

ORIGINAL ARTICLE

The History of the Development of Ophthalmology in Georgia

Abstract

Ophthalmology has been an integral part of daily medical activities since time immemorial, as it refers to the organ on which a person's perception of the world depends. This research aimed to find information about the Georgian School of Ophthalmology and to systematize it. Within the scope of the study, monuments of ancient Georgian medical literature, works and monographs by medical historians, internet materials, and modern collections were searched and analyzed. The study revealed that the history of the ophthalmology school in Georgia is quite complex. This is especially well documented in the works of Zaza Fanaskertel-Tsitsishvili, Sulkhan-Saba Orbeliani, and David Batonishvili. During the Middle Ages, Georgian knowledge of the visual system employed the principles of Eastern medicine. By the 10th century, ideas about the anatomy, physiology, and pathologies of the visual system, as well as treatment methods, were already well established. As for the modern school of ophthalmology, information can be found in various Georgian and foreign language sources, including numerous reports, facts, and episodes. The mentioned discoveries and all available information are systematized in this article.

Key words: Ophthalmology, Georgia, History, Middle Ages, Anatomy, Physiology, Pathology, Treatment

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Introduction

Both globally and in Georgia, ophthalmology emerged and developed along with other branches of medicine. It is a field focused on treating eye diseases and has been an integral part of surgery since early times. Antoine Metrejean (1650-1730) and later Jacques Daviel (1696-1762) were the first to modernize and introduce cataract extraction—the removal of cloudy lenses from the eye to restore vision—into sophisticated surgical practice. They laid the foundation for ophthalmology as a distinct field although its official establishment as an independent science did not occur until the 1820s (Leffler, et al., 2020). This progress was made possible during the years when specialized eye hospitals were opened in several countries (Marmion, 2005).

In Georgia, ophthalmology, like medicine in general, has a rich and ancient history. The tradition of folk eye treatment dates back to ancient times, as evidenced by the so-called “*miraculous*” eye treatments described in ancient fairy tales, such as “*the opening of an eye.*” Additionally, there is a story in Amiran’s epic: “*Amiran’s foster Yaman is one-eyed.*” Amiran learns that one of his eyes was taken by a demon. He goes to fight the devil, forcibly takes Yaman’s eye, and places it on his father. “*All legends and stories have a basis, and this miraculous ‘eye insertion’ should be seen as a reflection of folk treatment of the eye*” (Nemesius, 1914).

According to the research of V. Bardavelidze, St. Barbara is primarily the deity of the eye, to whom objects with the image of the eye were sacrificed: “*The deity Barbara is the supreme owner and ruler of the light of debt and contagious diseases. It gives light to a person’s eyes, protects them from eye pain and contagious diseases, and cures those suffering from this disease. At the same time, Barbara can make a person suffer and make him need a doctor*” (Bardavelidze, 2006).

The oldest and at the same time the most complete monument is “*Ustsoro Karabadini*” (which stands for “*Incomparable Karabadini*” in Georgian) (Figure 1), the date of its creation was thought to be the 11th century. However, the date was corrected to the 10th century as a result of the research conducted by Professor Ramaz Shengelia (Tuite, 1998). The author of “*Ustsoro Karabadini*” is a Kananeli, about whom no biographical information has been found.



Figure 1. Incomparable Karabadini (The picture is taken from corresponding author’s collection)



Also, the best monument of the 13th century is “*Book of Physicians*” or “*Book of Healing*” by Khojakofili, which provides a relatively comprehensive picture of the level of development of medicine at that time (Karaia, 2012).

The Mongols’ invasion of Georgia in 1235 lasted a century, weakening the country politically and causing economic and cultural decline. In the following centuries, Georgia was caught between two major aggressors—the Ottoman Empire and Iran—and was nearly isolated from the broader cultural world. Because of this, although medicine in Georgia didn’t see significant progress from the 13th century and its theoretical basis remained largely unchanged until the 19th century, it is notable that Renaissance influences are visible in the 15th-century “*Healing Book - Karanadini*” by Zaza Panaskerteli (Figure 2) and the 16th-century “*Iadigar Daudi*” by David XI (Bagrationi, 1985).



