

Russian thyroid surgery from the 19th to the early 20th century



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INTRODUCTION: *The aim of our study was to investigate the contributions made to thyroid surgery by outstanding Russian surgeons; (Pirogov N.I., Bujalskiy I.V., Velyaminov N.A., Bobrov A.A., Lezhnev N.F., Fyodorov S.P., Opel V.A. and others)*

MATERIALS AND METHODS: *Research was done on thyroid surgery in Russia in the period from the early 19th century to the early 20th century and the achievements of Russian surgeons were assessed in relation to progress in the field worldwide, including the difficulties that prevented Russian surgeons from gaining extensive attention at an international level and the steps taken by Russia in the 21st century to share expertise in thyroid surgery with other countries.*

Data was gathered from 178 documents. Books, manuals, and other scientific publications, as well as doctors reports and patient records were analyzed. Research was done on 15 surgical instruments and 10 photographs.

RESULTS: *The first description of thyroid surgery in Russia dates back to 1804. In 1831 Nikolaiy Ivanovich Pirogov described the anatomy, topography, syntopy and the main principals of thyroid surgery. In 1847 he performed the first "strumectomy" in the world under general anesthesia. For bleeding control he used 30 - 40 ligatures and vascular forceps with locks. The next operation on the thyroid under anesthesia was carried out 13 years later by Eugene S. Cooper (USA). Ilya V. Bujalskiy (Russia), consultant at St.-Petersburg Mariinsky hospital, used an ether narcosis in May, 1847 and chloroform in August 1848 when operating on the thyroid. One other description of the use of chloroform narcosis, by Paul von Sick (Germany) in 1867. In 1886 Nicolay A. Velyaminov performed thyroid resection in the Mariinsky hospital. In 1904 Russian surgeon Nikolai F. Lezhnev reported on 106 thyroid operations performed with visual control of the recurrent laryngeal nerves in Bobrov's clinic in Moscow, where those techniques had been introduced in 1893. He also dealt with the problem of ectopic goiter, and at sessions of the Pirogov Surgical Society gave case presentations of patients with lingual goiter (1908, 1926). Sergey P. Fedorov was well-known in Europe. That is why William Mayo came to observe his operations. He called Fedorov a "master surgeon".*

CONCLUSION: *The contribution of famous Russian surgeons to the field of thyroid surgery is important and should be appreciated at its true value.*

KEY WORDS: History, Thyroid surgery

Our Russian colleagues often complain that, in lectures on endocrine surgery and oncology, we frequently refer to the works of foreign surgeons. However, they are usually unable to name a surgical technique which was initially proposed by a Russian. A story of an old forgot-

ten photograph¹ inspired us to examine the archives of endocrine surgery. This analysis demonstrated that the development of thyroid surgery in other countries benefited from a significant contribution made by Russian surgeons. Indeed, Russian surgery in the 19th and early 20th century progressed as in other developed countries, yet references to Russian pioneers are seldom found. Here, we present data on the contribution of outstanding Russian surgeons, Drs. N. I. Pirogov (Pirogoff), N. A. Velyaminov, F. I. Inozemtsev, S. P. Fyodorov, V. A. Oppel, N. F. Lezhnev, and their followers, to the field of thyroid surgery.

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Nikolai Ivanovich Pirogov (1810-1881) was a genius of Russian surgery (Fig. 1). At the age of 20, at a written test to defend his Doctor of Medicine degree, he presented his understanding of the structure and function of the thyroid and the major checkpoints of thyroidectomy. He was pretty accurate in describing thyroid morphology and clinical features of thyroid disease, and also drew important conclusions about ways to prevent dangerous complications during thyroid surgery. Pirogov wrote: "Prior to extirpation, ligation of the superior thyroid artery should be performed and preferably on both sides. Regarding the inferior thyroid artery, due to its deep location under the gland, it has to be ligated after the lower end of the thyroid is lifted...". Pirogov described approaches to the thyroid ("elliptic, longitudinal, cruciform neck cuts"), and stages of thyroidectomy ("bilateral ligation of the superior thyroid arteries...exposure of the thyroid... ligation of the inferior thyroid artery") in detail ².

