ablation.

Among the procedures performed for the first time at the University Clinical Center of Serbia were awake spine surgery ("awake spine") and navigation-assisted stabilization. Culminating decades of spinal surgery in Serbia – beginning with Prof. Simić's pioneering surgeries and the founding of the Department of Neuroorthopedics to the present – in May 2025, the Department of Spinal Surgery of the University Clinical Center of Serbia was designated a *Eurospine Surgical Center of Excellence* (Figure 10), performing over 500 procedures annually.

Although successors will never fully grasp the challenges of being a leader and pioneer of spinal surgery, today's spinal surgeons can appreciate how difficult it was to operate on the spine in an era without tools such as the surgical microscope, CT scanner, NMRI, modern anesthesia, and contemporary implants. For this reason, profound gratitude and deep respect are owed to surgeons such as Prof. Petar Simić.

In conclusion, another quote from Prof. Simić's book, *Diseases of the Spine*: "*It has been said that humankind had to leave Paradise behind because of the desire for knowledge, but whether*

this be true or not, it is certain that our desire for knowledge will secure Paradise for us in the future" [4].

Ethics: The authors declare that the article was written according to the ethical standards of the Serbian Archives of Medicine as well as ethical standards of institutions for each author involved.

Conflict of interest: None declared.

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Figure 1. Prof. Petar V. Simić, PhD (1927–2004), founder of spinal surgery in Serbia and Full Professor at the University of Belgrade Faculty of Medicine

ОРТОПЕДИЈА

УЏБЕНИК
НАМЕЊЕН МЕДИЦИНАРИМА И ЛЕКАРИМА

НАПИСАО
Dr БОРИВОЈЕ ГРАДОЈЕВИЋ

ИЗДАЊЕ ФРАНЦУСКО-СРПСКЕ КЊИЖАРЕ
А. М. ПОПОВИЋА БЕОГРАД

Figure 2. The first orthopedic textbook, written in 1934 by dr Borivoje Gradojević