Figure 2. Zaza Panaskerteli – Mural in Kintsvisi Church, Georgia (The picture is taken from corresponding author’s collection)

Issues of Eye Anatomy

While ancient Georgian medical practitioners faced significant challenges in studying eye anatomy due to the absence of modern techniques such as ophthalmoscopy (a method of examining the inside of the eye) and religious restrictions on dissection, they succeeded in developing a sophisticated understanding of the organ of vision. This knowledge was documented in various texts, often described using metaphors and concepts unique to their time. Modern anatomical knowledge allows us to reinterpret these ancient descriptions through a contemporary lens, helping us better understand the medical advancements of that era.

According to the fragment in the “*Tisgni Saakimoi*” by Panaskerteli (XVc): “*it is clear from the given fragment that the organ of vision consists of seven layers and three contents*”. These descriptions, when interpreted through the lens of modern anatomy, can be referred to as follows:

1. Maltahamai – Conjunctiva: The mucous membrane of the eye, the thin, protective layer that covers the white part of the eye and the inside of the eyelids, described as “*all surrounding*,” which in modern terms refers to the conjunctiva. Its function, as interpret-



ed from the ancient description, is to anchor the eye to the surrounding muscles – “*it is attached to the area of the meats*” (where “*meats*” stands for muscle in ancient Georgian).

2. Karinai – Cornea is the clear, outer layer at the front of the eye that helps focus light entering the eye: It is described as “*hard and looks like a white horn*,” which aligns with the modern understanding of the cornea, serving to protect the lens from “*misfortune*.”

3. Ghabibai – Iris is the colored part of the eye that controls how much light enters through the pupil. It is described as “*looking like a grape seed*,” which would be modernly interpreted as the iris. The passage notes that the iris is white in color and helps preserve light, a function that correlates with the modern role of the iris in regulating the amount of light entering the eye. The hole (pupil) is said to be located in the middle of the “*third membrane*” (Ghabibai), where two hollow “*Phias*” (nerves) come from the front part of the brain. This description suggests an early understanding of the role of pupillary accommodation.

4. Ankabita – Lens capsule is the thin, protective layer surrounding the lens inside the eye: It is described as “*like a net and white in color*,” which can be compared to the modern concept of the lens capsule that supports the lens (Jaladi) and “*preserves the thickness and reverses the defect*.”

5. Shabakai – Choroid is the layer under the retina that provides blood and nutrients to the eye: Its function is to nourish the vitreous body, aligning with the role of the choroid in modern anatomy.

6. Jalidia – Retina is the layer at the back of the eye that captures light and sends visual signals to the brain: It is described as “*like a rose in color*,” and its function is to protect the lens from the “*heat of the quarrelsome vessels*,” which may correspond to the modern protective role of the retina in the overall function of the eye.

7. Salbia – Sclera is the white part of the eye, which gives the eye its shape and protects the inner parts. It is described as “*the strongest of all*”, reflecting the modern understanding of the sclera, which serves to fix the eye and protects it from damage, providing structural support.

And the three contents of the organ of vision, “*Pulps*”, or “*Rutobat*”, were distinguished:

1. Jalidi – It was described as “*inside the eye, surrounded by silk*.” Jalidi was believed to be nourished by Zajiji (see below). Given its localization, in front of the vitreous body, it is most likely referred to as lens.

2. Zajiji – It was referred to as “*pulp as a melted glass*.” Zajiji was thought to be positioned behind Jalidi and serve as its source of nourishment. Based on this description, it corresponds to the vitreous body.

3. Baitai – It was described as having an inside “*as white as an egg white*” and being “*in front of Jalidi (lens), cooling and repelling air and dryness*.” Baitai likely refers to the aqueous humor of the anterior chamber of the eye (Fanaskerteli, 1950; Shengeliia, 1981).

However, it should be noted that, based on the analysis of the content, these are thought to refer to the modern organs mentioned.