In May 1847 in St. Petersburg he performed a number of experiments with ether anesthesia in animals and on himself, and was the first in the world to perform thyroid resection under general anesthesia ³, less than a year after the beginning of clinical use of ether by Dr. John Warren (USA). Similar operations were performed in 1852-1853, again, using 30-40 ligatures, which was unusual in European surgical practice at that time. "The first description of thyroid operations" was published by Prof. Yefrem O. Mukhin of the Moscow University in 1807 ⁴, however, neither clinical cases, nor surgical techniques or their results were presented. A similar publications on thyroid surgery was presented by Christian Salomon in "Manual on Operative Surgery" of 1840 ⁵. The observations made by Nikolai Pirogov were of a precise, certain, and complete nature, and included data on outcomes. That is why the thyroid operation performed by Prof. Pirogov in 1847 has been acknowledged to be the first one in Russia.



Fig. 1: Nikolay Ivanovich Pirogov (1810-1881).



Fig. 3: Fyodor Ivanovich Inozetsev (1802-1869).



Fig. 2: Ilya Vasilievich Buyalsky (1789-1866).



Fig. 4: Nikolay Vasievich Sklifosovky (1836-1904).



Fig. 5: Pirogov's travel kit.



Fig. 6: Vasily Ivanovich Razumovskiy (1857-1935).

At the same time (in May, 1847), surgical interventions under general anesthesia were performed by Ilya V. Buyalskiy (Fig. 2) in St. Petersburg, and Fyodor Inozemtsev (Fig. 3) in Moscow. In August 10 of 1848 Prof. Buyalskiy, consultant at Mariinskiy Hospital from 1831 to 1864, successfully used chloroform for general anesthesia in a baby girl 7.5 months of age with cubital lipoma. The next report of chloroform narcosis was made by Paul von. Sick (Germany) in 1867.

In October 9, 1874 Professor Nikolai V. Sklifosovskiy (Fig. 4) performed a total thyroidectomy in a 21-year-old man with goiter causing dyspnea. The surgery took place at the Imperial Military Medical Academy, St. Petersburg. He used vascular forceps with locks that were manufactured at the St. Petersburg Instrument factory already in 1841-1856 when Prof. Pirogov, was its director. Prof. Pirogov carried these forceps in his travel kit (Fig. 5). The manufacture of reusable vascular forceps in Europe was started only in 1872-1874, by Thomas Spencer Wells in Great Britain

In 1903, Professor Vasily I. Razumovskiy (1857-1935) (Fig. 6) from Saratov published a monograph on

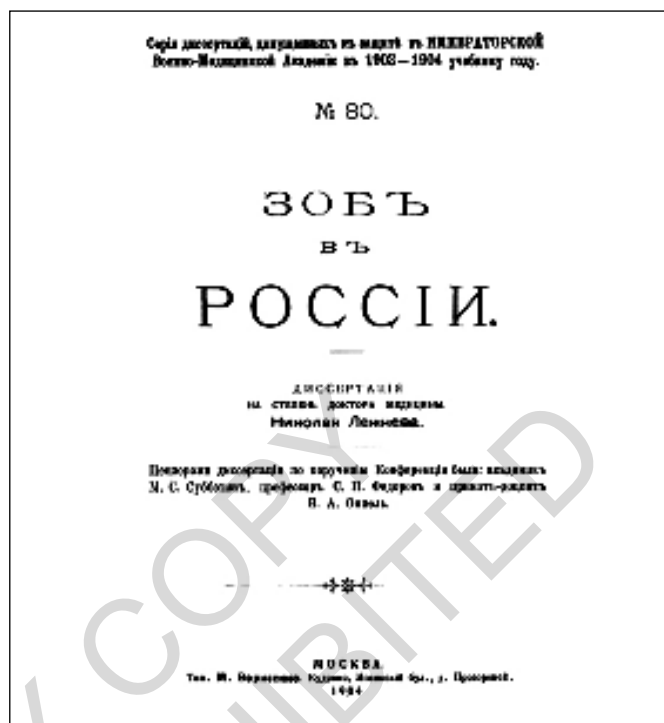


Fig. 7: First Russian thesis on surgical treatment of thyroid diseases, by N.F. Lezhnev in 1904.

