
Impact of Primary Open-Angle Glaucoma: Early Diagnosis and Timely Treatment

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ABSTRACT

Glaucoma is the leading cause of irreversible blindness worldwide and it is important to assess the impact of timely diagnosis and treatment on this disease due to the complications it can bring to patients. It is an insidious pathology and sometimes it is usually detected spontaneously in ordinary consultations. The most frequent type of glaucoma is primary open-angle glaucoma (POAG), being the second cause of blindness worldwide according to the WHO. Making known and providing information on the subject can reduce cases of blindness in the world and patients could lead a better quality of life by going to the doctor in time knowing how to identify the pathology through its clinical picture in early stages.

Glaucoma is the leading cause of irreversible blindness worldwide. It is an insidious pathology that is usually detected spontaneously. The most common type is the open angle primary (OPAG). It is important to know and provide information in order to detect and prevent cases of blindness in the world.

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INTRODUCTION

Glaucoma is a chronic progressive optic neuropathy associated with a condition of the visual field due to a gradual deterioration in the head of the optic nerve (excavation) that generates a loss of the nerve fiber layer, generally associated with ocular hypertension. Glaucoma is one of the most important ophthalmological pathologies, as it is considered the leading cause of irreversible blindness worldwide. The most frequent type of glaucoma is primary open-angle glaucoma (POAG), being the second cause of blindness worldwide according to the WHO. Its high incidence is attributed to different causes and risk factors, where knowledge of the subject of patients, prevention and timely diagnosis are highlighted to have a better management and treatment of the pathology to avoid possible complications, ensuring a better quality. of life. The purpose of this research is to evaluate the impact of timely and early diagnosis and treatment in primary open-angle glaucoma.(1)

Glaucoma is a chronic, progressive, irreversible and acquired optic neuropathy that affects the optic nerve and produces a concave depression of the optic disc. This pathology is characterized by progressive loss of the peripheral visual field, usually asymptomatic until advanced stages of the disease. (1)

It is the second most common cause of blindness in the world in people over 40 years of age. In addition, the WHO reported that by 2020 there were at least 11 million people affected globally, and in Mexico it is estimated that there are around 1.5 million affected and up to 50 thousand cases of blindness due to late detection, since normally the Patients do not realize their affectation until the glaucoma is more developed and they present a very significant "tunnel vision", this means that their frontal vision is maintained but the lateral vision is affected, so field of vision is lost. vision and you may also see black spots or dots. By not realizing it early, the pathology begins to advance, increasing the pressure of the eyeball,

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which generates progressive damage to the optic nerve and irreversible vision loss.(2)

The main mechanism of blindness in glaucoma is retinal ganglion cell apoptosis, which leads to thinning of the inner nuclear and nerve fiber layers of the retina and axonal loss in the optic nerve. This condition in turn leads to thinning of the neural rim and progressive enlargement of the optic nerve cup. The loss of nerve fibers causes a permanent decrease in the visual field. (1,3)

This pathology will be classified into primary and secondary, in the first group are primary open-angle glaucoma, primary angle-closure and congenital, while in the second are traumatic, post-surgical, as a result of an inflammatory process, by medications, and by tumors. (1)

GLAUCOMA CLASSIFICATIONS

• Primary open angle glaucoma:

It is called "primary" because there is no other associated disease, and "open angle" because the iridocorneal angle contains the structures between the root of the iris and the peripheral cornea, which include the Shwalbe, which represents the anterior termination of the cornea, the trabecular meshwork, the scleral spur, and the root of the iris. When the four structures of the iridocorneal angle are observed by gonioscopy, it is determined that the angle is open. This type of glaucoma is the most common in the world. Its main etiology is elevated intraocular pressure; normal PI is 12 and 22 mm Hg, and in the open-angle type it does not rise above 30 mm Hg. The higher the are at increased risk for early onset, delayed diagnosis, and severe visual loss; people with a personal history of glaucoma or a personal history of diabetes or severe myopia. (4)

Other factors that influence the development of this pathology are age, since it is generally present in patients over 40 years of age, due to heredity, associated diseases such as Diabetes Mellitus and SAH, and having a high degree of myopia. (two)

Within the clinical picture, it is usually bilateral, there is the presence of headache, eye pain, nausea and vomiting, blurred vision, the vision of halos around lights and redness of the eyes. (two)