In addition to the anatomical layers of the eye, the muscles and nerves play a crucial role in eye function. Most of the ancient texts describe twenty-four muscles for the eyes (Kofili, 1936). Knowledge of the presence of 24 muscles in the eye is intriguing, though modern anatomy recognizes a maximum of 12 pairs (superior rectus, inferior rectus, medial rectus, lateral rectus, superior oblique, inferior oblique, levator palpebrae superi-

oris, orbicularis oculi, ciliary muscle, sphincter pupillae, dilator pupillae, superior tarsal (Müller's) muscle). However, given the advanced nature of this historical information, it remains unclear what exactly was meant by “24 muscles” at the time, making it a subject for further research.

As for the nerves, Khoja Kofili mentions in the “*Book of Healing*” (XVc) that the body has vessels (nerves) that help the eyes see and communicate with the brain, and seven pairs originate from the brain. The first pair penetrates inside the eyes and the second pair is attached to the layers of the eye” (Kofili, 1936). These latter ones is likely to refer to the optic nerve and oculomotor nerve, respectively.

Regarding the Renaissance period, David Batonishvili (David the Regent) (Figure 3) describes the anatomy of the eye and the functions of its individual parts in paragraph 89 of his famous book, “*Concise Physics*,” published in 1818. The book covers physics, chemistry, biology, astronomy, and meteorology (Parkadze, 1954). He names the eyelids, eyelashes, and six ocular motor muscles, four of which are straight and two sloping. He explains their functions correctly although he assigns the “*pleasant look*” and “*furious look*” to the sloping muscles. In paragraph 90, he describes the structure of the eyeball with sufficient detail: “*The eye (called “Guga” by the author) consists of several pulps and layers.*” Among these layers, he mentions the “*upper layer*,” which seemingly refers to the sclera, and describes the swollen, bulging part of it, most likely the cornea. The “*inner layer*” is called “*the grape layer*” and has an opening called “*Baia*,” likely referring to the choroid and pupil, respectively. He names the colored layer around this opening and the whitish round ligament behind it—probably the iris and ciliary body. He states that the remaining part is called “*khoroidi*,” which is pronounced as “*choroid*” in Georgian.



Figure 3. David Batonishvili – David the Regent 1767-1819 (The picture is taken from corresponding author's collection)

By Batonishvili, the following picture of the nervous system of the organ of vision is presented: *“The god divided and established the vessels in the body of a man so that a man may know, hear, and speak with intelligence and commandments, know good and evil spirit, have intelligence, understanding, love, and learning. He raised four vessels from these twenty large vessels on both eyes, so that the eye would tilt from these four veins and work with the power and mercy of those and see everything, and thanks to these veins, the eye would drink water from the brain and give light”* (Bagrationi, 1985). In the citation, the vessels refer to the nerves.

According to the analysis of the works by David Batonishvili, a lens, similar to pure water, is placed between the transparent layers. The third, *“internal”* layer is called the *“net”*. These parts consist of *“nerves, i.e., the vessels of sense.”* The eye is divided into two cavities - the front and back parts (*“Komar”* and *“Kellen”*), which are filled with *“pure pulp”*. After the rays enter the eye and are refracted, the object is perceived (*“is displayed”*) *“at the bottom of the eye, on the retina.”*

Thus, David Bagration describes the anatomy of the eye with considerable precision, and it is quite surprising that the terminology he uses corresponds to the terminology used today. He used the Georgian names for Lens, Pupil, Iris, Retina, Vitreous body for the first time in Georgian literature (since these terms are not found in earlier sources). Such an independent coincidence of modern terms and the terminology adopted by David Batonishvili indicates his higher education and reflects the traces of his European education (Abashidze and Metreveli, 1978).

Issues of the Physiology of Vision

The issues of sight physiology are not given in detail in the Georgian literature of the developed feudalism era (XI-XVIII centuries). However, physical and physiological optics are depicted with sufficient accuracy in the Georgian medical texts from this era and the transitional period (1801-1860). Additionally, we have encountered interesting issues, which provide us with some idea of the level of knowledge about the physiology of the organ of vision at that time.

