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Zdravko Nižetić in Heidelberg in 1934: a herald of cadaver cornea transplantation

Zdravko Nižetić u Hajdelbergu 1934: vesnik transplantacije rožnjače umrlog davaoca

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Introduction

The lack of appropriate human donor corneas from enucleated pathologic living human eyes was pointed out by Arthur von Hippel as early as 1878: "Unfortunately, until recently, I was unable to find simultaneously both an eye suitable for keratoplasty, and the other, with a clear cornea, intended for enucleation. The conditions are not as favorable elsewhere as in London, where a colossal amount of material is concentrated in the hands of a few surgeons" [1].

The donor material from stillborn infants was also scarce. Among thirty cases of keratoplasty presented by Fuchs in 1894, only four corneas were obtained from this source [2].

First of the milestones along the road leading to the solution to this problem was Magitot's experimentation during 1911 and 1912 which resulted in three achievements: a medium of hemolyzed blood for tissue preservation, a successful transplantation of a living human donor cornea after being kept in such a fluid, and a retained transparency of that transplant during a long follow-up [3]. The next milestone was the result of the steadfast work of Vladimir Filatov of Odessa, who sought a massive source of donor corneas as an answer to the growing need for sight restoration, and found it in cadavers. Obviously inspired by Magitot's results of tissue preservation [3], Elschnig's large series of penetrating keratoplasties [4], and encouraged by simultaneous attempts at cadaver blood transfusion [5–7], Filatov and his associates performed 455 keratoplasties from 1922 to 1938, out of which they made use of the preserved cadaver donor corneas in 264 cases [8]. Such a convincing number influenced legislators to facilitate the process of organ and tissue donation and conceived the foundation of eye banks by Paton, McLean and Brackinridge in the following decade [9, 10].

Filatov's achievement was followed by Zdravko Nižetić, who performed the first keratoplasty in Yugoslavia in 1933 and made a series of 90 transplantations during the following six years, with 88.2% of cadaver donor corneal transplantations out of 51 keratoplasties performed from 1937 to 1939 [11]. This pioneering work secured him a place in the history of ophthalmology [12, 13].

The purpose of this paper was to find out whether the report presented by Nižetić at the meeting of the German Ophthalmological Society in Heidelberg on August 6, 1934 [14], was the first announcement of a successful use of cadaver cornea as a material for transplantation in Western Europe.

Sources

The timeline of events leading to the successful use of corneas from deceased adult human donors as a material for transplantation was documented in the memoirs of Zdravko Nižetić, as well as in editions of the daily newspaper *Vreme*, which covered this topic during 1933 and 1934. The memoirs offer insight into the life and deeds of Zdravko Nižetić in the form of sixty handwritten pages covering the period from June 7, 1919, to April 6, 1941. They were found in the personal archive of Dr. Ljiljana Marjanović (born Nižetić), and published in 2010 [15]. The *Vreme* newspaper, founded on

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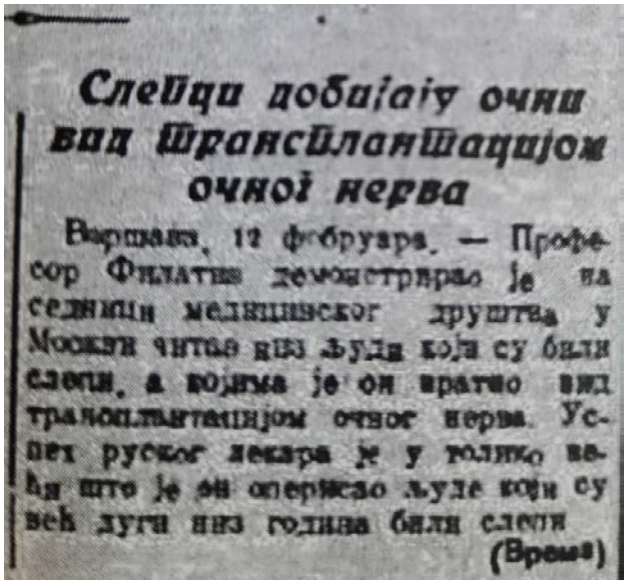
the initiative of King Alexander I as a competitor to *Politika* [16], regularly reported on progress in medicine.

