Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 1, January 2026
Website: usajournals.org

HISTORY OF THE DEVELOPMENT OF NEUROSURGERY AS A SPECIALTY

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Abstract

The purpose of this message is to demonstrate the features of the formation of neurosurgery as an independent clinical discipline in various countries of Europe (USSR, Great Britain, France, Germany) and North America (USA, Canada) using a systematic approach. Considering neurosurgery as a system, we created a doctrine of system-forming factors, called in this case discipline-forming factors. There are three of these factors: 1) socio-historical; 2) natural science; 3) institutional. The socio-economic factor includes wars and the level of development of society; natural science - the successes of natural science that made possible the emergence of modern surgery. At the same time, neurosurgery itself was an experimental testing ground for testing physiological concepts and establishing the role of certain brain structures in health and disease. The components of the natural science factor are: the creation of special diagnostic methods, surgical instruments, the development of new surgical approaches. The institutional factor provides for the emergence of leaders with their own style of clinical and scientific activity, their creation of surgical schools, personnel training systems, organization of specialized departments, departments and institutes, professional societies and journals. Thus, neurosurgery as a specialty with its own philosophy, methods, instruments and area of scientific interests was formed in the interwar period (1920-1930s of the twentieth century). Created on the basis of a systematic approach to the genesis of neurosurgery, the doctrine of discipline-forming factors can contribute to the analysis of the formation and development of other medical disciplines both in the global and national context.

Keywords: History of the development of neurosurgery, specialization in medicine, medicine of the twentieth century.

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ISSN (E): 3067-803X
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Website: usajournals.org

Introduction

The process of development of neurosurgery in the leading countries of the world (Russia-USSR, Great Britain, USA, Canada, France, Germany), despite all the differences, was subject to general patterns. The use of a systems approach (which is based on the study of objects as systems) to the study of the genesis of neurosurgery allows us to cover, on the one hand, the problem as a whole, and on the other, to reveal its components. Considering neurosurgery as a system that has its own history, methodology, sphere of scientific and practical interests, specific diagnostic and surgical techniques and instruments, features of personnel training, etc., we can identify a complex of its system-forming factors. In relation to the subject of our research, we will call these factors discipline-forming. Among them we have identified three: 1) socio-historical; 2) natural science; 3) institutional (organizational). Each factor has its own characteristic features.

1. Socio-historical factor

1.1. Level of development of society

Neurosurgery could be in sufficient demand to become an independent specialty only at a certain level of development of society. This was accompanied by a rapid increase in the number of urban residents, especially in large industrial centers.

The concentration of population (and, therefore, the concentration of diseases and injuries) is a necessary condition for the work of specialists in various fields of medicine, including neurosurgery. For example, in the Soviet Union, along with Moscow and Leningrad, neurosurgical departments arose in large industrial cities - Kharkov, Rostov-on-Don, Kyiv, Sverdlovsk, Gorky.

The development of university education played a significant role in the emergence of new medical specialties, including neurosurgery. The pioneers of neurosurgery were university professors (A.S. Tauber, V. Razumovsky, L.M. Pyccen - in Russia, H. Cushing, Ch. Frazier, W. Dandy - in the USA, E. Bergmann, O. Foerster - in Germany, C. Vincent - in France, G. Jefferson - in England, etc.). The first neurosurgical departments in the interwar period, as a rule, were created on the basis of university clinics.

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ISSN (E): 3067-803X
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1.2. Wars

The leading cause of death from traumatic brain injury in the mid-19th century was septic complications, and intracranial hemorrhage was often considered an inflammatory reaction. Treatment of head injuries was, on the one hand, the same as for apoplexy, on the other hand, as for inflammation: bloodletting, laxatives, cold to the head, leeches on the neck (cited by R. Hooper [27]). In the conditions of the pre-antiseptic period, limiting the indications for craniotomy was completely justified. The sanitary report on the Franco-Prussian War of 1870 provides data on 947 injuries to the skull bones, only 29 patients underwent trepanation (cited by O.M. Holbeck [22]).

