Glaucoma before the 20th century
La gota serena, el glaucoma antes del siglo XX

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Abstract
In ancient times, blindness was often explained by a clinical appearance of gutta serena or other terms such as amblyopia, amaurosis, glaucoma or sufussio, a term used for cataracts. Gutta serena, which today we call glaucoma, could be due to sun or air exposure, certain foods and particularly sexual excesses, especially onanistic ophthalmia, used as a reason for blindness to intimidate “vicious” young people. It is interesting to take a look at the evolution of knowledge about glaucoma over the centuries.

Key words: Glaucoma. Gutta serena. History

Resumen
En tiempos remotos, la ceguera se explicaba, a menudo, por un cuadro llamado la gota serena u otros términos como ambliopía, amaurosis, glaucoma o sufussio, como se llamaba también a la catarata. Los cuadros de gota serena, que hoy llamariamos glaucoma, podían deberse a la exposición al sol, al aire, a ciertos alimentos y, particularmente, a los excesos sexuales, en especial la ophthalmía onanística, argumento como causa de ceguera para amedrentar a los jóvenes “viciosos”. Es interesante dar una mirada a la evolución que a lo largo de los siglos va teniendo el conocimiento del glaucoma, o mejor dicho, los glaucomas.

Palabras clave: Glaucoma. Gota serena. Historia.

The term glaucoma exists since the aphorisms of Hippocrates, but does not designate a specific clinical entity, but only those cases of blindness in advanced age in which the pupil had a glazed appearance: “If the pupil gets a color similar to that of the sea, the vision is destroyed and commonly the pupil of the other eye follows it.” The color referred to is, without a doubt, green or, maybe, a greenish coloration, hence the etymology of the term. Obviously, it was applied in a generic way, without any specific pathological connotation, just pathologies that coincided in causing blindness in which the pupil took a greenish-colored glaze; surely including absolute glaucoma, among others. The related clinical entities were also named indistinctly with terms such as amblyopia, amaurosis or, more commonly, “gutta serena”. The genesis of blindness was often located in the lens, since it was considered the essential organ of vision, altered due to the "visual
spirits”. For some authors, this disease occurred because the spirits could not travel freely through the optic nerve to the brain.

At the beginning of the Christian era, Celsius (25 BC-50 AD), Rufus of Ephesus (95-117 AD) and Galeno di Pergamo (131-210 AD) considered that blindness could be caused by two entities or set of diseases. The first one, “suffusion”, associated with a malignant humour in front of the lens, in which the patient could perceive the light, and was susceptible to be remedied by surgery, even when the pupil was white; that is, cataract. The second, due to desiccation of the lens, in which the patient was totally losing sight, the pupil had a glazed appearance of bluish-green coloration and the loss was unrecoverable; that is, glaucoma.

In 1796, Juan Naval, physician of the kings of Spain, in his book “Of ophthalmia and its species”, explains that it was called gutta serena because in other times it was believed to be due to a lymph effusion, and “se-rene” is added because the eye is not turbid, as in cataracts. If the healthy eye is closed and the blind is exposed to the light, the pupil of the blind, far from contracting, sometimes dilates... and this is a sign of gutta serena... it is also called suffusion nigra». He refers that the famous French oculist Mr. De Saint-Ives, divides gutta serena into perfect and imperfect. In the latter, the eye still sees “something”. The Spanish doctor continues: “The degree of this disease will easily be known by making the patient look at a book while closing the healthy eye, in this way he will see only a certain portion of the page, while with the healthy eye he will see it complete.” The deterioration of the visual field due to glaucoma!

With time, the term gutta serena, hispaniziced as “serene drop”, was associated with what we know today as glaucoma. In 1817, the Dictionary of the Royal Spanish Academy of Language defined gutta serena as the total deprivation of sight without an external or visible sign in the eyes (glaucoma). By the mid-nineteenth century, before the ophthalmoscope, it was already common to emphasize that cataracts should not be confused with glaucoma, a disease in which “the doctor and the patient see nothing” (the doctor did not observe alterations in the eye).