Figure 3. Clinic for Orthopedic Surgery and Traumatology, Belgrade, circa 1960

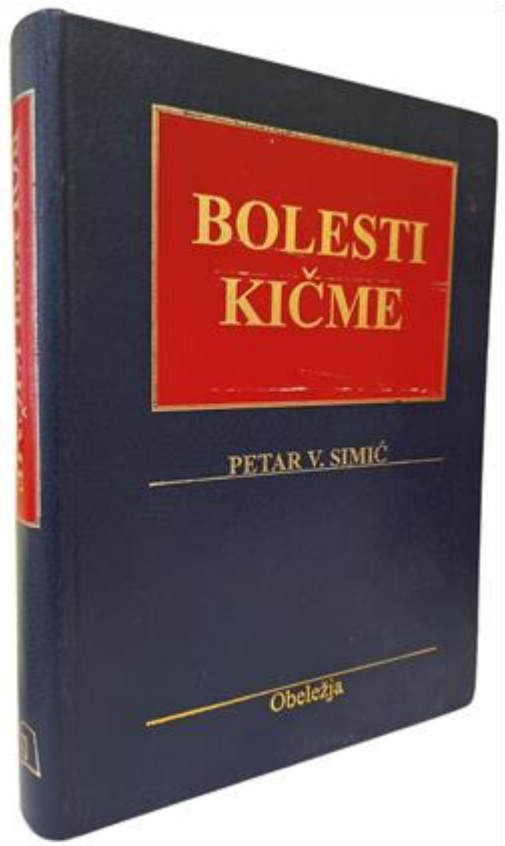

Figure 4. Title page – *Diseases of the Spine*

Figure 5. Prof. Petar Simić's works of art

Figure 6. Prof. Petar Simić's works of art

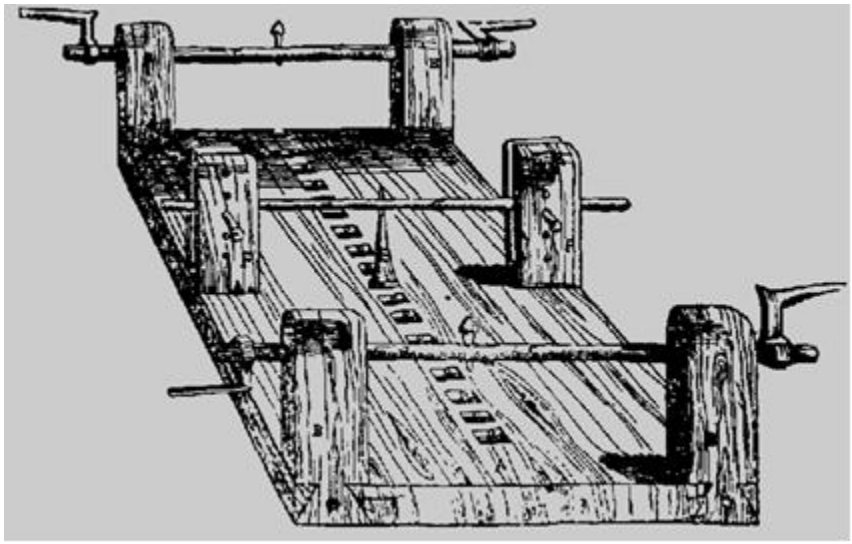

Figure 7. The Hippocratic bench (source: *Loeb Classical Library*)

Figure 8. Source: King D. Internal fixation for lumbosacral fusion. J Bone Joint Surg Am. 1948;30A(3):560–5. [PMID: 18109577]

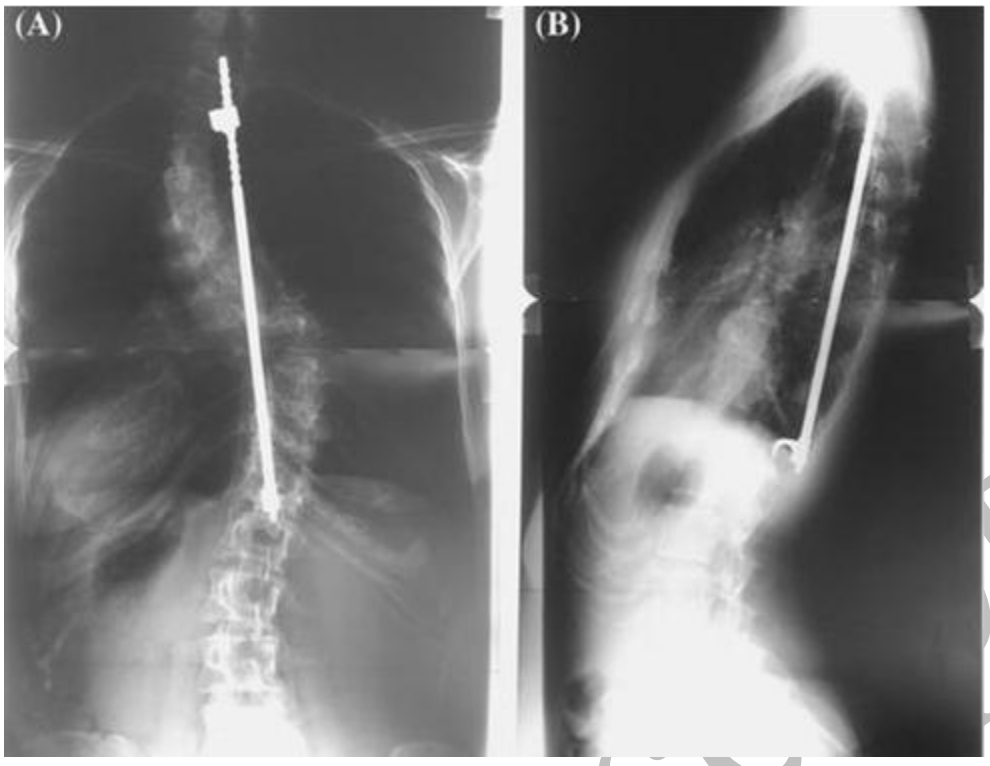

Figure 9. The Harrington rod fitted with hooks; source: Hasler CC. A brief overview of 100 years of history of surgical treatment for adolescent idiopathic scoliosis. J Child Orthop. 2013;7(1):57–62. [DOI: 10.1007/s11832-012-0466-3] [PMID: 24432060]

Figure 10. The *Eurospine Surgical Center of Excellence* certificate