The Russian-Japanese War of 1904-1905 gave a powerful impetus to the development of neurotraumatology. The first monograph in Russia devoted to military-field traumatic brain injury was published [22].

First World War 1914-1918 was an incentive for the separation of neurosurgery due to the massive flow of wounded people in the head and spine who required specialized care.

It is significant that during the First World War mines, grenades, and explosive shells were widely used for the first time. As a result, blast injury was added to the gunshot wounds. In relation to the skull and brain, this led to the appearance of both a complex combination of gunshot and mine-explosive damage in open trauma, and a common closed injury, the so-called. barotrauma with cerebral contusion. Purulent-inflammatory complications of traumatic brain injury (meningitis, encephalitis, abscess) also often occurred (A.A. Opokin, 1931).

The overall mortality rate for military traumatic brain injury during the First World War was 10% for non-penetrating injuries, 65% for penetrating injuries [32]. Craniocerebral injuries, according to the authors, were detected in 3-8% of the total number of wounded. This required the creation for them of special, so-called. stage hospitals.

In Russia, during the First World War, flying surgical units of the Red Cross Society were created, which were equipped with surgical instruments and included two doctors, two medical students, 8-10 nurses and several orderlies [7]. A freelance consultant surgeon for the Red Cross Society was N.N. Burdenko. In

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1914, he first created specialized infirmaries for head wounds in Zherardow, Vilna and Riga [3].

In Kharkov in 1915, a neurosurgical department of the infirmary of the Council of the Congress of Miners of Southern Russia was opened for wounded soldiers [6]. The infirmary consultant neuropathologist selected patients at the distribution point. The organization of the neurosurgical department made it possible to "significantly expand the treatment of soldiers with injuries to the nervous system." In addition, the department provided advisory assistance to other hospitals.

On the basis of headed by L.M. Pussep of the neurosurgical clinic in February 1915 opened the first Petrograd military hospital named after. N.I. Pirogov for those wounded in the head [17].

The experience of treating head trauma during the First World War is reflected in the last book of volume 33 (books 4-6, 1917) of the Velyaminov Surgical Archive, published in 1919 under the title Collection of Articles on Surgery, as well as a number of other publications [2, 24]. Losses from traumatic brain injuries in the First World War in the Russian army accounted for about 25% of all losses [15].

As noted in the review by M. Scoblo, "the statistics of injuries to the skull and brain during the last war for foreign armies is determined at 8-15% in relation to the total number of injuries. The most common complication of skull wounds is infection (up to 70-85% of frontal skull wounds are infected). From 20 to 40% of the wounded suffer from meningitis" [21].

The highest mortality rate, according to European and American authors, is caused by penetrating wounds of the skull and brain. The frequency of gunshot wounds to the spinal cord during the First World War did not exceed 1% in relation to the total number of wounded on various fronts [20]; the frequency of injury to nerve trunks was 1.5-2% [9].

Thus, wars, especially the First World War, were an important factor in the development of neurotraumatology and the separation of neurosurgery from general surgery.

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Preparations for World War II were a powerful incentive for government support for the development of neurosurgery, especially in totalitarian states (Germany and the USSR).

The development of weapons with the widespread use of aircraft, tanks, large-caliber artillery and other means of destruction has made it possible to predict a higher incidence of head injuries. By the way, the term "traumatic brain injury" appeared in Russian literature only in the 30-40s of the twentieth century. Before this, they talked and wrote about "trauma of the skull", or "cranial trauma". In the English-language literature, the most common term is "head injury".

Thus, there is sufficient reason to believe that the components of the socio-historical factor that contributed to the establishment of neurosurgery as a clinical discipline were realized in the period between the two world wars.

2. Natural science factor

The natural science factor is based on the successes of natural science that made the emergence of modern surgery possible. This is, first of all, the progress of microscopic technology, which contributed to the discovery of the cellular structure of living matter and the emergence of bacteriology, which in turn led to the emergence of asepsis and antiseptics; advances in chemistry (combined with changing attitudes toward pain and suffering) led to the emergence of anesthesia. At the same time, knowledge of the anatomy and physiology of the central and peripheral nervous system, primarily the brain, was improved. The idea of localizing brain functions captured the minds of European researchers, starting with the creator of phrenology F.J. Gall (1758-1828).