“Damage and Diseases of the Thyroid”. This seems to have been the first manual for treatment of thyroid pathologies in Russia. Prof. Razumovskiy was very negative about injection treatments of the goiter. He considered this approach as an unsafe due to a possible embolism of the branches of the pulmonary artery, and because it was associated with frequent relapses of the disease, and caused additional difficulties and risks for subsequent surgical treatment due to the involvement of surrounding tissues⁶. He advocated general anesthesia for all thyroid operations. In the event of bleeding, he recommended “...to tear the wound rapidly...find the vessel and ligate it”. Tactics used nowadays, too. To prevent damage to the recurrent nerves and a bilateral palsy of the vocal chords, he suggested leaving residual thyroid tissue above the nerve. In case of tracheal or esophageal rupture, Razumovskiy suggested using “...suture or tamponade, depending on the circumstances...”, principles also used for treatment of these complications today. He recommended laryngoscopy in all patients prior to the surgery to determine the possibility of damage to the recurrent laryngeal nerve, and to prevent bilateral palsy of laryngeal muscles, a life-threatening condition. The latter recommendation remains a hot topic even nowadays, since not all surgeons follow it routinely⁸. Prof. Razumovskiy classified thyroid cancer into medullary and adenocarcinoma. The first description of medullary thyroid cancer as we know it now was made by Julius. Jaquet (France) in 1906, three years later.

Thyroid sarcoma, according to Razumovsky, could consist of round, spindle-like, or giant cells. Probably, this was the first description of anaplastic thyroid carcinoma in the world. In Europe, Alexander Murray Drennan (Great Britain) (Scotland) described a group of patients with undifferentiated carcinoma only in 1947. We found that, to confirm the diagnosis, Razumovsky and his colleagues used fine needle aspiration and incision biopsy as early as the late 19th century (and published at 1903) ("a puncture and removal of goiter fragments for diagnostic purposes")⁶. From the literature, we know that the first puncture biopsy was proposed by H. E. Martin and E. B. Ellis only in 1930¹⁰, while studies on frozen fragments of tumors were used starting in 1818.

In 1904, Nikolaiy. F. Lezhnev at Moscow University defended the first thesis in Russia on the surgical treatment of thyroid diseases¹¹ (Fig. 7). The title of the thesis was "Goiter in Russia". It included descriptions of 575 thyroid operations performed in different regions of the Russian Empire. Lezhnev reported on surgical treatment of goiter in a 2 year old child performed by Dr Ivan Dzirne in Samara on October 28, 1897. This was the first report on a thyroid surgery in a 2 year old, at least in Russia. In his thesis Lezhnev, also mentioned that, starting from 1893, in the A. A. Bobrov clinic, 106 thyroid operations had been performed with visual monitoring of the recurrent laryngeal nerves. Professor Aleksey Bobrov in a description of "strumectomy" states: "Our attention increases ad maximum when we approach the inferior thyroid artery: we first find the recurrent laryngeal nerve and carefully dissect it from the tumor, and then we ligate the lower thyroid arteries and veins. After tumor resection, the wound is inspected, bleeding vessels are ligated and skin sutures are applied. The most critical and technically difficult part is to preserve the integrity of the recurrent laryngeal nerve which is often injured during strumectomy when the tumor is strongly adherent to the nerve¹¹. Dr. F. G. Lahey from Boston, USA published results of this method only in 1938¹². Dr. Nikolaiy I. Volkovich of Kiev performed a successful thyroid resection in a 18 year old female with Graves disease on May 18, 1894¹¹. This was probably the first documented report on the surgical intervention for Graves disease in Russia. Prof. Nikolai A. Veliyaminov from Saint-Petersburg performed surgery for Graves disease during a period between 1897 and 1909, and all the patients survived. In Moscow, on October 26, 1893, Dr. Ivan Sarychev from Moscow removed 3 goiter cysts in a 27 year old female with clinical Graves disease (goiter, tachycardia, exophthalmus, and dyspnea) with a good outcome. Dr. Vladimir A. Opiel, professor at the Saint Petersburg Medical Academy and one of the founders of endocrine surgery in Russia, in the 1920s, established a detailed methodology on preparation of patients, surgical techniques for treatment, and prevention of postoperative complications in patients with Graves disease¹⁷. Professor Sergeiy P. Fyodorov from Saint-Petersburg was

