

Original article

Establishment of Saratov orthopedic school: The background and leading scientists

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Abstract:

The article elucidates the establishment of Saratov orthopedic school, along with contributions of the most prominent Saratov scientists and practitioners in the field, Sergey Mirotvotsev, Leonid Deryabin, Alexander Eletsy and Alexey Demidov.

Keywords: history of orthopedics, Saratov orthopedic school, Sergey Mirotvortsev, Leonid Deryabin, Alexander Eletsy, Alexey Demidov.

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Introduction

In the first half of the twentieth century, there were seven orthopedic centers of distinguished regional significance in the USSR: Moscow, Saint Petersburg, Kazan, Kiev, Kharkov, Odessa and Saratov. Two of those were established in historical capitals of Russia, whereas the other five were influential regional schools formed in accordance with the European model, i.e., on the basis of significant university schools in their regions. Saratov was the city with the last imperial University founded in 1909 and the most recently established orthopedic center nationwide. The goal of our study was to investigate the development of orthopedic school in Saratov along with the contributions of individual scientists and practitioners into its establishment.

Materials and Methods

The resource database for this study was compiled from unpublished documents of the State Archive of Saratov Oblast (SASO), archival sources of Saratov Research Institute of Traumatology and Orthopedics (SRITO), personal documents and published sources.

Results

Baseline

In our opinion, the starting point of Saratov orthopedic school development could be tied to the beginning of 1910s, judging by the following facts: in 1912, a practitioner Leonid V. Deryabin and a scientist Nil V. Kopylov started working in Saratov. The latter held the position of anatomist at the Department of Operative Surgery and Topographic Anatomy. The same year, he published a number of research papers in orthopedics including Introduction to Orthopedics, which has become widely known in Russia [1].

Saratov medical research community was renowned in Russian Empire, and later in the USSR, for such prominent specialist as S.I. Spasokukotsky, V.I. Razumovsky, S.R. Mirotvortsev, N.V. Kopylov, L.V. Deryabin, V.I. Lisnyansky, V.L. Bogolyubov and many others. However, assessing actual contributions into the development of orthopedic school in the region, we should admit that in the first half of the twentieth century, orthopedics in Saratov was promoted mainly by the efforts of four scientists: Leonid Deryabin, Sergey Mirotvortsev, Alexander Eletsy and Alexey Demidov.

Leonid Deryabin as a disciple of leading European traditions in Saratov

In our opinion, Leonid V. Deryabin (*Figure 1*) is a founder of orthopedic surgery in Saratov. He was born on May 24, 1879, in Stavropol-Kavkazsky. While a student at Odessa University, he has been mastering the best achievements of Odessa and Kharkov scientific schools. Then, in 1905, Leonid Deryabin started working as a medical resident at the hospital of Professor von Fink. The private orthopedic hospital of Doctor Julius von Fink in Kharkov was the first medical institution in Ukraine, where medical treatment was given to the patients (both adults and children) with injuries and musculoskeletal system disorders. In his practice, professor Julius von Fink used the most progressive methods of his time for treating injuries and congenital skeletal deformities: plaster immobilization, gradual plaster bandages, orthopedic redressement, etc. He introduced the technique of soft tissue immobilization and talipes correction in children from the first days of their lives, which is still used as Fink-Etingen bandaging [2].

Upon the graduation from the university, Leonid Deryabin served as apprentice to leading European orthopedists of early twentieth century. In Vienna, Professor Adolf Lorenz taught him the methods of treating bone and

joint tuberculosis and congenital joint dislocations. Professor Schulthess taught him scoliosis treatment and muscle transplantation in Zurich. Riccardo Galeazzi, Head of Pious Institute for Rickets Sufferers of Milan (currently an orthopedic hospital [3]) and the founder and editor of the scientific magazine, Orthopedic Archives, taught him the basics of preventive pediatric orthopedics. Hermann Küttner, and especially Erwin Payrin who was known for his works in the field of arthroplasty in Breslavl (older name of Wroclaw), shared with Leonid Deryabin their knowledge of replacement arthroplasty.

From 1912 and until his death (1944) Leonid V. Deryabin worked in Saratov. The initial field of his research activities was determined by the epidemiological situation, associated with a high prevalence of bone and joint tuberculosis among children in Saratov, as well as of musculoskeletal system disorders requiring an orthopedic treatment.

