

## *Looking for the Heart: From the History of Heart Transplant in the USSR*

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### **Abstract**

Medicine is an exquisitely sensitive indicator of the dominant cultural characteristics of any era. In the XIX-XX century, one of them was the possibility of organ and tissues transplantation. And it's one of the most interesting medical disciplines that was very active in imperial Russia and later in the USSR. The historical analysis of the development of experimental transplant in the USSR confirms that it was a result of high level of the Russian medical science. Nevertheless, since the start of clinical transplantation era, only three cardiac transplant operations were made in the USSR. Why did the clinical heart transplant virtually disappear from the practice of soviet surgeons? The system of Soviet healthcare was an organic part of the system of total state control over society. An Order of the Minister of the Healthcare of the USSR No. 600 of August 2, 1966, allowing the transplantation of organs and tissues only with a special permission from the Ministry of Health of the USSR actually imposed a ban on the clinical heart transplants in the USSR. Despite the attempts of renowned surgeons to cancel this order, the suspension lasted for 20 years and seriously impaired the medical activities in this area. All heart transplant activities had to be taken away by the stroke of a pen of the government official. As well as alive people, which were deprived of the chance to live with a new alive heart in their chest.

Keywords: organ and tissues transplantation, heart transplant, soviet medicine

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## **Introduction**

The history of medicine is one of the few disciplines that allows you to accumulate the history of mankind from the moment of its inception, when the medicine was in close relationship to culture and philosophy to the abstract determinism of contemporary scientific medicine. As Jose Ortega y Gasset expressed "culture is a system of vital ideas, which each age possesses; better yet it is the system of ideas by which each age lives". Medicine is an exquisitely sensitive indicator of the dominant cultural characteristics of any era. Every culture it seems has developed a system of medicine which bears an indissoluble and reciprocal relationship to the prevailing views of the body and the world. It incorporates the main concepts of era: an utopia or myths, it is subjected to the influence of revolutionary ideology or ideological vacuum, it modifies the relationship of the state to man.

In the XIX-XX century, one of the revolutionary ideas was the possibility of organ transplantation. The historical analysis of the development of experimental transplant in the USSR confirms that it was a result of high level of the Russian medical science. Nevertheless, clinical heart transplantation in the USSR was almost not developed. Nevertheless, clinical heart transplantation in the USSR was almost not developed. I will argue that principal cause is not the lack of the necessary conditions for transplant operations but the disinclination of the government officials to create the conditions for heart transplant operations. More specifically, I want to show you how the state was limited the ability of the professional medical community to influence the development of medicine in the USSR.

## **Basic Views Concerning history of organ and tissue transplant in Russia**

The history of the Russian transplantology has genesis in the name of the outstanding Russian surgeon Nikolay Ivanovich Pirogov (1810-1881). In 1835 he gave a lecture "On plastic surgery in general, about rhinoplasty in particular." N.Pirogov analyzed the problem of organs transplantation and tissues in detail, at that work and all his ideas were the result of thoughtful analysis and surgical practice. They were based on the doctrine of the movement or resettlement (transplantation) of animal parts, tissues and organs. He argued that it's possible to move the part of the body separable from the body or associated with body from one place to another. «A material, from which nose is formed, is skin. According to the laws of transplantation the flap of skin for transplant purpose can belong body or be completely separate from him»<sup>1</sup>, he wrote. It became the scientific basis of a new area of a medicine - transplantology.

The pioneer of heart transplantology Alexey Alexandrovich Kulyabko (1866-1930) conducted his first experiments on revival of isolated heart of animal in 1901. In August 1902, he «recovered» heart of the 3-month-old child in 20 hours after death which came from pneumonia for the first time in the world. The heart movements resumed in 20 minutes after passing through the heart of a special solution enriched with oxygen. There was a first revitalization of the human heart in almost one day after heart beat stopped.

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<sup>1</sup> Spasskiy I.T. On plastic surgery in general, about rhinoplasty in particular. Lecture at the Imperial Saint Petersburg Academy of Science by N. Pirogov, PhD,MD, 9 December 1835. Voenno-Meditsinskiy Zhurnal 1836; 28: 3–36. [In Russian]

The further development of transplantation was aimed to resolve problem of the long-term storage and conservation of tissues and organs. This research was represented by the outstanding scientists Sergey Sergeevich Bryukhonenko (1890-1960) and Sergey Ionovich Chechulin (1894-1937) . They have come up with an artificial circulation method with the help of a mechanical device - an auto-zhector, provides blood circulation both in an organism, and in the isolated body automatically supports blood pressure at the set level. The constant normo- and hypothermic perfusion became subsequently one of the basic and most physiological method of organs conservation.