The components of the natural science factor are: the creation of special diagnostic methods, surgical instruments, the development of new surgical approaches

2.1. Special diagnostic methods

For many centuries, the diagnosis of brain injuries and diseases was exclusively cranial, i.e. Only external changes in the scalp and skull were taken into account. In the second half of the 19th century. Objective methods for diagnosing focal

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lesions of the brain and spinal cord have appeared. In 1851, Helmholtz invented an ophthalmoscope, which made it possible to detect congestive changes in the fundus of the eye due to tumors and other space-occupying processes in the brain. The first spinal (lumbar) puncture was performed by Corning in 1885, but only in 1891 did it become widespread after Quincke undertook it for therapeutic purposes [4]. Lumbar puncture provided valuable information about the level of intracranial pressure and the composition of the cerebrospinal fluid.

In 1895 V.K. X-ray discovered the special properties of rays, which were later named after him, which marked the beginning of craniography and spondylography. However, if radiography of the skull and spine was only an extrapolation of Roentgen's invention to the bone cases of the brain and spinal cord, then the introduction of air into the cerebrospinal fluid spaces of the central nervous system proposed by W. Dandy (pneumoventriculography - 1918, pneumoencephalography - 1919) is a specific method for diagnosing neurosurgical diseases.

At the age of 32, W. Dandy made his most remarkable discovery. Examining an X-ray of the patient's abdomen, he drew attention to the intensity of the shadow of air and liquid and concluded that it would be possible to see the outline of the ventricles of the brain if the cerebrospinal fluid was partially replaced with air. Experiments showed that changes in the contour of one of the ventricles of the brain on radiographs often made it possible to localize a lesion that could not previously be localized. This method is often called one of the most outstanding achievements in the field of neurosurgery" [29].

A similar role was played by myelography with the introduction of radiocontrast agents, proposed by A. Sicard in 1921, and cerebral arteriography, proposed in 1927 by the Portuguese neurologist E. Moniz.

Thus, in the late 1920s, a complex of neurodiagnostic methods emerged, many of which were invasive and could only be performed by neurosurgeons.

It should be noted that the listed diagnostic methods, having played their discipline-forming role, remained basic until the early 1970s, when they began to be replaced by non-invasive neuroimaging methods - bloodless, safe and much more informative (CT, MRI and their various variants).

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2.2. Creation of neurosurgical instruments

The technique of craniotomy has been improved over many centuries [11].

In 1864, Ollier proposed a method of osteoplastic resection of the skull bones by folding back a bone flap along with adjacent soft tissues, but only in 1889 W. Wagner (1848-1900) from Königschütte (Germany) performed this operation on a living person (cited by L. Rogers [31]).

The most convenient tool for cutting out a bone flap was a wire saw, proposed in 1894 by the Italian obstetrician L. Gigli (1863-1908) for cutting the pubic joint. In 1897, A. Obalinsky noted the advantages of the Gigli saw for craniotomy, and a year later L. Gigli improved his invention by proposing a rounded metal conductor to avoid damage to the dura mater of the brain when cutting out a bone flap (cited by J.T. Goodrich [25]).

In 1908, the French surgeon T. de Martel (1876-1940) proposed the use of an electric drill, which automatically stopped when drilling the internal bone plate. In Russia, one of the pioneers in the use of new techniques for craniotomy was the famous surgeon S.P. Fedorov [23].

Electric suction was proposed by F. Krause in 1908 and improved by G. Cushing around 1920. In 1911, G. Cushing proposed silver clips to ensure hemostasis during brain surgery, and in 1927 he adapted the Bovie electrocoagulator for coagulation of blood vessels and removal of brain tumors.