Following the traditions of Swiss school represented by Wilhelm Schulthess, Leonid V. Deryabin employed various methods of scoliosis treatment. The onset of his professional carrier was associated with the First Children's Hospital in Saratov. The latter has been established on charitable donations of a merchant's widow D. Pozdeeva. However, two years later, Leonid Deryabin has founded his own clinic, which was officially named The Orthopedic Clinic of Dr. Deryabin. Quite soon, it has become the foremost orthopedic center in Saratov. The clinic has been functioning until the end of 1920s – until elimination of private clinics in the USSR.



Figure 1. Leonid Vladimirovich Deryabin. The source: the archive of Professor Daniil Puchinyan

Leonid V. Deryabin was among the first in Russia to appreciate an importance of X-ray methodology for the development of traumatology and orthopedics. In 1910s, he became one of the first members of the German X-ray Society with a membership card of Deutsche Röntgen Gesellschaft number 110. Medical science historians note that the first X-ray experiments in Russia were conducted in Saint Petersburg – but it was Saratov, where the first Russian X-ray society was established in 1913, whereas such organization appeared in the capital of the Russian Empire only three years later. Saratov has become one of the first Russian regional cities to have an X-ray device [4].

Despite the fact that Leonid V. Deryabin was a practitioner, he was treated with respect by many renowned scientists, including Sergey Mirotvortsev. This fact was confirmed by the analysis of personal correspondence between two Saratov orthopedists [5].

Sergey Mirotvortsev: Military surgeon and organizer of orthopedic and trauma service in southern Russia

Sergey R. Mirotvortsev (Figure 2) was born on May 16, 1878, in Ust-Medveditskaya Cossack village in Tsaritsyn region of Saratov Province (currently, it is the town of Serafimovich) in the family of a gymnasium teacher. In 1898, Sergey Mirotvortsev was admitted to the School of Medicine at Kharkov University, and his first student studies were dedicated to the anatomy of the musculoskeletal system, “on simulated dislocation of wrist bones and on the blood supply system of tendons and the sheath of a hand.” He was awarded golden medals for these scientific explorations [6]. In 1903, Mirotvortsev graduated from Kharkov University with an Honors Diploma of a medical doctor. In the Fall, he left for Saint Petersburg, where he worked as a medical resident at Obukhov Hospital under the supervision of Professor Sergey P. Fedorov.



Figure 2. Sergey Romanovich Mirotvorsev. The source: the archive of SSMU, Case 1894, Sheet 1

In January 1904, the war between Japan and Russia has started, and a young talented surgeon applied for the field hospital service near the scene of military operations in Port Arthur, China, where he worked under the supervision of a prominent field surgeon, Viktor B. Hubbenet. For treating the wounded, as well as for the personal courage, Sergey Mirotvortsev had received multiple awards: the Order of St. Stanislaus of the 3rd degree with swords; Golden Medal 'For Courage' on the St. George's Ribbon, Order of St. Anna Medal, of the 3rd class, with swords; Red Cross Medal for the Russo-Japanese War; Silver Medal 'For the Siege of Port Arthur'; Red Cross Emblem of the 2nd degree.

In August 1905, despite his young age (his was just 27), Sergey Mirotvortsev was admitted to Saint Petersburg Imperial Military Medical Academy, where his scientific advisor was S.P. Fedorov, who has worked with him earlier and who recommended him to elaborate the surgical method for ureter transplantation into the rectum. At the conference of the academy on March 23, 1909, as a result of his successful research, Sergey R. Mirotvortsev underwent the flawless defense of his dissertation for the Doctor of Medicine degree on the topic, "Experimental Data for Conducting Ureter Transplantation into the Rectum."

In 1909-1911, while working as an Assistant Professor at the Department of General Surgical Pathology, chaired by Professor V.A. Oppel, he was directed to the clinics of August Bier in Berlin and of 1909 Nobel Prize winner, Emil Theodor Kocher in Bern, for further professional development [7].

The further career of Sergey R. Mirotvortsev was tied to Saratov, but his presence here was interrupted by the World War I in summer of 1914. He applied for the military surgeon service jointly with his colleagues, S.I. Spasokukotsky, A.B. Arapov, V.I. Razumovsky and others. Sergey R. Mirotvortsev was appointed the chief surgeon at the Red Cross hospital at the southwestern battleline, in Warsaw and later in Lublin. He was awarded the Order of Saint Vladimir of the 4th class with swords, and he has become State Councillor, which, at the time, corresponded to the rank of General in the army.

During the World War I, Sergey R. Mirotvortsev had conducted over 2,000 surgeries. He described his immense experience in several major scientific papers, including two monographs ("On the Shrapnel Wounds Caused by Airplane and Zeppelin Bombs" and "Proceeding of Military Field Surgery Based on the Materials Basis of the Western Front for January-April of 1916").