In this regard, relatively extensive data is found in Ioane Petritsi's (also referred to as John Petritzos) (Figure 4) 11th-century translation of *De natura hominis* (*“On Human Nature”* or *“On the Nature of Man”*) by Nemesius of Emesa (Casiday, 2012, p. 544; Emesa, 1914).

In the work, the essence of vision is discussed separately, under the title *“For vision”*, where complex problems of the physiology of vision are systematized. In this chapter, it is mentioned that *“sight”* is a *“storage of sensation”* and a *“power of perception.”*

Four things were considered necessary for correct vision: an unharmed (healthy) eye, a *“moderate tilt”*, a *“moderate rotation”*, and clear air.

The author identifies the external organ of vision as the eye and refers to the central visual pathway to the brain as the *“power of sensation.”* It is explained that in the act of seeing, the eye itself perceives only the shape and color of the object. At the same time, the rest of the perception occurs through the sense organs, i.e., with the complex of sensations in the brain, the perfect perception of the object takes place. (Emesa, 1914).

Such profound explanations of the complex problems in the physiology of vision, despite the several misconceptions they include, indicate that scientific thinking in ancient



Georgia was quite advanced. This work is indeed a translation, but its existence in the 11th century demonstrates the readiness of the Georgian scientific community to understand it.



Figure 4. Statue of Ioane Petritsi in Tbilisi, Georgia (The picture is taken from corresponding author's collection)

The functions of eyebrows and eyelashes are interestingly explained in the *“Medicinal Book - Karabadini”* by Zaza Panaskerteli (XVc): *“Eyebrows and eyelashes are for the benefit of a person, and the hair of the head, beard, and mustache are created for beauty... Eyebrows and eyelashes are the power of the eyes, not created for beauty. If a person does not have eyebrows, they cannot look at the sun and cannot see well in the distance. The eyelash is designed to prevent dirt and dust from entering the eye. That's why eyebrows and eyelashes don't grow like hair and a beard”* (Panaskerteli, 1950). A similar idea is repeated in Kananeli's *“Incomparable Karabadini”* (Xc) (Kananeli, 1940).

The functions of the eyelashes, eyebrows, and eyeball bones are even more precisely discussed in the *“Book of Physicians”* by Khoja Kofili (XIIIc): *“The frontal bone outside the facial bones is designed to protect the eyes. For instance, if something falls from above, it will protect the eyes. And the eyebrows are made to guard the eyes so that when one wants to close the eyes, and the eyelashes are made to be a gate and a cloth to keep out dust and dirt”* (Kofili, 1936).

In the *“Book of Physicians”* (XIIIc), sight is considered as one of the senses, the ability of which is manifested only in daylight or light. Visual acuity can be determined by the ability to perceive the *“size”* of an object from a certain distance. In the same book, both the definition of the functions of the individual membranes of the eye and the general issues of the physiology of vision are given. Naturally, many of these definitions are simplistic and can be far from the truth; however, some are entirely correct and scientifically accurate.

As we mentioned above, the issues of physical and physiological optics are described with sufficient precision in the works of the developed feudalism and transition period. In this regard, the works of Ioane and David Bagrationis, brilliant representatives of Georgian medicine, are of great importance.



gian medical thought during the transitional period, are particularly important.

Ioane Bagration, a younger brother of David Batonishvili, has dedicated separate chapters to the above-mentioned issues in his "*Kalmasoba*" (Lat. — "*quaerere*." Geo. — "*to go in search*", i.e., "*to search*"), XVIIIc. A separate chapter is devoted to the microscope, where Ioane explains the principles of its function, its varieties, the features of the equipment according to the magnification, and many other issues. While talking about the use of the microscope, he reveals his knowledge in relation to refraction anomalies: "*All men's vision is not the same because some are far-sighted and some are near-sighted, and this is due to the arrangement of their organs.*"

Based on the state of refraction of the eye, the author gives a rule for setting up the microscope. It distinguishes microscopes that magnify the object five hundred times, one thousand times, and two thousand times. Separately, the general issues of optics are discussed and explained in real scientific depth under the title "*For Optics*". Ioane Bagrationi defined optics as the science that investigates the mechanism of sight. This field explains the visual perception of objects by analyzing the behavior of light rays, including their reflection from objects and subsequent refraction through the air and the eye. Bagrationi's classification divides optics into three distinct branches: catoptric, dioptric, and perspective, each with its own dedicated interpretation.