One of the important indicators of the development of neurosurgery is the use of various foreign materials, contrast agents, drainages and other devices for the diagnosis and surgical treatment of diseases of the nervous system. By 1930, the neurosurgeon had 12 different foreign substrates in his arsenal [30].

Thus, in the 1920-1930s, neurosurgery had the basic tools necessary for macrosurgical treatment of focal pathology of the brain and spinal cord, contrast agents for X-ray diagnostics, as well as various implantation materials (suture material, drains, bone substitutes, etc.

2.3. New surgical approaches and their experimental justification

In the first half of the 20th century. new surgical approaches have been proposed: transnasal access - for removal of pituitary adenoma, suboccipital - for removal

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of tumors of the posterior cranial fossa, perforation of the floor of the third ventricle (Stukey's operation), coagulation of the choroid plexuses of the lateral ventricles in hydrocephalus, etc.

The study of intracranial hypertension (ICH) in experiments and clinics also played an important role in the development of neurosurgery [18]. By the end of the 19th century. B. In the understanding of cerebral pressure, ICH and the causes of their clinical manifestations, the teachings of E. Bergman and T. Kocher occupied a dominant position.

T. Kocher, being the founder of the theory of increased intracranial pressure (ICP), combined the doctrine of hypertension in tumors and in trauma. E. Bergman's experiments were repeated by G. Cushing in T. Kocher's laboratory in Bern at the turn of the twentieth century.

G. Cushing interpreted the increase in blood pressure as a protective reaction to maintain blood supply to the brain in conditions of increased ICP (the so-called “Cushing reflex”). The degree of arterial hypertension, according to G. Cushing, is a function of compression of the centers of the medulla oblongata.

Based on this, the idea of bilateral infratemporal decompression to control elevated ICP arose, which played a key role in the decision to limit surgical practice to brain surgery [26]. It should be noted that the method of bilateral infratemporal decompression proposed by G. Cushing in order to reduce elevated ICP and eliminate the threat of fatal brain dislocation has proven to be in demand in modern neurosurgery. It is listed in clinical guidelines as an extreme but effective means of combating uncontrollable ICH in severe traumatic brain injury [16]. In close connection with the doctrine of ICH, the doctrine of brain dislocation, important for neurosurgery, also developed [5].

The development and implementation of new special diagnostic methods, surgical approaches and surgical instruments contributed to both a significant increase in the number of neurosurgical interventions performed and an improvement in their outcome.

Let us consider the statistics of neurosurgical operations in relation to brain tumors at the end of the 19th and beginning of the 20th centuries. By the end of 1887, information about 14 operations for brain tumors was provided in the

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literature. Of these, 11 patients were operated on for tumors of the cerebral hemispheres, 3 for tumors of the posterior cranial fossa. Of the 11 patients, 3 died; in the second group, all patients died from shock in the early postoperative period. After 6 years, American neurologist M.A. Starr [34] has already described 84 observations of operations for brain tumors that he found in the literature; the tumor was found during surgery in 52 patients, the overall postoperative mortality rate was approximately 60%. It is interesting that these 52 patients were operated on by 44 surgeons, of whom only 4 performed more than one craniotomy. The record holders were McEwen and Gorsley, each of whom removed 5 brain tumors.

In the guide L.L. Levshin [10] cited the work of Anorez, dated 1891: "The statistics of operations performed for the purpose of enucleation of cerebellar tumors is very disappointing, because out of 23 operations collected in one statistics, only in 4 cases did surgery lead to enucleation of the tumor, but of the latter two died, one immediately after the operation, and the other on the 10th day after it, and an autopsy revealed that most of the tumor had not been removed. The fate of both survivors after the operation was terrible: both of them were left blind, deaf and paralyzed."

When analyzing the subject index of medical bibliography (Surgeon General Index Catalog) for 1886-1896. It was found that more than 500 surgeons reported performing brain operations during this period. Over the next 10-year period (from 1896 to 1906), their number did not exceed 80, reflecting the disillusionment of general surgeons with brain surgery. From 1906 to 1916, only a few surgeons published the results of brain surgery; they all began to focus on this special area of surgery [33].