The causes of gutta serena could be due to sun or air exposure, certain foods, etc., blood congestion in the head and, particularly, sexual excesses, especially onanism opthalmia, widely referred as a cause of blindness to intimidate “vicious” young people!1

In 1709, Michael Brisseau, after examining Dr. Pierre Bourdelot, the blind doctor of Louis XIV, associated cataracts with the opacification of the lens. Likewise, he deduced that glaucoma or gutta serena was not due to a lens anomaly. However, years later, in 1748, Boerhaave (probably the famous doctor Herman Boerhaave, called the Dutch Hippocrates, who had already died in the year indicated by the source) argued that glaucoma was a type of cataract that started with pain and ended with blindness. Neither of them mentioned any change in the consistency of the eyeball!1

In the tenth century, the Arab doctor Al-Tabari in his “Hippocratic Treatment Book”, wrote about a chronic inflammatory process of the eye that showed an increased tone of the globe. A few centuries later, Samas-al-Din (? -1348), from Cairo, reviewed 153 diseases of the eye and its annexes. He described a “migraine of the eye” or “headache of the pupil”, characterized by ocular pain, headache in the hemi-skull, hardening of the humours of the eye and followed by dilation of the pupil, cataract and blindness!1

The English itinerant surgeon Sir Richard Bannister, Fellow of the Royal College of Surgeons, author of the first book of Ophthalmology in English, with original teachings, made in 1622 the first clear recognition of the association of increased ocular tone and glaucoma. He distinguishes between the curable cataract or “gutta obscura” and “gutta serena” in which “…the humour settled in the hollow nerves, be growne to any solid or hard substance, it is not possible to be cured…”* (the humor housed in the spaces of the nerves matures (sic) to a solid or hard substance and is not possible to cure it), and continues “…If one feels the Eye by rubbing upon the eyelids, that the Eye be growne more solid and hard so naturally it should be…”* (If one feels the eye palpating through the eyelids, the eye will have matured (sic) more solid and hard than it should naturally be). He added that the course of the disease was long, the pupil became fixed and the perception of light was lost!1

In the eighteenth century, glaucoma was frequently associated with inflammation. If the pupil of the inflamed eye had a blue-green coloration, the visual prognosis was bad, with no reference to ocular tone. However, Johann Zacharias Platner, in 1738, distinguished two types of disease, one due to inflammation of the lens, in which the eye became hard, and another due to inflammation of the vitreous, in which the eye became soft.

* The grammar of that era is preserved.
In the eighteenth century, in Spain, the Benedictine monk Benito Geronimo Feijoo (1676-1764) became famous. He held the Chair of Theology at the University of Oviedo and his interests included various human and worldly aspects. In his late years, from 1726 to 1740, he published in nine volumes, under the title of “Universal critical theater”, on «all kinds of subjects, to “set right” common mistakes»; in volumes II and III he refers to ocular aspects. In addition to stating several correct concepts in terms of anatomy and physiology of the visual apparatus -although there are some misconceptions-, he relates «a commotion, or impression, that makes the visual rays in the retina spread in a moment by the optic nerve, which is a continuation of it, to the origin of the nerve, which is inside the brain...When the impression arrives at the origin of the optic nerve, that perception of the object, which we call Vision, results or is excited in the soul». One of the diseases that the author describes is gutta serena, that possibly corresponds to glaucoma: “The particular organ of sight is perfectly well disposed; however, the subject who suffers from this disease sees nothing because, by virtue of the indisposition of the optic nerves, the impression that the objects make in the eye is not propagated to the brain.doctors usually explain this defect.by the lack of fluency of the animal spirits from the brain to the eyes, whose course prevents obstruction, or compression of the optic nerve». Using the term gutta serena, Feijoo tries to explain the visual function of the soul: «If the eyes were the organ of visual power, as long as they were healthy, alive and animated, the vision could not be absent; but this is false: that illness that we call gutta serena comes only from the obstruction of the optic nerve, and if the obstruction is perfect, the vision is entirely missing; nevertheless, the eyes are alive and animated».