The statements from these sources were considered subjective. They were, therefore, compared to such objective sources as the Report from the Meeting in Heidelberg [14], and scientific papers and books written by Filatov, Nižetić, and other authors [8, 11, 12].

Memories of the first keratoplasty

Nižetić remembers in his memoirs: "…Five years later, I began to publish again, and one of my papers appeared in the leading German ophthalmology journal, *Klinische Monatsblätter für Augenheilkunde*, in 1933. Also, my wishes were fulfilled, and my attempts at corneal transplantation were realized at that time. I often thought of this operation while I worked in Niš, but it was impossible to find both a donor and a recipient simultaneously… One day, the newspaper *Vreme* reported on a successful transplantation of a cadaver eye by a Russian scientist, Filatov." [15].

Indeed, a short note entitled "Blind men regain vision after transplantation of the optic nerve" appeared in *Vreme* on February 13, 1933. The whole text reads: "Warsaw, February 12. At the medical society session in Moscow, Professor Filatov presented a whole range of previously blind people who regained vision after undergoing transplantation of the optic nerve. The success of the Russian physician is all the greater because he operated on people who had been blind for many years [17]" (Figure 1).


Слепци добијају очни вид трансплантацијом очног нерва

Варшава, 12 фебруара. — Професор Филатов демонстрирао је на седници медицинског друштва у Москви читав низ људи који су били слепи, а којима је он вратио вид трансплантацијом очног нерва. Успех руског лекара је у толико већи што је он оперисао људе који су већ дуги низ година били слепи

(Време)

Fig. 1 – News about Vladimir Filatov's success published in *Vreme* on February 13, 1933.

It was hidden on page 7, between other curiosities from the world, such as "A lion eating in a restaurant," "Two swimmers devoured by a shark," and "A fight with axes and pistols" [17].

Obviously puzzled by the news, Nižetić continues: "I started to think about it, knowing that the transplantation of the whole eye was impossible. A tormenting idea immediately came to my mind that these might have been cases of corneal grafting, and I decided to try it. Both Professor Šahović and Professor Milovanović were ready to make the material available to me" [15].

It is hard to know exactly how many patients Filatov presented at the session mentioned in *Vreme*. One can only guess that it was a series of 95 keratoplasties, or a part of it, which were about to appear in his later publications. The number of recipients of preserved cadaver donor corneas must have been much smaller, as he began applying this method in May 1931 [18]. Moreover, his follow-up usually lasted for over a year.

Nižetić, on the other hand, probably counted on cadaver corneas from the beginning, at least in some cases. This statement is supported by his saying that both the head of pathology and the head of forensic medicine were ready to make "the material" available to him, and what else could that material be but cadaver corneas? On an unknown date in 1933, he performed his first keratoplasty and left a poetic description of his endless happiness on the first postoperative day, "when the graft appeared shining like a drop of oil" [15]. At that time, he was the chief of the Eye Department of the State General Hospital in Belgrade, Yugoslavia, by decree of His Majesty King Alexander I (No. 15302) issued on August 15, 1932 [15].

The first in Europe?

Nižetić soon reached tremolo with his pace of transplantations and publications. His modification of Filatov's technique of keratoplasty appeared in a respectable German journal of ophthalmology at the beginning of 1934 [19], although Filatov did not consider it a novelty [20]. Seven months later, he attended the 50th Congress of German Society of Ophthalmology in Heidelberg, where he "was able to present a case of a successful corneal transplantation with the material from cadaver, performed in Europe, in fact on the continent outside the Soviet Union, as Filatov's work had been strictly within the borders of Russia and unknown to Europe" [15].

Reading the names of the speakers at the afternoon session of this congress, held on August 6, 1934, is like reading a textbook of ophthalmology full of eponyms: Thiel, Comberg, Eugen von Hippel, Arruga, Meesmann, Wessely, Junius, Bücklers, Franceschetti, Marchesani, Bielschowsky. Among those few without such an aura, one finds Zdravko Nižetić from Belgrade, Yugoslavia. His oral presentation "Keratoplasty with a corneal material taken from a cadaver eye" was a case report of a cosmetic keratoplasty for unilateral adherent leucoma after scarlet fever in a fifteen-year-old girl, with a clear transplant after a four-month follow-up. The donor was a girl who had died 20 hrs earlier. In addition, Nižetić mentioned two recent keratoplasties with a follow-up of only two weeks, where the donor corneas had been taken 16 hrs post mortem from a three-year-old child who had died from enteritis [14]. He used his own modification of Filatov's technique, with a temporary conjunctival flap over the graft and the lens protection with a knife inserted into the anterior chamber before trephination [19].