According to E. von Bergmann, at the end of the 19th century. Of the 47 patients who were suspected of having a cerebellar tumor, no tumor was found in 32. Of the 11 operated patients, 4 survived, and all of them had severe neurological defects. According to the literature collected by this author, more than 50% of brain tumors are not detected during surgery. About the heroic nature of brain surgery at the beginning of the twentieth century. M. Borchardt's statistics eloquently testify: for tumors of the cerebellar hemispheres, postoperative

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mortality was 60%, recovery was noted in only 12% of cases. Of 19 patients with tumors of the cerebellopontine angle, 14 died during or after surgery, and only 2 recovered.

If in 1910 (according to F. Krause) postoperative mortality for spinal cord tumors reached 33%, 20 years later, according to various authors, it decreased to 5%; in 90% of cases, patients recovered with a return to their previous activities [13].

In 1915, G. Cushing analyzed the results of 149 operations he performed on 130 patients for brain tumors. The mortality rate was 8.4% [26].

From 1933, when S. Vincent [35] organized the neurosurgical department at the La Pitie hospital in Paris, to 1938, 1435 ventriculography procedures were performed and 2060 operations were performed. Mortality after surgery did not exceed 16%. This figure, in the author's opinion, could have been lower if patients had been referred earlier, had not operated on patients in a coma, and had not attempted to perform intervention on certain types of tumors that were considered inoperable, for example, retrochiasmal craniopharyngioma.

Similar dynamics of increase in the number of neurosurgical interventions were observed in other countries, and not only in relation to brain tumors. For example, the number of surgical interventions performed by the neurosurgical service of the Lageya Clinic in Boston increased from 284 - B 1933. o 636 - B 1939 r. [28].

Thus, by the 1920-1930s, neurosurgery acquired a complex of specific diagnostic and therapeutic methods, tools and equipment, which largely determined its formation as a clinical discipline and further development.

3. Institutional factor

3.1. Schools of neurosurgeons

We are talking about such components of this factor as the emergence of leaders with their own style of clinical and scientific activity, their creation of surgical schools, a system for training neurosurgeons, the emergence of specialized departments, departments and institutes, societies and journals.

The concept of “scientific school” does not have an unambiguous interpretation. We have taken as a basis the following definition: “A school is a community of people that emerged in the process of joint activity and consists of at least two

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generations, which has developed an epistemological system with a number of features and ensured its inheritance" [8]. The epistemological system refers to new knowledge and skills. Further, the concept of "school" is divided into two subclasses - schools as educational institutions and schools as forms of activity. In turn, the latter are divided into local and global.

Among local schools there are: 1) communities that arise around any centers of crystallization (teacher, leader, magazine, workshop, etc.) - faction schools and 2) regional schools tied to certain geographical points (for example, the Novgorod school of icon painting).

In relation to neurosurgery, we can talk about both global (for example, G. Cushing's school) and local (for example, Moscow, Leningrad, Kharkov, Rostov, Kiev) neurosurgical schools. A. Melnikov [14], summing up the development of Russian surgery in the first quarter of the twentieth century, devoted a separate section to schools of Russian surgery. The "schools of large university centers that set the tone for all Russian scientific surgery" include, firstly, hospital-type schools (schools of a scientific hospital warehouse). Secondly, schools of surgeons of an academic direction (schools of a scientific and clinical nature). "These schools select certain areas, for example, the nervous system, which is why a large number of cases accumulate, which are processed by numerous assistants. In these schools, little-known areas are studied, experiments are carried out on animals and cadavers, new theories are created and new approaches are elucidated. These include the school N.N. Burdenko". Thirdly, schools of a scientific-theoretical warehouse (creating a new teaching) - the schools of V.N. Shevkunenko, V.A. Oppel.

At the beginning of the twentieth century. Both neurosurgeons (surgical neurologists) emerge from neurologists, and neurosurgeons emerge from general surgeons. The first neurosurgeons (patho)logists were the student V.M. Bekhtereva L.M. Poussep - in Russia, Babinsky's student C. Vincent - in France, O. Foerster - in Germany. In the USA, the pioneers of neurosurgery were surgeons G. Cushing and S. Frazier.

