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RESEARCH ARTICLE

THE GLAUCOMA RIDDLE – Why do Patients Still Go Blind from Glaucoma Despite All the Advances in its Management?

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ABSTRACT

Glaucoma is the first leading cause of preventable irreversible blindness worldwide.

Despite significant resources and treatments, a substantial portion of patients go blind.

This editorial examines the complexities surrounding glaucoma's progression, emphasizing the urgent need for comprehensive approaches to diagnosis, treatment, and patient education. It underscores the imperative of early intervention, accurate risk assessment, and innovative strategies to mitigate the devastating impact of glaucoma-induced blindness on a global scale.

Introduction:

Why do Patients Still Go Blind from Glaucoma Despite All the Advances in its Management patients progress with seemingly well-controlled Similarly to the sphinx riddle "What animal has four legs in the morning, two legs in the afternoon and three legs at night?" for which the wrong answer condemned to death by devouring; in the glaucoma riddle, "Why do people still go blind from glaucoma?", the wrong answer blinds millions of people around the world. Glaucoma affects almost 70 million people worldwide and is the first leading cause of preventable irreversible blindness[1] despite the availability of numerous resources and its slowly progressive nature.

At the World Glaucoma Congress in 2021, Prof. Louis R Pasquale, MD, from the School of Medicine at Mount Sinai, NY, concluded that unfortunately, most of the time, we do not know what is causing the disease progression.[2] The Johns Hopkins Hospital in 2018 reported that around 15% of patients treated for glaucoma will go blind in at least one eye.[3] This is confirmed by several studies, including one carried out at the Mayo Clinic in 2013 in which 13.5% of patients treated for glaucoma became blind on average after ten years of follow-up.[4] Regrettably, the majority of clinical studies do not help patients; more than 80% are a waste".[5] These studies divert attention from what is clinically important to know about glaucoma and waste valuable resources.

Nevertheless, there have been some important advances in glaucoma management that deserve attention. The "Five Rs" program established a propaedeutic sequence for analyzing the optic nerve and specified the typical signs of glaucomatous optic neuropathy. It is considered one of the best programs for diagnosing glaucoma. Additionally, the advent of Optical Coherence Tomography (OCT) has revolutionized diagnosis and monitoring, enabling early detection of structural changes that precede functional loss.[6] Despite these advances, the training of ophthalmologists is still inadequate for diagnosing glaucoma.[7,8]

Robert Fechner, Chairman of Glaucoma University Syracuse, pointed out the great gap in comprehending the behavior of intraocular pressure during the day.[9] This highlights that the characteristics of the most important cause of disease onset and progression, and the only one that can be modified with treatment, are not fully understood, explained at least in part the statement above of Louis Pasquale. The IOP peak is the most vital parameter in the progression of the disease, but it occurs outside office hours in 70% of the time.[10] Therefore, many peak pressures in the office measurements are not detected. In clinical practice IOP peak can be evaluated with 24-H Diurnal Nocturnal Tension Curve, Day Time Tension Curve, and the Water Drinking Test.

Among all methods, the water drinking test is the cheapest, most viable and easiest test for estimating the IOP peak in clinical practice." (M.Reza Razeghinejad, Wills Eye Institute Philadelphia, USA.). Despite the large body of evidence showing its importance, [11-22] this test is still insufficiently used in glaucoma management.

Estimating the patient's peak and target pressure is crucial to establish the risk of glaucoma progression. This enables timely modifications to the treatment before progression occurs, rather than after. The cost of waiting for the disease to progress before adjusting the treatment is high, as visual field progression is a consequence of the loss of hundreds of thousands of nerve cells, and the more damaged the nerve, the lower the IOP required to reduce the progression and the greater the risk of blindness.

Furthermore, visual fields and OCT have important limitations. The limitations of the visual field include poor patient acceptance and relatively poor reproducibility.[23-25] The variability of measurements using OCT between visits is of 5µm which represents more than 10% of the dynamic range, thus reducing the accuracy of OCT for detecting changes.[26]

Additionally, the classification that early glaucoma is characterized by a visual field loss <6 dB, on average 332.000 retinal nerve fiber loss (RNFL); moderate glaucoma >6dB <12 dB on average 551.000 RNFL.[27] Such amount of loss from on average 983,000 nerve fibers of a normal patient may not be considered an early or moderate stage of the disease. This classification may lead to improper treatment.

While the solution to the sphinx riddle is straightforward: "a man crawls as a baby (sunrise), uses two legs as an adult, and uses a cane in old age (sunset)", the glaucoma riddle is much more complex.

Conclusion:

The answer to the glaucoma riddle involves early treatment, preventing progression with a better understanding of risk factors, estimating the IOP peak, increasing treatment adherence through the educational process, more efficient and low-cost

drugs, treatments that do not depend on the patient for application, and appropriate surgery at the right time.

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