In the Royal Academy of Surgery of Paris, Arrachat, in 1786, described an acute picture of glaucoma in which the eye becomes painful and inflamed, the iris loses its color, and the pupil dilates and takes a greenish color and evolves to blindness. In 1792, Josef de Beer, from Vienna, describes an “inflammation of the iris” with the distinctive signs of glaucoma, without mentioning hypertension that he associates with a “gouty diathesis”.

In the 19th century, ocular hypertension and glaucoma were definitely correlated. The first masterful description appears in 1818 in the “Traite des maladies de yeux”, by Antoine-Pierre Demours, a book in which the author left to posterity the body of medical knowledge of his father, Dr. Pierre Demours. He described: «Le globe devient dur au toucher», describing for the first time the classic colored halos (l’arc-en-ciel) around the lights. In 1823, GJ Guthrie, in London, recognized an entity called glaucoma in which “if the eye is palpated, it will be harder than normal”. Glaucoma was still considered associated with an inflammatory condition; some contemporary authors described an acute inflammatory syndrome affecting the vitreous and choroid, called “arthritic ophthalmia”, and another chronic form of the same condition that corresponds to what we call today absolute glaucoma. Francis C. Donders considered that the non-congestive (simple) form was a member of the same family. There was no doubt about the definitive association of ocular hypertension with chronic or acute glaucoma from the postulates of William Mackensie (1791-1868) in 1835, and he distinguished between chronic glaucoma and acute glaucoma.

The Helmholtz ophthalmoscope, whose use was spread by Albrecht von Graefe in the mid-nineteenth century, gave another milestone in the historical evolution of the knowledge of glaucoma. At this time, the changes in papillary excavation began to spread and drawings describing the alterations proliferated. Von Graefe classified it into three categories, still valid: acute, chronic and secondary. Another important advance in the first decades of the twentieth century was the clinical examination of the angle of the anterior chamber (in which our compatriot Dr. Manuel Uribe and Troncoso stands out), as well as the knowledge of aqueous humor fluidity.

Louis de Wecker (1832-1906), prominent French ophthalmologist, born in Frankfurt am Main, in his “Manuel d'ophtalmologie. Guide pratique” (1889), notes that the eye becomes glaucomatous when the balance between secretion and excretion of the organ is broken favoring the amount of fluid physiologically contained in the globe. This balance rupture will cause an increase in intraocular pressure, an accentuation of tension and a consecutive distension of the less resistant parts of the eyeball. He distinguishes four types of glaucoma: 1) prodromal, 2) chronic simple, 3) chronic irritating, 4) irritating acute and fulminating. In simple chronic glaucoma, he describes the increase in papillary excavation and loss of peripheral visual fields. He adds: for the prodromal, they are generally subjects of nervous and irritable temperament. They should be recommended an outdoor life, walks in the countryside, sea baths, a drop of pilocarpine when sleeping or during the day and periodic applications of eserine; if the problem persists, then a sclerotomy with periodic massage and pilocarpine must be performed; and if the prodromal attacks intensify, it will be necessary to perform an iridectomy.
The general treatment recommended by Wecker was the one recommended before the 20th century; hygienic and dietetic measures, complemented with the usual antiphlogistic methods, such as purges, emetics, suction pads, dry (with leeches) and wet bloodletting by phlebotomies and medicines “that increase the spirits and that partially attenuate and partly reveal, promote and dissipate the viscosity of the humours allowing (but also interpolating) the suitable purgatives and well-indicated emetics”. «If gutta serena comes from a bad venereal disease.mercury is needed».

It is believed that, among the Aztecs, glaucoma was treated with a plant called ohuaxocoyolin, mixed with excrement, which was applied to the eyes.

At the end of the 18th century, Dr. H Collin, from Vienna, popularized the management of gutta serena with arnica drops (Linnaeus: Arnica Montana or Fherio panacea)².