It was from this moment, when the first neurosurgeons began to pass on their experience to students, preparing specialists like themselves, that the most

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important stage of professional training began. The role of G. Cushing is especially great, who trained students not only from America (W. Dandy, etc.), but also from other countries - Great Britain - H. Cairns, N. Dott, etc., Austria - B. Schlesinger, etc. Typically, training consisted of a one-year internship at the G. Cushing Clinic in Boston, during which not only mastered surgical techniques, but also carried out research work. Along with this, many surgeons studied with G. Cushing during short visits to the USA. G. Cushing created the first international neurosurgical school.

When revealing the role of the founders of neurosurgery, it is important to take into account their personal qualities that influenced the education of students and the creation of neurosurgical schools. This allows us to understand why some leaders of neurosurgery created their own schools, while others, no less talented, failed to do so.

The system of training neurosurgeons arose in the 1930s. The organization of neurosurgical departments required a constant influx of specialists. Hence the need to create a system of postgraduate specialization arose. The world's first private assistant professor course in surgical neuropathology was organized by V.M. Bekhterev on the basis of the Psychoneurological Institute in St. Petersburg in 1908, it was headed by L.M. Poussep [11].

However, broad specialization in neurosurgery began much later (in the 1930s), when departments of neurosurgery appeared at the Institutes of Advanced Medical Studies in Leningrad (1935) and Moscow (1938), and the department of neurosurgery at the Sorbonne (1938)2. At the same time, clinical residency and postgraduate studies in neurosurgery were organized in the USSR, as well as on-the-job training at the Central and Leningrad Institutes of Neurosurgery, and the Department of Nervous Diseases of the Rostov Medical Institute.

Here, given the scale of neurosurgical pathology, especially in wartime, it should be noted the importance of neurosurgical training of related specialists, primarily surgeons, neuropathologists and traumatologists. In the USSR, this was a function of the Moscow and Leningrad Institutes of Neurosurgery, as well as the Neurosurgery Center of the Central Research University and the Leningrad State Institute of Neurosurgery by organizing cycles of primary specialization. Thus,

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ISSN (E): 3067-803X
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Website: usajournals.org

the training of a sufficient number of specialists was ensured, which was one of the main prerequisites for distinguishing neurosurgery as an independent clinical discipline.

When analyzing the separation of many clinical sections of therapy and surgery into independent medical disciplines throughout the twentieth century. (cardiology, cardiac surgery, traumatology and orthopedics, endocrinology, gastroenterology, oncology, etc.) the crucial importance of training relevant specialists is also evident. Without this, there can be no talk of any independence of the medical discipline. Therefore, we have the right to consider that it took shape in the 1930s of the twentieth century. the training system for neurosurgeons is a key criterion for the emergence of this specialty [19].

3.2. Creation of specialized departments, clinics and institutes of neurosurgery

For a long time, neurosurgical patients were placed in surgical or neurological departments. However, the specifics of diagnosis, treatment and nursing of such patients could best be realized only in conditions of their concentration in specialized neurosurgical clinics.

The first such department was created in St. Petersburg in 1910 by L.M. Poussep [1]. During the First World War, specialized departments were deployed in military hospitals of the warring countries (France, Germany, Russia, Great Britain, USA), where they concentrated those wounded in the head and spine.

The next step was the organization of planned neurosurgical departments for the treatment, first of all, of tumors of the brain and spinal cord. In Soviet Russia, similar departments arose in Petrograd (clinic of A.L. Polenov, 1921), Moscow (clinic of N.N. Burdenko and V.V. Kramer, 1929), Rostov-on-Don (clinic of P.I. Emdin, 1925), etc. In the USSR, for the first time in the world, research institutes of neurosurgery were organized - the Institute of Surgical Neuropathology in Leningrad (1926), transformed in 1938 into the Leningrad Neurosurgical Institute, and the Institute of Neurosurgery in Moscow (1932), transformed in 1934 into the Central Neurosurgical Institute (CNHI). The peculiarities of domestic institutes of neurosurgery were the complexity of their organization

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with the inclusion in their structure of specialists of various profiles and research laboratories, a powerful clinical base (for example, in 1936, the Central Scientific Research Institute had 100 neurosurgical beds). In the 1930s, a network of neurosurgical departments and clinics was created in a number of large industrial centers of the USSR (Kharkov, Kyiv, Sverdlovsk, Gorky, etc.).