The problem of same importance was the viability of tissues and organs after death. Will they be able to function in another organism? Vladimir Nikolaevich Shamov (1882-1962) was a scientist who resolved this problem by making the transfusion of cadaver blood. First-ever he in 1928 experimentally proved a possibility of transfusion of cadaveric blood. After the series of experiments he declared: “The blood, which was in cadaver for 11 hours can be used in another body and can functioned there, it's nontoxic and viable”. “The corpse in early after death represents a vast depot of viable tissues and organs, the hopes for widespread clinical use of which are quite real. The corpse should not be considered dead longer, it not only continues to live in its own parts, but it can also give gifts of extraordinary value to survivors - viable tissues and organs. Moreover, judging by our experiments, the corpse, paradoxically, can even sponge still other living beings from imminent death and death”<sup>2</sup>.

Vladimir Shamov's student - surgeon Yury Yurievich Voronoy (1895-1961) in April 3, 1933 made transplant of kidney to 26-year-old woman with acute poisoning with mercury. The kidney was taken after 6 hours after dead of 60-year-old man, who died due a fracture of the base of the skull. The patient lived with a transplanted kidney for two days. So Y. Voronoy owns a dual priority: the first clinical kidney transplantation and the first use for the transplantation of the cadaveric kidney.

In 1945-1948 the soviet scientist Nikolay Petrovich Sinitsin developed his own method of heart transplantation in frogs. The animals with graft lived for a long time and it was an unique model for proving the principle possibility of the existence of an animal with a transplanted heart.

Finally, a new stage in experimental transplantation was started by Vladimir Petrovich Demikhov (1916-1998) , who in 1947, at the first time in the world, performed the operations of homoplastic transplantation of dog's heart and lung. As a result, he developed several options for surgical techniques of an additional and isolated heart, lungs, kidneys, and liver. He made 250 heart transplants and he proved the possibility of multi-day (up to 143 days) parallel function of the transplanted heart in the chest without immunosuppressive therapy. It was outstanding achievements of experimental transplantation for 1956-1957. He developed and achieved significant successes in using the heart as a second intra-thoracic pump. The results of many years of experience were summarized in his study “Experimental transplantation of vital organs” which was published in 1960 Apparently, it was the first in the world book devoted to organ transplantation.

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<sup>2</sup> Shamov V.N. To the study of homoplasty on corpses - blood transfusion from a corpse. New surgical archive 1929, Vol. 18, 1-4, p.184.

The first successful heart transplantation from human to human was done by South African surgeon Christian Barnard in December 1967. The patient lived for 18 days and died of pneumonia as a result of massive immunosuppressive therapy. Christian Barnard conducts a second heart transplantation operation in January 2, 1968. It was much more successful than his first one and the patient lived for 2 years and wrote his book.<sup>3</sup>

The operations conducted in Cape Town were the momentum for carrying out numerous cardi transplantations in all cardiological centers of the world. By March 1, 1969, 122 heart transplant operations were made worldwide. On November 1, 1975, the number of operations increased to 293. There were made only two heart transplant in USSR by then. Neither one of them was successful. By 1987 only 3 operations were made. Why? Why did the clinical heart transplant virtually disappear from the practice of soviet surgeons?

The main document we have addressed to is an Order of the Minister of the Health Care of the USSR No. 600 of August 2, 1966 "About transplant of organs and tissues" ,allowing the transplantation of organs and tissues only with a special permission from the Ministry of Health of the USSR<sup>4</sup>.

This Order has been referred to another Order 1607 of Council of People's Commissars of the USSR of September 15, 1937 "The modalities for conducting medical operations". Accordance with this document the People's Commissariat of Health was delegated the right to issue mandatory for all institutions, organizations and individuals orders for the implementation of medical, surgical operations, including transplantation operations from corpses, blood transfusion, transplantation of an organs, etc. This document, published to facilitate the practice of clinical transplant of corneal of the eye helped solve the problems of the Soviet transplantology at the time.