The printed version of his presentation at this meeting has 109 lines of text. It took Nižetić 40 lines to report his

cases, while almost the same space, 36 lines, was needed for the description of Filatov's results of 96 cases of the cadaver cornea transplantations, two of them with a long (9–13 months) follow-up. The rest was spent on the introduction and conclusion, which ends with the statement that the results presented by both Filatov and Nižetić indicated that cadaver corneas were suitable for transplantation [14].

Was this presentation novel to Western Europe, as suggested by Nižetić in his memoirs? His statement looks rather clumsy because he clearly avoids the word "first", either because he was aware of the previous occasional attempts at cadaver cornea transplantation, or because he was trying not to sound presumptuous [15]. Indeed, Filatov listed those who published abroad, such as Fuchs and Magitot, alongside Shimanovsky, Saveliev, and Komarovich, whose papers appeared in Russian, as authors who had already tried keratoplasty using material taken from cadavers. All their occasional cases ended in failure, except for one reported by Magitot, who had used a cornea from an embryo [20]. On the other hand, Nižetić successfully used the cornea of a deceased adult donor to obtain a clear graft in a cosmetic keratoplasty, with a rather short, four-month follow-up [19].

Was Filatov's work really unknown to Europe at that moment? At least five of his papers on corneal transplantation were published in German journals from 1924 to 1933, and many of his reports in Russian appeared abroad as reviews from the foreign literature [11, 20]. Therefore, his work on keratoplasty with a graft from a living donor was well known. However, his first paper on cadaver cornea as a material for transplantation published abroad was the one which appeared in a French journal in September 1934 [21], one month after Nižetić had presented his case in Heidelberg [14]. Further, Filatov's most cited reports on his large series of patients treated in this way are those published in the Archives of Ophthalmology in 1935 [22] and in the Lancet in 1937 [18], a year and four years later. Therefore, it seems that Nižetić's statement was true – he really had the advantage of one month over the first subsequent communication on that matter published in the West.

On the other hand, how could he write an extensive description of Filatov's experience with this method in the introduction of his presentation at Heidelberg if it was unknown in Europe? The answer to this question may be found both in his memoirs [15] and the newspaper *Vreme* [23].

On May 5, 1934, journalist Radmilo Milenković published a long interview with Dr. Nižetić in *Vreme*. Its title, "In Belgrade, surgeons will soon treat blind people by transferring eyes from – a dead person" [23], was a promise of a giant step forward (Figure 2).


Субота, 5 мај 1934

Време

СТАРИ РЕВОЛУЦИОНАР НА СЛОБОДИ

Амнестија генерала Санхурха била је разлог оставке г. Леруа

ЈЕДАН НАУЧНИ НАПОР КОЈИ СЕ ВРШИ У НАШИМ ЛЕКАРСКИМ КРУГОВИМА

У Београду ће ускоро хирурзи лечити слепе људе преносом очију са — мртвог човека

И после 36 часова „смрти" око поново може да функционише кад се прекалеми

Пре стотину и више година покушало се први пут са трансплантацијом рожњаче

Како се врши пренос ока са мртвог на живог човека

Г. др. Нижетић

ДА БИ СПАСЛА СТОКУ...

Старица налази смрт у запаљеној колиби

РАДМИЛО МИЛЕНКОВИЋ

Fig. 2 – Interview with Zdravko Nižetić in *Vreme*, May 5, 1934.

One single sentence from this interview gave us a clue for the solution of our puzzle: "A clarification… was given to us by Dr. Nižetić, who has been in continuous contact with the famous Russian Professor Dr. Filatov from Odessa since the day when the news about transplantation of the eye appeared in *Vreme* [23]." This means that Nižetić contacted Filatov soon after February 13, 1933.