Sergey R. Mirotvortsev was the first to elaborate on the issue of professional orthopedic education in Saratov. According to the protocol of the School of Medicine session at Saratov University, his proposal was discussed from February 26 through March 11, 1918. He gave two reasons as the background of this necessity: first, there were many children in need of orthopedic treatment in Saratov; and second, "the abundance and variety of the latest orthopedic methods have made it an independent surgical field" [8]. Professor I.N. Bystrenin supported his colleagues and added the initiative to create a mechanotherapy office. To justify its necessity, he described the perplexing situation regarding the preventive care and treatment of pediatric diseases: orthopedic care, physiotherapy exercise and massage were available exclusively at private medical offices, which served only commercial needs, "...often on the brink of profiteering" [9].

Apart from the resolution to elect a committee of eight professors for further consultations, there were no other specific decisions made by the end of the discussion. That is

why, a year later, Sergey R. Mirotvortsev has returned to this issue, and on July 3, 1919, he wrote a letter to the executives of the School of Medicine at Saratov University with a request to establish the Department of Orthopedics. Professor Mirotvortsev supported his decision by the fact that orthopedics already existed as a scientific discipline. Moreover, he lectured in orthopedics himself but, due to the fact that orthopedics per se was not officially recognized as an independent scientific branch, he had to teach it under the names of desmurgy, mechanurgy, and the study of fractures and dislocations [10]. His request was reviewed and approved by the School of Medicine Committee on its session on July 25, 1919. One of the reasons of that approval was related to an imminent growth of orthopedic patients due to forthcoming industrialization [11].

It should be noted that on December 29, 1922, Sergey R. Mirotvortsev has become the Chancellor of Saratov University: as a matter of fact, he was so far the last medical professional taking this position at the university. The chancellor elections in the newly formed USSR were still organized, according to the European model, by curiae (students, faculty and staff). Each curia offered its candidates, and then the participants of the second round (those who received at least three quarters of the votes) were elected by the secret ballot. The winner was elected by the open vote of the majority. Back then the chancellor was reelected annually. Professor Mirotvortsev held this post until April of 1928. Under his management, the university library started to develop rapidly and was put onto the list of libraries obligatorily provided with the sample copies of all books published in the USSR. This achievement has determined further development of the university library by making its collection unique: it has become the third major library nationwide in the second half of twentieth century (at present, the collection includes over three million books) [12]. In 1928, he decided against his reelection the next year due to increased role of School of Social Sciences and other trends of early Stalinism.

In 1928, Professor Sergey R. Mirotvortsev has returned to the Department of Surgery, which he directed for the rest of his life. The rejection of administrative work allowed him, as early as at the beginning of 1929, starting an independent course in orthopedics for students, which was the completion of his ten-year long work in the field. During this period, Professor Mirotvortsev wrote the majority of his 80 scientific papers.

In 1939-1940, at the beginning of World War II, Professor Mirotvortsev was appointed the Chief Surgeon of all civil and military hospitals in Saratov and Penza Oblasts, and since 1941, the Chief Surgeon of all Saratov hospitals. The sad heritage of World War II endorsed the scientist's dreams to create an orthopedic service in the region. The significant number of war invalids, who could return to active life, required the professional orthopedic care. Specialized orthopedic and restorative surgery centers were established nationwide; and on November 19, 1945, on the basis of military hospital No. 995, Saratov Research Institute of Orthopedics and Restorative Surgery was founded. Sergey R. Mirotvortsev was appointed its first director.

Saratov period of scientific explorations of one of the founders of orthopedic service in Ukraine

Alexander G. Eletsy (Figure 3) was born on May 29, 1889, in Kharkov in the family of a clerk. In 1906, he was

admitted to the School of Medicine at Kharkov University. He graduated with excellent grades, and after the graduation, he was drafted into the military service in Saratov as a physician. In 1913, A. Eletsky was admitted to Saratov University as an assistant prosecutor to the Department of Operative Surgery. In 1919, he organized an orthopedic unit at the health resort for the patients with bone and joint tuberculosis, where he worked on development of surgical treatment methods. In 1924, A. Eletsky defended his doctoral dissertation, Resection of Posterior Radices of the Spinal Cord as a Method of Spastic Paralysis Treatment, and in January of 1925 he took the position of a Professor at the Department of Operative Surgery and Topographic Anatomy, Saratov State University. In October 1924, Saratov State Institute for Tuberculosis of People's Commissariat for Healthcare of the Russian Soviet Federative Socialist Republic was established. Professor Alexander Eletsky was appointed the Head of Orthopedic Unit of that Institute.