In the USA, the first neurosurgical department was actually created by G. Cushing in 1912, when he headed a surgical clinic in Boston, where planned neurosurgical patients were hospitalized, primarily with tumors of the brain and spinal cord. This contributed to a significant increase not only in the number of patients operated on, but also to an improvement in outcome. In Canada, the Montreal Neurological Institute opened in 1934, headed by W. Penfield.

A student of W. Dandy H. Olivecrona (1891-1980) in the 1920s created a neurosurgical clinic in Stockholm (Sweden), where patients from all over Europe operated on and European surgeons trained in neurosurgery.

In 1933, the first neurosurgical department, organized by S. Vincent, appeared in the Paris municipal health care system in France. In 1934, the first neurosurgical department in Germany was opened in Würzburg, headed by W. Tonnis.

Preparations for the opening of the first neurosurgical department in England were carried out at the National Neurological Hospital in London. In 1933, H. Kerne and D. Jefferson, in a special memorandum, outlined in detail the requirements for the organization of a full-fledged neurosurgical department, paying attention to all aspects of its future activities, including patient care, training of medical personnel, and experimental research. However, due to bureaucratic and financial obstacles, the implementation of this project became possible only after the Second World War [12].

Thus, in the 1920s and, especially, in the 1930s, a network of specialized neurosurgical departments and clinics arose in the leading countries of the world, in which patients with neurosurgical pathologies were concentrated and special methods were used for the diagnosis and treatment of focal diseases of the brain and spinal cord, as well as peripheral nerves. This was one of the necessary conditions for neurosurgery to gain its independence.

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3.3. Creation of neurosurgical society journals

Pursuing the goal of uniting neurosurgeons, providing an opportunity to discuss scientific and clinical issues, and getting acquainted with the experience of leading specialists, neurosurgical societies in the USA and Europe arose based on the traditions and conditions of a particular country.

The first meeting of the Society of Neurological Surgeons was held in Boston on November 26-27, 1920 at the G. Cushing Clinic. It was attended by 11 people. Leading members of the society held meetings twice a year in their clinics. They included morning demonstration operations and afternoon scientific sessions, where clinic staff gave presentations; they were attended by members of the Society and guests, from whom new members were chosen.

In December 1926, the Society of British Neurological Surgeons was founded on the model of the American Society of Neurological Surgeons. Following national traditions, the British Society functioned as a closed gentlemen's club, the number of members in which, according to the original charter, should not exceed 15 people. Another feature of the Society was regular visiting meetings in European countries (France, Germany, the Netherlands, etc.).

In the USSR, the role of the scientific society of neurosurgeons was initially played by the Neurosurgical Council, formed in 1934 at the Central Scientific Research Institute on the initiative of N.N. Burdenko. It included leading neurosurgeons and neurologists from those regions of the country where there were neurosurgical departments. Beginning in 1935, the Council held annual sessions, which were attended by hundreds of specialists and involved many days of discussion of current problems in neurosurgery.

The formation of scientific societies of neurosurgeons in the 1920-1930s was a significant sign of the institutional discipline-forming factor in the USA, Great Britain, and the USSR. At the same time, this sign is not among those mandatory for the establishment of neurosurgery as a clinical discipline; in France, Germany, and Austria, neurosurgical societies arose only after the Second World War.