interested in ectopic goiter, and presented clinical cases of lingual goiter in 1908 and 1926. It is clear from the reports of Willam Mayo¹⁸ that American specialists highly valued the level of Russian surgery and specifically of Dr. Fyodorov. D.Mayo called him "a master surgeon" and invited him to become surgeon-in-chief at the Mayo Clinic., World War I, the Russian Revolution in 1917 and the Civil War that followed, the Cold War with its "iron curtain", and financial problems almost completely blocked any communication between Soviet/Russian surgeons with their colleagues in Western Europe and the USA. As one can see from the correspondence between Drs. Mayo and Fyodorov¹⁸ on November 4, 1920 Mayo wrote to Fyodorov: "...We have all been greatly concerned over the news received from Russia...Is it too much to hope, Professor Fyodorov, that, in time you may be able to visit the States? The professors of the United States will give you the warmest of welcomes...". In response, Fyodorov wrote: «...You are, evidently, far from realizing the true state of things with us in Russia ... I have no hope at all of ever having a chance to visit America. First, because we are not allowed to leave Russia, and, second one - needs money for such travel. You are probably aware that all valuable property and money have been confiscated and, naturally, the same fate has overtaken all I had... I can tell you as an example of the kind of life we live, that it is about two years since I began to chop and saw wood, carry pails of water and live three of us in two small rooms... Sometimes, my compensation for surgery is 2 or 3 lbs of butter, 5 lbs of bread, 5 or 6 eggs, or something of the kind. If you take all this into consideration, you will surely agree with me that the time when Russia reaches the same point of economic conditions you saw a few years ago, is very remote, indeed".

Current changes in the international political climate open new possibilities to restore lost communications and help us to objectively evaluate advantages and disadvantages in medical education, in health care, and in specific fields of surgery. The 11th Russian Symposium of Endocrine Surgeons organized by the staff of the Department of Hospital Surgery, St. Petersburg Center for Endocrine Surgery and Oncology, St. Petersburg State Pediatric Medical School, which took place on July 15-17, 2003 served as the first step in restoring lost connections. Actually, this was preceded by personal collaboration between two doctors and their teams. In the spring of 2001, Prof. Gregory W. Randolph, his anesthesiologist Ilya Malikin, his lab technician and three residents from Boston, USA, visited Clinical Hospital 122, St. Petersburg with the purpose of giving a master class in thyroid surgery using monitoring of the recurrent nerve. On the first day, operations were performed by Professor and Chief of the Department and Center, Anatoly F. Romanchishen. After three operations, Gregory said to Romanchishen, "... your surgical technique guarantees preservation of the recurrent laryngeal

nerves, and monitoring them is unnecessary". During the week, our American colleagues were watching and taking part in the surgery. Our collaboration continued during the coming years within the framework of the School of Endocrine Surgery. We used the device for electrophysiological monitoring of the nerves during reconstruction of the nerves. This was the beginning of collaboration between the St. Petersburg Center of Endocrine Surgery, and the Harvard University School of Medicine. In 2003, this collaboration was announced as the "International School of Endocrine Surgery and Oncology".

In November 2001, Prof. Romanchishen was invited to make a presentation on "Russian Technique in Thyroid Surgery: the experience of the St. Petersburg School". These days, we organize courses in endocrine surgery and oncology in various regions of the country, and we regularly take part in the Harvard courses. In July 2003, 2007, and 2010, as well as in October 2010, June 2012, and September 2014 we organized international symposia, seminars, and forums on surgery and oncology in St. Petersburg. Prominent experts from all over the world, Presidents of European, American, Asian and International Associations for Endocrine Surgery and Oncology were invited as key speakers. More than 437 presentations were given and a number of round table discussions took place during these events. During the last five years (2007-2017) the staff of our Department and Center actively participated in 99 international meetings, and gave 236 communications, lectures, and video presentations, and published 137 papers. Our collaborations with Italian colleagues from the groups of Profs. Michele and Fabio d'Agello, Perugia University School of Medicine, have been particularly fruitful. Under the patronage of the Russian-Italian Surgical Alliance, six forums were held starting in 2010.

Why do we need all this? Who needs lengthy flights, sleepless nights, English (and now – Italian) lessons? Is just watching places and new people rewarding enough? Why do we hit the road again and again to go to a new meeting? Maybe because we want to see and express our personal appreciation to the superstar legends of surgery, such as Rocco Bellantone, Blake Cady, Orlo Clark, Fausto Chiesa, Roger L. Crumley, Gerard Doherty, Henning Dralle, John Farndon, Hermes Grillo, Piter Goretzki, Ian D. Hay, Jeremy Freeman, Jean - Francois Henry, Sten Lennquist, Jesus E. Medina, Ernest L. Mazzaferi, Shiro Noguchi, Charles Proye, Jatin Shah, Ashok Shaha, Giuseppe Spriano, Marshall Strome, Geoffrey Thompson, Norman W. Thompson, George de Toma, Malcolm Wheeler, and many others? Maybe because there is no better feeling, than understanding, that your own knowledge and experience are also recognized and valued? Whatever your answer would be, international collaborations ultimately serve our patients, which is our main goal. Recent evidence of that are international schools and meetings such as the

International School of Endocrine Surgery and Oncology and the Russian Symposium of Endocrine Surgeons, and forums under the patronage of the Russian-Italian Surgical Alliance.