During that period, Saratov orthopedic school formation influenced similar trends in other regions. Professor A. Eletsky was the first in the USSR to perform hip and knee arthroplasty in patients with tuberculosis lesions of joints. In 1928, at the Surgery Congress in Leningrad, he presented the report on the significance and perspectives of arthroplasty. Saratov period of A. Eletsky's research is marked with development of novel fields in the reconstructive surgery of the locomotor system. In Saratov, A. Eletsky had his first disciple, Alexey Demidov, whose achievements will be described below.

In 1932, Alexander G. Eletsky was invited to work at the Department of Traumatology and Orthopedics of Academician A.A. Bogomolets Medical Institute of Kiev. It is noteworthy that the world-renowned academician Alexander Bogomolets worked at Saratov University, where he laid the foundation for a novel branch of medical science, pathophysiology. In 1918, he established the first State Institute of Microbiology and Epidemiology of the Russian Southeast (it is known at present as the Russian Research Antiplague Institute 'Microbe'); and in 1933-1965, he was in charge of this department [13]. He organized the school for young scientists, the graduates of which were the future professors A. Ozerov, I. Knysh, M. Panchenko, I. Talko, A. Scherban and distinguished Soviet scientists.

In 1932, the People's Commissariat of Healthcare of the Ukraine invited Alexander G. Eletsky to Kiev Medical Institute to become the Chair of the Department of Traumatology and Orthopedics. Interestingly, that happened not only because of scientific merits of the candidate, but also due the fact that he represented the school of famous Saratov professors, Sergey I. Spasokukotsky and Vasily I. Razumovsky [14].

First dissertation research in the field of orthopedics in Saratov

The first dissertation on orthopedics in Saratov was written in 1939 by Alexey Ya. Demidov on the topic, "The Influence of Limited Knee Resection on the Growth of the Lower Limbs."

Alexey Ya. Demidov (Figure 4) was born on August 9, 1898, in Saratov in a family of a clerk. From 1917 to 1922, he studied at the Medical School of Saratov University. While he was a student, he worked as an Instructor of Anatomy at the Department of General Anatomy and Operative Surgery.



Figure 3. Alexander Grigorievich Eletsky. The source: Grishin SE, Ulyanov VYu, Ostrovsky VV, et al. Traumatology and Orthopedics in Saratov: History, Traditions, Achievements. Vol. 1. Saratov: New Medical Technologies LLC, 2020. P. 56. (304 p.).

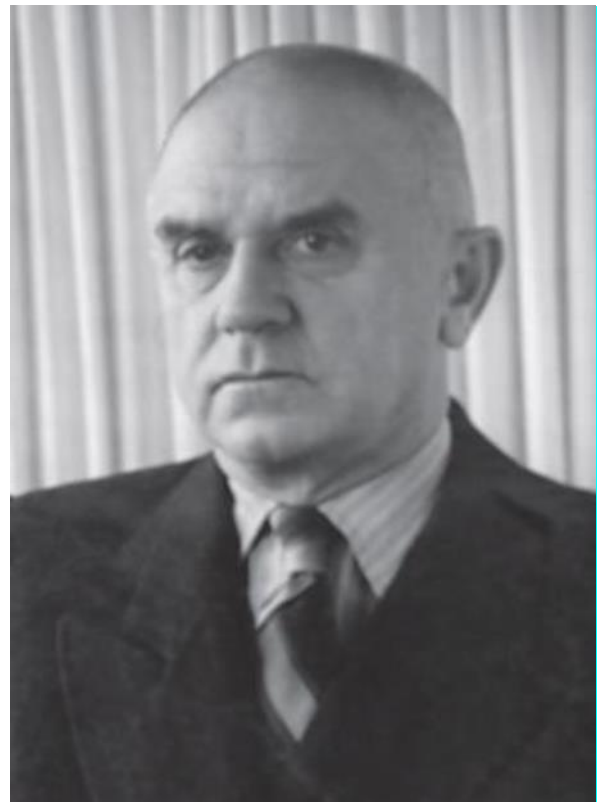


Figure 4. Alexey Yakovlevich Demidov. The source: the archive of SRITO SSMU, Case 796, Sheet 1

His devotion to surgery led a young doctor to the hospital surgery clinic supervised by Professor Sergey I. Spasokukotsky, where he worked as a medical resident. Due to an absence of a full-time, he moved to the city of Guryev (Kazakhstan), where he supervised the City Hospital and Department of Surgery.