Neuropsychiatric and surgical congresses and conferences also played an important role in the discussion of neurosurgical problems in the interwar period. For example, at a congress of German surgeons in 1936, one day was devoted to

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the discussion of neurosurgical issues. The discussion about brain surgery also unfolded at the First Congress of the German Society of Neuropathologists and Psychiatrists in 1935. The problem of localization of neuropsychic functions was the program issue of the 1st Ukrainian Congress of Neuropathologists and Psychiatrists (Kharkov, June 19-24, 1934). Among the main problems of the 2nd All-Union Congress of Neuropathologists and Psychiatrists (Moscow, December 25-29, 1936) were trauma to the nervous system and brain tumors. Interdisciplinary dialogue has undoubtedly contributed to the development of neurosurgery as an open, dynamic system.

However, by the 1930s, as neurosurgery began to acquire the characteristics of an independent clinical discipline, the need for more rapid presentation, discussion and transfer of experience among professionals increased. Periodicals, usually in the form of magazines, could play such a role.

The first neurosurgical journal was “Zentralblatt fur Neurochirurgie”, founded in 1936 by W. Tonnis and published 4 times a year in Germany. The magazine was conceived as an international publication, publishing articles in German, English and French. The composition of the editorial board was also international. It was the impossibility of obtaining this journal during the Second World War that served as the impetus for the creation of the Journal of Neurosurgery in the USA in 1944. In 1937, the journal “Problems of Neurosurgery” appeared in the USSR, also published four times a year.

The emergence of professional periodicals undoubtedly indicated the emergence of neurosurgery as a clinical discipline. In turn, magazines became catalysts for this process.

Conclusion

Specialization and differentiation of clinical disciplines in medicine is an objective and necessary process associated with its development. However, in relation to each specific specialty, it is unique, has different (main and secondary) discipline-forming factors and their components. Thus, the main discipline-forming factor for radiology was the discovery of X-rays by K. Roentgen;

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
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Helmholtz's invention of the ophthalmoscope played a decisive role in the development of ophthalmology, and the cystoscope for urology.

As for neurosurgery, the situation seems to be more complex and is mediated by the sum of the three factors analyzed (socio-historical, natural-scientific and institutional). One could, of course, associate its formation with the advent of specific diagnostic methods (such as ventriculography, pneumoencephalography, angiography, etc.). However, without denying their essential role, it should be assumed that neurosurgery could become an independent clinical discipline without them. Such a significant socio-historical factor as large-scale wars (especially the First World War of 1914-1918) itself required the development of a clinic, diagnostics and methods of staged treatment of those wounded in the head and spine.

It is difficult to find a neurosurgical operation that could be called discipline-forming. In this matter, one can, on the one hand, rely on analogies in other medical disciplines; on the other hand, neurosurgical specifics should be taken into account.

For example, gastrectomy is considered a discipline-forming operation for gastric surgery; for pulmonary surgery, pneumonectomy played this role; for cardiac surgery, radical correction of tetralogy of Fallot. However, apparently, it would be more correct to talk about a complex of operations. It would seem that the discipline-forming operation in relation to neurosurgery is craniotomy, which was performed in prehistoric times. But such a statement is erroneous, since it was used to treat wounds of the skull and its covering, and not at all brain tissue. The role of a discipline-forming operation could be the deliberate opening of the dura mater of the brain to remove its tumors and other focal pathology, which happened at the end of the 19th century. and marked the beginning of elective brain surgery.

Therefore, we must take into account the complexity of the reasons for the separation of neurosurgery as an independent discipline. Another thing is that the proportion of various discipline-forming factors and their components in neurosurgery differs significantly in different countries.

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In the 1920-1930s, almost simultaneously there was a convergence of all three discipline-forming factors, which determined the formation of neurosurgery as a clinical discipline in the interwar period in the leading countries of the world (USA, Canada, Great Britain, France, Germany, USSR). At the same time, in many countries neurosurgery became an independent discipline only in the second half of the twentieth century, when the main components of the institutional factor were able to be realized there.

Thus, the identified complex of discipline-forming factors and their components, which determined the formation of neurosurgery as a clinical discipline, allows us to fairly objectively determine the chronology of its emergence both in the global aspect and in the national context.

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