The distinctive pathological feature of Primary Open Angle Glaucoma (POAG) is a process of resistance development in the trabecular meshwork and juxtacanalicular tissue due to the accumulation of materials such as pseudoexfoliation, pigment, glycosaminoglycans or abnormalities in the collagen structure in the trabeculum, which they decrease the light of the intertrabecular spaces and the juxtacanalicular connective tissue, and finally due to failure of the endothelial function and collapse in Schlemm's canal. This differs from the normal aging process. The consequence is reduced outflow of aqueous humor leading to a rise in intraocular pressure that precedes optic disc and visual field changes by

months to years, as well as optic nerve damage from compression. (1)

The diagnosis focuses first on the campimetry that helps us to detect the reduction of peripheral vision and the presence of scotomas or blind areas in the visual field, tonometry to measure intraocular pressure, eye fundus in which at first and The definitive manifestation of glaucomatous change is the blurring of the contour of the cup or cup, generally located in the superior or inferotemporal margin of the same and associated with its pallor. Continuing the evolution, to this alteration is added an increase in its depth with exposure of the cribriform plate. At the same time, a progressive rejection of the central retinal vessels towards the nasal side and pallor of the nerve head are visualized, which finally compromises the entire surface of the optic disc. (two)

As a treatment there are three possible options, the first is pharmacological, where prostaglandin analogs and beta-blockers will be implemented. On the other hand, the second and third correspond to the

incisional and surgical procedures where Trabeculoplasty (Laser) and Bulbar Implant Trabeculectomy would enter. (1)

• Primary angle-closure glaucoma:

This type of glaucoma also occurs in anatomically predisposed eyes with no other pathology. Likewise, there is elevation of the PI as a consequence of the obstruction of the excretion of aqueous humor due to occlusion of the trabecular meshwork by the peripheral iris. In these cases, PI can reach 60 to 80 mmHg, which causes acute ischemic damage to the iris with associated corneal edema and damage to the optic nerve. (5)

Primary acute angle-closure glaucoma is an ophthalmological emergency in which an increase in intraocular pressure, decreased vision, intense eye pain and blockage will be found.

mechanics of the trabecular meshwork. The clinical picture of this pathology is present through red or congestive eye, corneal edema, Tyndall, mydriatic and fixed pupil and optic nerve atrophy. (5)

Pharmacological treatment consists of Mannitol IV by jet, Timolol Maleate 0.5% drops BID, Acetazolamide 125-250 mg PO, Pilocarpine drops every

15 minutes for 2 hours. Similarly, incisional and surgical treatment include Yag Laser Iridectomy or Surgical Iridectomy. (4)

However, in this work we will focus on primary open-angle glaucoma because it is the one with the highest incidence.

As previously stated, early diagnosis of these patients is essential to be able to reduce damage with timely treatment, and reduce blindness in these patients, so in this research we will carry out a bibliographic search to evaluate the importance of an effective dx in primary open-angle

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glaucoma and thus be able to avoid or encourage the risk of the worst complication in this type of patient: "blindness".

For an early assessment, any detectable characteristic or circumstance that is known to be associated with an increased probability of developing the pathology must first be identified, so in the study "Risk Factors Associated with Progression to Blindness from Primary Open-Angle Glaucoma in an African-American Population", emphasizes that the population at greatest risk are African-Americans with disease rates 5 to 6 times higher than that of Caucasians, as well as the worst prognosis with decreased quality of life related to disease. vision from the resulting blindness. A total of 2,119 patients with this eye condition were examined, all of whom were black and older than 35 years.

As a result, they found that 59 eyes of 48 subjects were legally identified as blind, and 16 of these eyes presented blindness at diagnosis and the rest had worse visual acuity of less than 20/40, which conferred a 27-fold increased risk of progression. Other important findings were visual field defects and increased pre-treatment IOP greater than 21 mmHg and at more than 20% of follow-up visits they were 73 times more likely to go blind. (6)

Another important risk factor is genetic risk. "Association of a Primary Open-Angle Glaucoma Genetic Risk Score With Earlier Age at Diagnosis" examines that the genetic load accumulated by combining individual genetic variants in a single measure, has a greater effect and power to detect relevant associations related to the disease. Therefore, the heritability of POAG is substantial, since the genetic effect may be greater in patients with an earlier onset of the disease, so a retrospective cross-sectional study was carried out to evaluate the association of a cumulative dose of 12 variants of Genetic risk in established POAG with age at diagnosis. Finally, it was found that patients with higher GR had an age of diagnosis 5.2 years younger than the average, so they will require more years of treatment and are more likely to go blind. Therefore, it is suggested that patients with GR could help identify patients at risk of earlier onset of the disease, which would affect surveillance, therapeutic and detection strategies. (7)