Soon after electricity was discovered, it became fashionable for therapeutic purposes. In 1799, in Spain, Dr. Pedro Aguilar, in view of the fact that conventional treatments had no effect on a patient afflicted with gutta serena, “switched to electricity” by means of “bath electrification” with a glass disk that was applied to the patient’s orbit, in half-hour sessions that, after several days, had to be suspended due to an intense headache, but after a period of treatment with leeches the sessions with electricity were restarted, and days later, the patient «left this hospital cured to the satisfaction of D. Pedro de Aguilar».

In 1836, the Journal of the “Academia Mexicana de México” (sic) (this organization was the first one to take the name of “academy”, it existed only for a few years and the current National Academy of Medicine of Mexico is the third with the name) reported that the ancient treatments for gutta serena consisted on causing irritation to the surface of the cornea, using, for example, frictions with wheat whiskers; Dr. Taylor rubbed the cornea with pumice stone or with a sheet of very rough gold; but the method that is recommended in the article is that of Dr. Serre D’uzes, “simpler, easier and less painful”, that consists on using silver nitrate in a pencil, which is gently applied to the lower edge of the transparent cornea “until a small cloud appears in the cauterized spot”. Then, wash the eye with plenty of water to dissolve the surplus caustic “and soothe the temporary irritation that results from its application.” Dr. Serre describes eight cases treated with his method, most of them “amaurosis that had appeared almost suddenly and whose duration was very recent”. The author concludes that “it is a precious remedy in many circumstances in which until now, art was almost impotent”.

Naturally, upon the introduction of the ophthalmoscope invented by Hermann von Helmholtz, the knowledge of glaucoma and the literature about it, as well as all the conditions of the ocular fundus, increased. An important contribution emerged a few years later: the design and use of ocular tonometers. The first designs were indentation tonometers, made in 1863 by von Graefe, Donders and Hamer, then Dor, in 1865, Priestley Smith, in 1879 and Koster, in 1895. All these models were displaced by the tonometer of Hjalmar August Schiotz (1850-1927), manufactured in 1905. Weber in 1867 and Maklakov in 1895 designed the first applanation tonometers. The latter was the one that prevailed. In the 20th century, many other applanation tonometers appeared. Visual field alterations are known since antiquity, however, the contribution of Janik Peterson Bjerrum (1851-1920) and his tangential screen, in 1889, was decisive for the study of glaucoma, complemented by his disciple Henning Roenne³.

There are records of surgeries for glaucoma prior to the description and dissemination made by Albrecht von Graefe (1828-1879) of the iridectomy in 1856 or 1857⁴, which was rapidly adopted throughout the world; although he himself accepted that the idea of making a small excision in the iris had been previously postulated by Louis Auguste Desmarres. Indeed, since 1728, William Cheselden had performed the iridotomy by puncturing the iris with a needle. Other authors subsequently used different types of lancets, and penetrated the cornea instead of the sclera. In 1872, during a conference in London, William Bowman presented a communication about the formation of the pupil by incision, the so-called optical iridotomy. The person who underwent an iridotomy or an iridectomy was told that it was an artificial “antiphlogistic” pupil, which prevented the consequences of seclusion or pupillary occlusion in cases of “suppurative iridochoroiditis” that occurred in one in 500 or 600 cases of intraocular surgery, as affirmed by Carl Ferdinand von Arlt (1812-1887)⁵. Optic iridectomy was very popular for the management of nuclear congenital cataracts and it was practiced in the inferomedial quadrants. At the beginning of my practice, I saw older adults who had this intervention when they were children. A curious surgical intervention for glaucoma was that proposed by Hancock, the “ciliary muscle section”, introducing a cataract lancet on the inferior and outer edge of the cornea at its junction with the sclera, passing the tip of the knife from the front to the back and up and down so that the fibers of the...
sclera were obliquely divided to an extension of one eighth of an inch. He states that the operation is rarely followed by inflammation or bothersome symptoms.

The treatment with drugs arrived years later. In 1876, Adolf Weber (1829-1915), disciple and friend of von Graefe, started the application of pilocarpine. Almost at the same time, Ludwig Laqueur (1839-1909), in 1876-1877, promoted the topical application of eserine.

The etiopathogenic and therapeutic concepts of the past seem absurd and ridiculous today...What will future generations think about our current knowledge?

References