David Bagrationi deals with the subject of vision more extensively. When discussing these issues, David reveals his rather reasonable and modern worldview, separating the analysis of vision from metaphysical speculation. This was a matter of dispute for hundreds of years until the connection of sight with metaphysics was finally dismissed in the nineteenth century. According to David, the function of vision is attributed to "*the vision of the organ, not the soul.*"

In Chapter 91 of Bagration's work on the eye, the subject of biconvex glass ("*daman*") is discussed as an optical weapon. The author explains the passage and refraction of the reflected ray from the object in the optical system with complete precision: "*If we do not have several pulps in the eyes, which are refracting the light, then the rays will reach the fundus of the eye in a scattered manner and we will not be able to see the object anymore*". The "*refractory pulps*" of the eye cause the rays to refract and converge to one point (macula).

It is known to the author that the rays coming from the object are reflected on the retina "*invertedly*": "*up-down and down-up, right-left and left-right*", the diagram of which is given in the author's work. According to him, each eye perceives an object separately, but one object is "*imprinted*" in the consciousness, not two, by the "*sensible nerves*" leading to the brain and the brain itself. The pupils "*widen in the dark and shrink in the light*".

The author defines presbyopia as follows: in youth, the lens is "*swollen*," and "*in old age, it begins to flatten*." This is why the elderly use "*slightly bent glasses*". At the end, the physical explanation of the causes of myopia is given: "*When the crystalline pulps (likely meaning the lens) are more swollen, it causes blindness. To correct this, they use concave lenses ('shrunk glasses')*".

In the following passages, David discusses microscopes. It distinguishes between simple and complex microscopes. Additionally, five schematic drawings are provided, illustrating the mechanisms and processes of ray passage and refraction of rays in microscopes.



Additionally, it is both unexpected and remarkable to find such insightful and practical optical essays in the manuscript by King Vakhtang VI of Georgia (Bagrationi, 1985) - "*Book of mixing oils and making chemistry*." XVIIIc. The author apparently had a special interest in optical topics since the mentioned paragraph is disconnected from the rest of the text, which describes the chemistry of oils and other substances. It is noteworthy that the glass-making techniques described by Vakhtang closely resemble those used in the leading optical workshops of the twentieth century. (Shengelia, 1963)

The History of Differentiation and Treatment of Eye Diseases

In the ancient Georgian monuments, eye diseases were presented separately and in a fairly systematic way almost everywhere. In the monuments of all periods, the humoral-pathological theory was precisely preserved in the explanation of the essence of pathology and/or disease, as follows: each essence consists of four elements: fire, air, earth, and water. The combination of these elements is fourfold, and the nature of the combination is also fourfold: fire gives a hot nature, air gives cool, water gives raw, and earth gives dry. Like fire, air, earth, and water, there are four types of bodily fluids, or organisms, namely: blood, phlegm, gall, and melancholy.

According to the beliefs of the time, the equal mixing of these last four elements ensures health, while the incorrect mixing gives rise to pathology and disease. The pathology of the organ of vision was based on this ideal philosophical concept. Through an analysis of these ancient texts, we can identify modern equivalents of some of these diseases.

It should be noted that the majority of acute endogenous eye diseases are divided into four groups in "*Book of Physicians*", "*Incomparable Karabadini*", and "*Yadigar Daud*": "*Eye pain, which is from blood (1), from phlegm (2), from gall (3), or from sadness (4)*". This is the "*4-component*" above-mentioned classification.