Similarly in "The genetics of glaucoma: Disease associations, personalized risk assessment and therapeutic opportunities-A review" Affirms the point of genetic risk, with the identification of the myocilin gene (MYOC) associated with autosomal inherited POAG dominant, mutation in optineurin genes, optineurin genes, among others. Several genome-wide association meta-analyses have been performed and also identified 127 associated loci. Therefore these inherited autosomal dominant POAG mutations have a high penetrance, collectively accounting for only about 5% of all cases of adult-onset POAG. (8)

In the article "Screening for Open-Angle Glaucoma and Its Effect on Blindness" he mentions the study they carried out in Malmö, about open-angle glaucoma and since, as we know, it is one of the main causes of blindness, and its main

risk factor is late development since in developed countries there are 50% of glaucoma cases that are not yet diagnosed. A study was conducted with a large population screening in Malmö, Sweden, in which 32,918 people were examined. Patients diagnosed during or after screening were evaluated for blindness. (9)

The diagnosis of glaucoma was based on the expected eligibility criteria which are: reproducible visual field deficiencies and corresponding optic disc disease in 1,680 (91%) of the patients. There were no statistically significant differences between the examined teams, the non-responders and the non-invited ones in relation to the practice of attention; the mean number of visits and the percentages of patients who had been treated Those with laser trabeculectomy or surgery were similar in the 3 teams. The primary outcome measures were the hazard interrelationships of the cumulative incidence of bilateral low perspective or blindness caused by glaucoma in screened patients compared to potential competitors. The cumulative incidence of blindness has been 0.17% in the examined population versus 0.32% among probable patients; and for the low perspective of 0.25% against 0.53%. The results suggest that population screening can minimize bilateral low perspective and blindness caused by glaucoma by about 50%. (9)

The article "Primary open-angle glaucoma, clinical characterization in Pinar del Río" first mentions that the WHO states that of all the blind people in the world, the primary reasons that are affecting the population is POAG, so its detection early and successful procedure, constitutes a challenge for the assisting doctor since, first peripheral visual acuity is impaired and it is not until advanced stages that the central perspective is altered and the patient manages to notice changes in perspective. An analysis was carried out in the province of Pinar del Río from 2017-2018, of which 1,447 patients attended the provincial glaucoma consultation, with the diagnosis of POAG, and underwent a complete ophthalmological examination. 68.7% had mild glaucoma, 89.8% visual acuity between 1.0-0.3, and 68.7% had ocular pressure between 15 and 20 mmHg. When assessing the relationship between the evolution time of POAG and the current treatment, the result was that 75.2% had a disease evolution time of five years or more, that is, 89.4% had strict medical treatment until the day of the study, so these patients had a mild degree of severity, with PI within normal limits and without great visual impairment. (10)

Regarding timely treatment, its objective is to delay or stop the progression of the disease and preserve the quality of life related to the vision of patients throughout their lives, for which the reduction of intraocular pressure is important, since each 1 mmHg, decreases the risk of progress, so in the article "Evaluation of the triple combination Bimatoprost/Brimonidine/Timodol in the control of intraocular pressure in patients with glaucoma" he carried out an investigation with the intention of evaluating the control of intraocular pressure in POAG. 15 patients with a diagnosis

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of primary open-angle glaucoma treated at the Cartagena Ophthalmology Clinic between the years 2019-2021 who met an age range between 30-70 years, with a diagnosis of POAG, maximal bilateral ocular hypertensive treatment, baseline IOP >16 mmHg in both eyes, able to undergo washout of prior therapy for at least 2-4 weeks, and had best-corrected visual acuity (BCVA) <20 /400 in AO. They were then randomly assigned to treatment groups where one would receive the medication every 12 hours and the other every 24 hours, for a minimum period of 2 to maximum 4 weeks. During this evaluation period, IOP was monitored in both eyes by Goldmann acclimation tonometry. Assessments were made on day 1, 2 weeks, 4 weeks, and 3 months. As results, it was obtained that of the 15 patients who began the study, 93.3% completed the follow-up at 90 days. Median baseline IOP in both treatment groups was 20.5 mmHg with a range between 18 and 26, with a reduction in intraocular pressure from baseline that was statistically significant from day 1 and was maintained through day 90 of treatment. monitoring during the two daily intakes. The percentage of IOP reduction remained constant (44.6%) in both shots throughout the follow-up, being the highest prevalence in the morning. However, in the group in which the drug was administered every 12 hours, there was a higher percentage of reduction in the third week with 49%. The adverse effect that occurred in 100% of the patients was the growth of eyelashes. The second effect presented in 93.3% was conjunctival hyperemia. In general, the drug Bimatoprost/Brimonidine/Timodol controls IOP and is well tolerated by patients, which generates adequate adherence and a good response. (11)