The seeds of rational techniques in thyroid surgery in Russia were sown in 1831 by N. I. Pirogov, and successfully brought to fruition 16 years later, in 1847. Prof. Pirogov was the first in the world to perform thyroid surgery under general anesthesia. Thyroid surgery in Russia was promoted by the work of N. I. Pirogov, N. V. Sklifosofsky, V. I. Razumovsky, and other Russian surgeons. They were the first to regularly perform surgery on the thyroid. Further progress in thyroid surgery was facilitated by an improved knowledge of topographic anatomy and by improvements of the methods of general anesthesia. The thesis of Dr. N. F. Lezhnev (1904) was the first really notable, though forgotten work which reflected the contribution of Russian surgeons to thyroid surgery, and their role in the popularization of the thyroid surgery in Russia. In 1893-1903, Russian surgeons were the first in the world to use visual monitoring of the recurrent laryngeal nerve. Many Russian innovations in thyroid surgery in the 19th-early 20th century have become the "gold standard". Fortunately changes in the world political climate opened new opportunities to expand international collaborations between Russian surgeons and their colleagues abroad, and to compare medical education and health care systems.

Riassunto

Con questo studio si è voluto ricercare i contributi apportati alla chirurgia della tiroide da eccellenti chirurghi Russi: Pirogov N.I., Bujalskiy I.V., Velyaminov N.A., Bobrov A.A., Lezhnev N.F., Fyodorov S.P., Opel V.A. e altri.

La ricerca è stata effettuata sulla chirurgia tiroidea in Russia nel periodo tra l'inizio del 19° secolo e l'inizio del '900, e le conquiste dei chirurghi russi sono state valutate in relazione ai progressi nello stesso campo in tutto il mondo, comprese le difficoltà che impedivano ai chirurghi russi di acquisire un livello internazionale e le misure adottate dalla Russia nel 21° secolo per condividere le competenze in chirurgia tiroidea con altri paesi.

I dati sono stati raccolti da 178 documenti, analizzando libri, manuali e altre pubblicazioni scientifiche, nonché rapporti medici e cartelle cliniche. La ricerca è stata condotta anche su 15 strumenti chirurgici e 10 fotografie.

La prima descrizione di chirurgia della tiroide in Russia risale al 1804. Nel 1831 Nikolaj Ivanovich Pirogov descrisse l'anatomia, la topografia, le similitudini ed i principali principi della chirurgia della tiroide. Nel 1847 eseguì la prima "strumectomia" nel mondo in anestesia generale. Per il controllo del sanguinamento ha usato 30 - 40 legature e pinze vascolare autostatiche,

La successiva operazione sulla tiroide sotto anestesia fu

effettuata 13 anni dopo da Eugene S. Cooper (USA). Ilya V. Bujalskiy (Russia), consulente dell'ospedale Mariinsky di San Pietroburgo, usò una narcosi con etere nel maggio del 1847 e con cloroformio nell'agosto del 1848 quando operò sulla tiroide. Un'altra descrizione dell'uso della narcosi con cloroformio si ebbe nel 1867 con il tedesco Paul von Sick.

Nel 1886 Nicolay A. Velyaminov eseguì una resezione della tiroidea nell'ospedale Mariinsky. Nel 1904 il chirurgo russo Nikolai F. Lezhnev riferì su 106 operazioni tiroidee eseguite con controllo visivo dei nervi laringei ricorrenti nella clinica di Bobrov a Mosca, dove tali tecniche erano state introdotte nel 1893. Si occupò anche del problema del gozzo ectopico, e nelle sessioni della Pirogov Surgical Society presentò casi di pazienti con gozzo linguale (1908, 1926). Sergey P. Fedorov fu ben conosciuto in Europa, per cui William Mayo venne ad osservare i suoi interventi, e chiamò Fedorov "maestro chirurgo".

Si conclude che il contributo di famosi chirurghi Russi nel campo della chirurgia della tiroide è importante e dovrebbe essere apprezzato per il suo giusto valore.

*Never from worldly toils have I been free,
Never for one short moment glad to be!
I served a long apprenticeship to fate,
But yet of fortune gained no master
Non sono mai stato libero dalle fatiche del mondo,
Mai per un breve momento felice di esserlo!
Ho fatto un lungo apprendistato al destino,
Ma ancora di fortuna non ha guadagnato padrone*

Omar Khayyam

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