But if the transplantation rules have already defined, why did The Ministry of Health Care need to issue a new order? According to an Order 600, the reason of issue this document "because some transplantations had made at maladaptive conditions and often violated the established medical rules and legal norms". To understand what legal norms this document is kept in mind we should to answer the question: what a major development did take place in clinical transplantology in the USSR from 1937 to 1966? The professor Boris Vasilievich Petrovsky (1908-2004), the Minister of Health of the USSR from September, 1965, made the first successful kidney transplant in April 1965. That's why in accordance with Clause 1 an Order there was the listing of several organs, the transplant should be to established to: "the transplantation of organs (kidney, liver, etc.) from human corpse or animals to humans, can be carried out only with the permission of the Ministry of health of the USSR by all Healthcare Institutions irrespective of their departmental subordination". Pursuant to Clause 4 this document:

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<sup>3</sup> Blaiberg, Philip. Looking at my heart. London: Heinemann, 1969.

<sup>4</sup> GA RF [State Archive of the Russian Federation].P.8009.Opt.1. 1543 L.251.

“From 1 January 1967 to prohibit the transplant organs to person from other person, corpses or from animal by all health-care institutions, regardless of departmental subordination, without special permission of the Ministry of health of the USSR”.

Did this document have any relation to the regulation of heart transplant operations? This is the main question we need to clear up. First, it should be noted, there is no word “heart” at this document although the name of other organs (liver, kidney, etc.) are existed. Probably, there was no sense in the prohibition or resolution of heart transplantations, since no human heart transplant had ever been made to at that time. Secondly, first clinical heart transplant in the USSR was made in November 4th, 1968, in 2 years after this document has been issued. Accordance with common sense there had to make the additions to Order 600, but it hadn't done.

The fact that this document was temporary in nature says paragraph 2 of this Order: “before November 1, apply with petition to the Ministry of Health of the USSR on granting the right to the relevant subordinate institutions to transplant organs (kidneys, liver, etc.) from a person, corpse or animals to humans”. That is, further elaboration of this order was implied, which was done in the next Order of 665 of September 12, 1969, where the institutions that are allowed to perform kidney transplant operations were identified. And again there were no mention of permission to change other organs at this Order 665.

And finally any accusing in infringement concerning inappropriate (including hygienic) conditions in Order 600 are impossible in case of heart transplant operations at that time. That time till today it is still very expensive operation impossible provided without of high class clinic. In the light of the foregoing, we can assert that it was impossible to manage the conduct of heart transplants by applying this Order, because it didn't he does not meet an elementary requirements.

Another reason offered to explain the forbid of heart transplant is the diagnosis of so-called brain death. In all known cases of successful transplant's attempts the surgeons used the functioning heart taken from donors with this diagnosis. The extensive discussion which arose on this matter not only among specialists but also with attraction of various sectors of society, created public opinion about non-compliance with moral, ethical and legal norms. This view was also shared by the Minister of Health of the USSR, Boris Petrovsky, who believed that an introduction of the "brain death" concept unreasonable, because it's immoral and an offense against the law to declare that a person is dead when his heart beats. Thus, in the USSR, the legislation has not recognized the diagnosis «brain death» granting performing right of a possibility of removal of organs after biological death of an organism. In the countries at the existing legislation it was really possible to carry out organ transplant at patients only after the termination of cordial reductions was registered.

But the Soviet surgeons used the technique of coronary perfusion of transplant, which ensured the functional activity of the donor heart during the 3-hour period of its being outside the body. And first heart transplant by professor Alexander Alexandrovich Vishnevsky (1906—1975) was made that way. Professor Vishnevsky made the first heart transplant in the USSR in November 4, 1968. The operation was carried out using the classical Lower-Shumway method. There was used the method of connecting the perfusion apparatuses of the transplant and the recipient (the so-called

switching principle). The muscle of the heart was supplied with blood from a special apparatus after removal. The operation to the recipient could begin later, after a direct examination of the suitability of the heart for transplantation. The surgeon could transport the heart from donor to recipient quietly, without haste: three hours of normal life in a perfused condition was guaranteed.

In accordance with the Russian Medical Legislation the removal of organs and tissues for their transplantation was possible only with the onset of a true or biological death, i.e. after 10-minute resuscitative measures, which turned out to be unsuccessful. At Vishnevsky operation the donor had a heavy going transport trauma. After 2 hours resuscitation, there was a diagnosis of "irreversible damage to the brain". After another 2 hours, the diagnosis of the doctor's council was confirmed and donor was transferred to transplantation department. But the human heart is very sensitive and could not work after resuscitation. Therefore if an order 600 literally had been allowed the transplant of organ actually it meant your patient can be died because all donor's hearts were damaged by ischemia.