Most of the endogenous eye diseases known in modern ophthalmology were sorted under four diagnoses. Also, diseases of the eyelids, cornea, tear ducts, traumatic injuries, tumors, and surgical diseases of the external parts of the eyeball were given as separate nosological units.

Glaucoma, a disease of increased intraocular pressure, is described in "*Incomparable Karabadini*" (Xc) as follows: "*black water comes down into the eyes*". In the "*Book of Physicians*" (XVIIIc), Hordeolum is referred to as "*Shayraid*", and in the "*Incomparable Karabadini*" - "*Shahrad*". Chalazion is mentioned under the names of "*Salis*" and "*Shurnak*", and acute blepharitis - under the name of "*Sulaq*". In the same book, dacryocystitis is characterized as follows: "*pus coming from the eyes*", and exophthalmos - "*resurrection of the eyes together*". Pathologies of the optic nerve are referred to as "*not seeing well from the eyes*".

During those times, diagnosis was primarily based on external examination and patient complaints. Eyeball palpation and eyelid eversion to inspect the mucous membranes were common. Procedures, including surgical ones, were performed on conditions like Chalazion, Hordeolum (dissection), lacrimal sac (burning with a heated iron), eyelids (including plastic surgeries), the eyeball, and others. The repositioning of the lens within the vitreous body and the quick, effective recovery of vision through this method became especially significant. This technique was brought to Georgia by the first Iranian and Arab "*eye specialists*," who enjoyed the great trust of the people. Additionally, a form of



“culture” was formed with the understanding and treatment of glaucoma — for instance, as early as the 12th century, an anti-glaucoma operation similar to scleral trepanation (incision) was performed, using a gold tube to help relieve intraocular pressure. This is a rather extensive subject and deserves an independent scientific analysis and discussion.

Ophthalmology in 19th-Century Georgia

In 1806, a hospital for eye diseases was opened in St. Petersburg. Until the end of the 19th century, there was no specialized eye hospital in the Caucasus, nor was there an eye doctor of the civilian agency.

In 1803, a medical organization and the first 12-bed hospital were established in Tbilisi, and in 1808, a military hospital. In 1847, in the military hospital of Temur-Khan-Shur, the founder of military field ophthalmology, N.I. Pirogov, for the first time in the Caucasus, performed a traumatic cataract operation under Diethyl ether anesthesia. In 1867, the “*Caucasus Medical Society*” established the “*City Medical Center*” named after April 4, 1864 (the date the mentioned society was founded), where the population was offered ophthalmological assistance.

Scientific-based ophthalmology in Georgia was advanced significantly by the oculists of the Tbilisi Military Hospital, Jozef Talko and Michael Reich. In addition to treating the public, they authored the first original works in the field and respectively headed the hospital’s department of eye diseases. A notable contributor was Joseph Talko, who performed 31 operations in 1858 and also produced interesting research, such as his work on the “*Influence of tobacco on the organ of vision.*”

The department of eye diseases of the Kutaisi military hospital also worked with quite a lot of workload; in 1871, for instance, 591 patients were treated, of whom 540 had recovered. The capacity of the department was between 45 and 50 beds. In 1886-87, an “*eye sanitary station*” was established in the city of Borjomi, where 91 patients were treated in 1886 and 161 patients in 1887.

Despite the existence of the aforementioned department of the Kutaisi Military Hospital, the millions of inhabitants of Kutaisi and its governorate were deprived of inpatient care, as the hospital did not serve the general public. Kutaisi and all of Western Georgia were in such a state when a young, later famous public figure, a young doctor, Samson Topuria, arrived. Educated in Kharkov and Berlin, and a disciple of the renowned Rudolph Virchow, Topuria would become a famous public figure. With the support of other benefactors, he built the 75-bed “*Samson Topuria Healing Hospital,*” which opened on May 1, 1890. Topuria invited S.S. Golovin, a great Russian ophthalmologist, later the famous professor of Odessa and Moscow universities, to work in his hospital.