In 1925, Alexey Ya. Demidov returned to Saratov, because he was appointed a Senior Research Associate of Orthopedics Department at Saratov State Tuberculosis Institute, where he

started orthopedic research under the guidance of the Head of the Orthopedics Department, Alexander G. Eletsy.

In 1935, Alexey Ya. Demidov took the position of assistant orthopedist at the surgical clinic of Saratov Medical Institute, which was directed by Professor Sergey R. Mirotvortsev, under whose supervision Alexey Demidov had completed his dissertation research.

In the years to come, Alexey Demidov has further developed the scientific ideas Hip formulated by Professor Eletsy, which was reflected in his doctoral dissertation, Hip Arthroplasty with the Consequences of Tuberculosis Coxitis (1967). Experimenting with various biological tissues, he proved that the best interarticular coatings were autogenic and allogenic skin grafts. He has formulated the necessity criteria for such surgeries as pathological dislocations, false joints, deforming osteoarthritis, and ankylosis with stable cancellation of tuberculosis process with 78% of positive outcomes of arthroplasty [15, 16].

Alexey Ya. Demidov, the follower of professors Eletsy and Mirotvortsev, continued the development of orthopedic school in Saratov. He supervised the Orthopedic Clinic of Saratov Research Institute of Orthopedics and Restorative Surgery (in 1957, it was renamed into Saratov Research Institute of Traumatology and Orthopedics) from 1949 through 1964. During that time, Lydia P. Shtern, Julia D. Krasnyukova and Joseph Z. Neyman, future prominent orthopedic surgeons, prepared their dissertations under his scientific supervision.

The completion of Saratov orthopedic school establishment

As it was stated above, orthopedics in Saratov in the first half of the twentieth century was actually developed by the efforts of four people: L. Deryabin, S. Mirotvortsev, A. Eletsy and A. Demidov.

The situation had drastically changed after the establishment of Saratov Research Institute of Orthopedics and Restorative Surgery, which became an official orthopedic center in southern Russia. Over the first decade of its existence, the employees of this institution had published more than 120 scientific articles, defended 11 PhD theses, 9 of which were dedicated to the essential current issues of orthopedics and restorative surgery. On the whole, during this period, scientists were interested in issues related to restoring long bones from injuries, as well as in a surgical treatment of scoliosis.

Conclusion

Hence, for the first time, an influence of Ukrainian orthopedic school on other USSR regions is revealed in this publication. As it can be seen, all three scientists, who founded the orthopedic school in Saratov, were the disciples of the Ukrainian orthopedic school. According to one of the founders of Russian orthopedics, Roman Vreden, this remarkable fact could be explained by the most favorable conditions for orthopedics' development in early twentieth century existing in Ukraine, with its "excellent orthopedic institutions in Kharkov and Kiev". Strong informal scientific ties between Saratov and Kiev physicians, formed after the evacuation of St. Vladimir Kiev University to Saratov University because of the World War I beginning in 1915, are also worth noting.

A process of establishing Saratov orthopedic school lasted fifty years. During that period of time, three generations of orthopedists replaced each other – from the followers of Ukrainian orthopedic school (one of the strongest orthopedic schools in the Russian Empire), improving their skills and qualifications at leading European universities, to the graduates of the newly established Saratov orthopedic school.

An establishment of Saratov orthopedic school started in 1910s. It was associated with such prominent scientists and practitioners as Sergey Mirotvortsev, Leonid Deryabin, Alexander Eletsy and Alexey Demidov. Largely due to their recognition in the professional community, in the first half of twentieth century, Saratov has been acknowledged a significant orthopedic center in the USSR.

Alexander Eletsy has made the most substantial contribution into the elaboration of orthopedic surgery, and he was the first Soviet surgeon performing hip and knee arthroplasty in patients with tuberculosis damage to their joints. His Saratov follower, Alexey Demidov, in late 1930s, wrote the first orthopedic dissertation in Saratov. Demidov's disciples completed the formation of Saratov orthopedic school.

Leonid Deryabin had opened the first European quality orthopedic clinic in Saratov. His professional activity became widely known nationwide, and Saratov was highlighted as a new orthopedic center in the minds of Russian physicians.

The contribution of Sergey Mirotvortsev was in establishing orthopedic education as a separate discipline at Saratov University, as well as in founding the Research Institute of Traumatology and Orthopedics, which has become the specialized scientific and methodological center in southern Russia.

Hence, our analysis implied that the orthopedic school, established in Saratov in early twentieth century, was among the most influential in the USSR by the time of completing its formation in 1957.

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