What are the objective reasons to not allow the transplant of heart in USSR that time? What did think about this problem not officials, but other specialists: the surgeons, medical examiners?

According to the report by Viktor Ilyich Prozorovsky, the chief forensic expert of the USSR Ministry of Health, the removal of organs from living and dying people affects moral, ethical and legal aspects and requires the issuance of special rules. He wrote: "The removal of such unpaired organs as the brain, heart, liver, etc., for the purpose of transplantation, can be tolerated only if three specialist doctors from among persons who do not engage in organ transplant sign an act about the imminent death of the donor".<sup>5</sup>

Being one of the leading experts in the world in heart transplant issues, Alexandr Vishnevsky was firmly convinced that "if transplantation, at least to some extent, guarantees the patient's relief from the painful manifestations of deep disability, she really deserves a completely special relationship"<sup>6</sup>

Here is a letter from Vladimir Burakovsky, Director of the The Bakulev Institute of Cardiovascular Surgery, the third surgeon, who made the heart transplant in the USSR in 1983:

"Currently, heart transplant surgery is the only possible surgical method for treating doomed patients with heart disease.

It is already generally accepted that the heart transplant operation makes it possible to prolong the life of patients sometimes for 2-3 years or more.

The Bakulev Institute of Cardiovascular Surgery The Academy of Medical Sciences of the USSR, being the lead institution in the field of cardiovascular diseases, serves patients coming from all over the Soviet Union. The Institute has a vast experience in

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<sup>5</sup> GA RF [State Archive of the Russian Federation] P.8009.Op.50.D.1963 L.40.

<sup>6</sup> Achievements and perspectives of organ and tissue transplantation / A.A. Vishnevsky, I.S., Kolesnikov, F.V. Balliusek, V.F. Portnoy// *Voyenno-meditsinskiy zhurnal*,1971, 7:21-26

the surgical treatment of heart disease and blood vessels. The Institute has already done about 2.5 thousand operations with artificial circulation only, i.e. on the open heart operations .

At present, the whole volume of the most modern surgical interventions on the heart and the main vessels is carried out at the institute. For many years the institute conducts a comprehensive experimental study on the problem of "Heart transplantation".

More than 300 heart transplant operations have been performed in the world. Successful heart transplantations have been performed in the USA, France, South African Union and in a number of other countries.

Already about 3 years ago we applied to the Academic Council of the Ministry of Health of the USSR for issuing the appropriate permission to conduct such an operation, naturally in strictly defined cases, if absolutely necessary and necessary training was given.

I do not want to say that the implementation of several heart transplantations, even successful ones, will to some extent solve the problem of treating patients with heart and vascular diseases. However, the fact that this issue is not being resolved actively in our country, certainly affects the entire research work in general. Preparing for a heart transplant operation, its implementation without any doubt, should affect the progress of the entire medical science in general, in particular, in such disciplines as anesthesiology and reanimatology, as the doctrine of tissue immunity. In addition, a number of questions on tissue immunity, anesthesia, and management of the postoperative period can not be resolved in the experiment. It is necessary to conduct clinical studies... "<sup>7</sup>

But it also did not cancel the order of 600. Only showed the futility of attempts to influence the solution of the problem of heart transplantation with the help of surgeon alone.

Only 3 surgeons dared to break a ban: Alexander Alexandrovich Vishnevsky in 1968, Gleb Mikhaylovich Soloviev in 1971 and Vladimir Ivanovich Burakovsky in 1983. They believed that their duty was to help patients, even if it threatened their future. They were outstanding surgeons and they were famous surgeons in USSR and all around the world. There were sanctions for each of them after their heart transplant operations, but even they could not to break the system.

Formally this Order did not prohibit organ transplantation, but the way it was compiled led to impossibility of clinical heart transplant operation in the Soviet Union. It took 20 years for the practicing surgeons to "pave the way for the heart" and to change the transplantation law.

On February 17th, 1987 an Order № 236 called "Temporary instruction about ascertaining of death on the basis of the brain death diagnosis" was adopted. On March 12th, 1987 professor Valery Ivanovich Shumakov (1931-2008) the first in the

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<sup>7</sup> Burakovsky V.I. Notes of a cardiothoracic surgeon: essays and reflections. Moscow: Knowledge, 1988; 239.

USSR performed the successful operation of heart transplantation to patient with dilated cardiomyopathy, who has lived after operation about more than 9 years.

But no one will ever know how many people were deprived of the chance to live with a new living heart in their chest to this date.



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