Now, when the date has been established, one needs to know about the content of their correspondence, and goes back to the memoirs to find out that "… in those years, I used to frequent the University Hospital in Munich almost yearly, and visit its rich library. I wrote to Filatov from there, and we started a continuous correspondence. He sent me all his papers, and I sent him mine" [15].

Among these papers of Filatov's must have been the progenitor of all his later scientific communications, "Cadaver cornea as a material for keratoplasty," from the *Soviet Vestnik of Ophthalmology*, published at the beginning of 1934 [24]. Nižetić was obviously acquainted with it at the time of his interview, May 5, 1934, when he said: "The success of Dr. Filatov from Odessa lies in the fact that his astonishing experiments, completed and published at the beginning of this year, proved that keratoplasty could be done with a graft taken from – a corpse!" [23].

Therefore, we may conclude that Nižetić, while presenting his own work, was the first European promoter and follower of Filatov's ideas and surgical technique of cadaver cornea transplantation, shown in a large series of successful cases. The promotion of both the pupil and the distant mentor reached its peak in May 1935, when Nižetić received an invitation from the University Clinic in Munich, to perform a keratoplasty, which he did "in front of two professors and all doctors, after obtaining the tissue for transplantation from a deceased adult female donor in Schwabing Hospital morgue" [15] (Schwabing is a borough of Munich, author's remark). The statement of European priority in publication on cadaver cornea transplantation, no matter how much true *sensu stricto,* would seem presumptuous had Nižetić ever missed the opportunity to mention his role model even at the height of his career [11].

The timeline of discoveries, their practical applications, and publications that originated in minds and hands of Filatov and Nižetić have, at least in part, been influenced not only by the course of history of medicine and socio-economic regeneration after the war and revolution, but also by personal virtues and events from biographies of these two outstanding figures, as shown in the following croquis.

Nižetić and Filatov as antipodes

All that Nižetić is famous for has been created by a burst of his activity during a period of six years. It took him just eighteen months to grasp a new idea from a newspaper notice and to turn it into a capital presentation of a new approach to transplantation [11]. On the other hand, Filatov's inventive work continued steadily for decades, some years being more productive and more successful than others, with a painstaking refinement of details, and a long follow-up [20]. Nižetić was a cosmopolitan and a man of the 20th century, somewhat hectic and eager attendant of congresses abroad, while Filatov had reached his adulthood in the 19th century and was more rooted in his homeland and Orthodox religion. Both of them had an excellent medical education, but they lived in different social environments and had different abilities to adapt to their milieu. Both of them were imprisoned, one in Austria for sympathizing the nationalist Slavic movement at the beginning of World War I, the other during Stalin's purges; both witnessed building of their institutes *de novo*, but with different luck in running them: Nižetić was replaced, and Filatov remained at his position for life, even after a relocation of the Institute to the trans-Urals city of Tashkent during World War II [20].

Highly decorated academician Filatov lived to his old days with honors and left a myriad of famous pupils and followers [20]. Nižetić got his professorship in Zagreb in 1947, the last year of his short life [15]. His only follower, Dr. Đorđe Lukić, left Belgrade for South America soon afterward (personal communication with professors Z. Kecmanović and S. Dergenc). Patients who needed keratoplasty were sent from Yugoslavia to Odessa, where masterful surgical skills and human comfort were offered by Dr. Filatov [25]. The art of corneal transplantation returned to Belgrade more than a decade later, after a new generation of ophthalmologists had arrived from their observerships in France under Paufique in Lyon, and under Sourdille in Nantes. Together, they performed 15 keratoplasties *per* year, equaling the number set by Nižetić almost thirty years before [26].

Conclusion

The case of cadaver cornea transplantation performed by Zdravko Nižetić and presented by him at the Congress of the German Ophthalmological Society in Heidelberg in 1934 has been mentioned in our literature on the history of ophthalmology in Serbia only as a title. Our paper uses the report from this meeting to describe his presentation in detail and to determine the time sequence of its appearance by comparison to the dates of publication of Filatov's papers. It can be safely concluded that Nižetić was the first in Western Europe to promote the successful transplantation of the cornea taken from an adult deceased person with the use of Filatov's method.