Among the young Georgians who attended Russian higher education institutions in the 1880s were several notable figures: Giorgi (Gigo) Tarsaidze, Giorgi Korkashvili, Alexander Shatilov, Klimenti Topuridze, and Vakhtang Muskhelishvili. They founded Georgia’s first eye hospital, which subsequently provided the basis for the university’s department of ophthalmology and its program of scientific research.

It is interesting that during the trips to the southern regions of Georgia, Giorgi Tarsaidze accompanied the world-famous German doctor and scientist Rudolf Virchow, who came to Tbilisi in September 1881 to participate in the Fifth Archaeological Congress of the Caucasus (Figure 5). Virchow was particularly fascinated by the Borjomi valley and its resorts.





Figure 5. Rudolf Virchow, Giorgi Tarsaidze and Ilia Chavhavadze (The picture is taken from corresponding author's collection)

Upon his graduation from Kharkiv University in 1880, Tarsaidze (Figure 6) was compelled to decline an internship offer from his distinguished teacher, Dr. Leonard Girshman. He was obliged to work in the province for a certain period of time after finishing higher education. Consequently, he returned to Georgia and was appointed to a medical post in the Racha region. (Beradze, 1957).



Figure 6. Giorgi (Gigo) Tarsaidze (The picture is taken from corresponding author's collection)

Tarsaidze realized that his work would be more fruitful if he could establish his own ophthalmological hospital, which would contribute to the training of young ophthalmolo-



gists and also to the development of scientific work.

This dream was realized on November 24, 1892, when a free-of-charge hospital for eye diseases was opened in Tbilisi, which Tarsaidze led until the end of his life. During the 10 years of Tarsaidze's service at the hospital (1882-1902), about 45,000 patients were treated for the first time, and the number of patients who came for repeated treatment reached almost half a million. In this same period, about 8,000 surgical procedures were performed on both inpatients and outpatients.

The hospital for eye diseases provided free medical and medicinal assistance to the sick and carried out extensive sanitary and educational work. In addition to verbal advice, patients were given "*popular leaflets*." Written in the languages of the Caucasian peoples, these leaflets offered instructions on preventing common eye diseases and administering first aid.

The admission of patients to the hospital increased every year. Since 1898, due to the increased demand, patients continued to be admitted even in the evening, since patients came to Tarsaidze not only from the corners of Georgia, but also from Armenia, Azerbaijan, the North Caucasus, and even Russia.

Tarsaidze's daily medical and public activities in Georgia left him little time for scientific pursuits; this, however, should not obscure his merits nor imply a lack of research ability. Evidence of his scientific capability is found in his limited publications, notably his 1901 report to the 2nd Congress of Doctors of the Caucasus, titled "*Trachoma according to the data of the Tiflis eye hospital*". Published in 1903, this work offers a scientific analysis of multi-year patient data from the hospital, showcasing his skill in translating extensive clinical observation into formal academic study.

Tarsaidze has expressed certain opinions about malarial keratitis, crystal reclamation operation and its harmful consequences, plastic surgery of eyelids, skin transplantation, and others.

Giorgi's work was not limited to local healing work. On his direct initiative, in order to examine and treat eye patients, the "*Caucasian Department of the Care of the Blind*" sent "*eye flying squads*" to different parts of the Caucasus for several months every year. The organizer of such squads was Belyarminov, a famous Russian ophthalmologist in Russia. Almost no corner of the Caucasus remained without the services of "*eye flying squads*".

Indeed, the temporarily deployed detachments were not able to provide permanent medical assistance. However, they played an important role in the development of ophthalmological care in the Caucasus. Furthermore, the merit of the work of the detachments was that, in addition to outpatient admission, numerous operations, especially optical ones, were performed in the inpatient facilities. Due to the high number of patients, there were cases when the term of work of the squads was extended for several months, which undoubtedly reflects their popularity.

Like all advanced Georgians of that time, Tarsaidze also dreamed of the day when the cherished dream of the Georgian people would be fulfilled - to see a national university established in Tbilisi (Figure 7). Tarsaidze was pleased with his friend's initiative and contributed to the purchase of the plot of land and the collection of the necessary money for the construction of the building, which were raised via voluntary private donations. Unfortunately, Tarsaidze could not attend the opening of the Georgian University, although he would undoubtedly have an honorable place among his colleagues (Beradze and Chikovani, 1969; Chichua, Chichua and Gorgadze, 2021).



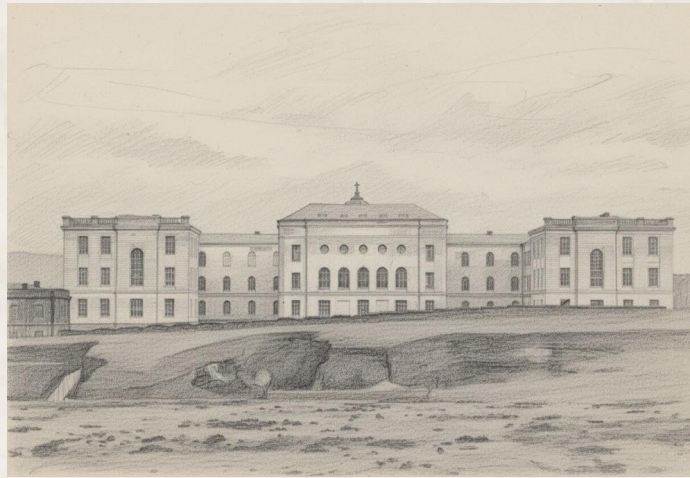


Figure 7. The First Building of Tbilisi State University (TSU), 1918 (The picture is taken from corresponding author's collection)

Ophthalmology in the Period of the Soviet Union

The Department of Eye Diseases was founded in 1921 under the name "*Department of Eye Diseases with a Clinic*" on the basis of the hospital for eye diseases near the school for the blind. In 1922, the department was located at the base of the private hospital opened by Dr. Nikoloz Melikishvili in 1909 (7 Sherozia St., Z. Chavchavadze St. now) (Figure 8), and later it was moved to the clinic "*New Hospital*", then "*Republic Hospital*", and finally "*First university clinic*". The heads of the department in different years were Alexander Machavariani, Vakhtang Muskhelishvili (Figure 9), Alexander Shatilov (Figure 10), Ivane Sikharulidze, Tatiana Shatilova, Tamaz Aleksidze, David Shengelia, Merab Dvali, and Nino Karanadze.



Figure 8. The Building Where the First Eye Clinic was Situated – Z. Chavchavadze St. 7, Tbilisi (The picture is taken from corresponding author's collection)





Figure 9. First Academic Staff of The Department of Eye Diseases – Nino Shikhashvili, Vakhtang Muskhelishvili, Taras Nikolaishvili, and Ivane Shkharulidze (The picture is taken from corresponding author's collection)



Figure 10. Alexander Shatilov and his Wife while Examining the Patient (The picture is taken from corresponding author's collection)



Conclusion

The history of ophthalmology in Georgia shows how medical science in the country has grown through the effort and dedication of many doctors, teachers, and researchers. From the first eye care practices to the creation of modern clinics and research centers, Georgian ophthalmology has developed step by step. Each generation of specialists has added new knowledge, improved methods of diagnosis and treatment, and trained young doctors to continue this progress.

Close cooperation with international colleagues and participation in global projects have also helped Georgian ophthalmology to reach a high professional level. Today, the field combines long-standing traditions with modern technologies, offering patients better care and more effective treatments. The development of ophthalmology in Georgia is not only a story of medical progress but also of national pride and commitment to improving people's vision and quality of life.

Authors' Contribution

Gigi Gorgadze contributed to the conception and design of the work, data collection, analysis, and manuscript drafting. Alexander Chichua and George Chichua participated in data acquisition, literature review, and interpretation of historical materials. Ramaz Shengelia supervised the research process, contributed to data interpretation, and provided critical revision of the manuscript. All authors read and approved the final version of the work.

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Conflict of Interest

None.

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