R E F E R E N C E S

1. *Hippel von A.* On Transplantation of the Cornea. Gräfes Arch Ophthalmol 1878; 24(2): 235–56. (German)
2. *Fuchs E.* On Keratoplasty. Wien Klin Wochenschr 1894; 7(45): 843–5. (German)
3. *Magitot A.* Transplantation of the human cornea previously preserved in an antiseptic fluid. JAMA 1912; 59(1): 18–21.
4. *Elschnig A, Vorisek EA.* Keratoplasty. Arch Ophthalmol 1930; 4(2): 165–73.
5. *Shamov WN.* The transfusion of stored cadaver blood. Lancet 1937; 230(5945): 306–9.
6. *Judine S.* Transfusion of cadaver blood to a human. Paris: Masson et Cie; 1933. (French)
7. *Yudin SS.* Transfusion of cadaver blood. JAMA 1936; 106 (12): 997–9.
8. *Sitchevska O.* Corneal transplantation with fresh, preserved and fixed material: experimental and clinical observation. Arch Ophthalmol 1944; 3(1): 118–9.
9. *McLean JM.* Corneal transplantation; technique. Am J Ophthalmol 1948; 31(11): 1370–4.
10. *Paton RT.* Eye-bank program. Am J Ophthalmol 1956; 41(3): 419–24.
11. *Nižetić Z.* On the development and the present state of corneal transplantation. Bücherei des Augenarztes. Stuttgart: Ferdinand Enke Verlag; 1940. (German)
12. *Castroviejo R.* Atlas of keratectomy and keratoplasty. Philadelphia-London: WB Saunders Company; 1966. p. 40.
13. *Wayenborgh JP.* IBBO: International Biography and Bibliography of Ophthalmologists and Vision Scientists A-Z. Julius Hirschberg, The Monographs, Vol 7, Part 1-2. Ostend: Wayenborgh Publishing; 2002. p. 490.
14. *Nižetić Z.* Keratoplasty with corneal material obtained from a cadaver eye. In: *Wagenmann A*, editor. Report on the Fiftieth Meeting of the German Ophthalmological Society in Heidelberg 1934. Berlin: Springer; 1934. pp. 341–4. (German)
15. *Kecmanović Z, Paunović D.* Professor dr Zdravko Nižetić 1895-1947. Beograd, Zrenjanin: Udruženje oftalmologa Srbije, Art-Projekt; 2010. p. 182. (Serbian)
16. *Dragović V.* Serbian press between two wars. Book 1. Basis for bibliography of Serbian periodicals: 1915-1945. Belgrade: SANU; 1956. pp. 54. (Serbian)
17. *Vreme.* Blind men regain vision after transplantation of the optic nerve. Vreme 1933; February 13, year XIII, number 3992, page 7, article 27. (Serbian)
18. *Filatov VP.* Transplantation of the cornea from preserved cadavers' eyes. Lancet 1937; 229(5937): 1395–7.
19. *Nižetić Z.* A modification of technique of the total penetrating keratoplasty after Filatov. Klin Mbl Augenheilk 1934; 93(1): 89–91. (German)
20. *Filatov VP.* Optical transplantation of the cornea and tissue therapy. Moscow: Narkomzdrav, State Publishers of Medical Literature "Medgiz"; 1945. (Russian) Reviewed by *Sitchevska O.* Arch Ophthalmol 1947; 37(5): 698–700.
21. *Filatov VP.* Cadaver cornea as a material for transplantation. Ann d'Oculist 1934; 171(Sept): 721–34. (French)
22. *Filatov VP, Sitchevska O.* Transplantation of the cornea. Arch Ophthalmol 1935; 13(3): 321–47.
23. *Milenković R.* In Belgrade, surgeons will soon treat blind people by transferring eyes from - a dead person. Vreme 1934 May 5; year XIV, number 4425, page 5, article 7. (Serbian)
24. *Filatov VP.* Cadaver cornea as a material for keratoplasty. Sov vestn oftalmol 1934; 4(2): 222–4. (Russian)
25. *Pinto G.* New Life of Andrija Mijušković. Borba 1946 July 23; year XI, number 175, page 4, article 65. (Serbian)
26. *Stanković M.* Vision saved by corneal grafting. Borba 1962 March 3; year XXVII, number 70, page 8, article 37. (Serbian)

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