"Latanoprosteno bunod for the treatment of open-angle glaucoma and ocular hypertension" tells us about the comparison of the efficacy between Latanoprosteno bunod and other analogous Prostaglandins as a treatment for POAG and the reduction of intraocular pressure. A systematic review of studies published between 2014 and 2018 was carried out, which were selected only if the studies reported efficacy between at least two treatments (para clonidine, brimonidine, betaxolol, carteolol, levobunolol, timolol, brinzolamide, dorzolamide, bimatoprost 0.01%, bimatoprost 0.03%, latanoprost, travoprost, tafluprost, unoprostone, latanoprostene bunod, and placebo) over a median of 3 months of use. A Bayesian framework with a random effects model was used to provide the relative effect in terms of mean difference in IOP reduction. Likewise, studies in which a cause of heterogeneity and inconsistency in treatment were identified were excluded. A total of 104 studies were obtained, in which Latanoprosteno bunod had greater efficacy in lowering IOP compared to apraclonidine, brimonidine, betaxolol, timolol, binzolamide and dorzolamide. In addition, Latanoprostene bunod also had greater efficacy than the other prostaglandins marketed and used as a treatment for POAG in Canada for lowering IOP. (12)

"Real World Study of Patient Satisfaction and Tolerability After Switching to Preservative-Free Latanoprost" tells us that as usually they do not perceive visual disturbances, and yet the therapy leads to far-reaching changes in the ocular area, which not only leads to inflammatory changes at the cellular level, but also subjectively causes discomfort to patients, limiting their quality of life. An analysis was done between 2013-2015 in which eligible adult subjects had to have a documented diagnosis of glaucoma or ocular hypertension and had been treated with PFL for at least 3 months at the time of the visit. analysis or may have been naïve to the procedure, this study was conducted to determine the level of satisfaction among patients without the procedure or those who had recently switched to PF latanoprost in single-use dose units. (13)

The analysis has been a cross-sectional, multicenter epidemiological survey, developed throughout a single consultation with a routine clinical examination. It was done in 337 private eye clinics. Ophthalmologists were chosen from national databases on the basis of feasibility as well as geographic and national balance. Ophthalmologists were asked to consecutively recruit 10 patients (5 in Switzerland) who had received PFL for glaucoma or ocular hypertension for at least 3 months at the time of the analysis visit. Sex, age, ophthalmological history, among others, at the date of diagnosis of glaucoma or ocular hypertension, type and phase of glaucoma in functionality of visual field disease, together with intraocular pressure (IOP) of the patient. The investigator also recorded the history of the patients' prior glaucoma therapy and the reason for switching to PF latanoprost. Intraocular pressure, the existence of pathology of the ocular area (OSD) and the time of dissolution of the tear tape (TBUT, classified in 3 sets (>10 seconds, from 5 to 10 seconds) were evaluated. In general, 76 0.2% were previously treated, 69.4% had received a preserved procedure, and 6.8% had a preservative-free (PF) procedure After 3 months of the PFL procedure, a vastly greater proportion of patients (95.3%) satisfied or fairly satisfied with their PFL procedure, and generally significantly so Ocular area pathology was diagnosed in 9.2% of patients (n=173) and has been primarily mild (76.9% Patient satisfaction with PFL has been quite high. Analysis showed that preservative-free latanoprost could be an important choice of therapy by switching patients from the preserved procedure due to tolerability issues, and can be considered as the first alternative in patients with g laucoma newly diagnosed, after at least 3 months of procedure with PF latanoprost, patient satisfaction has been quite high and potentially led to limited use of tear substitutes. (13)

On the other hand, the article "Effectiveness of micropulse diode laser trabeculoplasty in patients without previous treatment: retrospective study with 12-month follow-up" tells us about a retrospective observational study where a total of twenty-nine eyes of patients between 41 and 82 years old were included. with diagnosis of POAG in which all of them

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had IOP values equal to or greater than 21 mmHg prior to the application of MDLT. The IRIS Medical OcuLight® SLx 810 nm diode laser system (Iridex Corporation, Canada) approved by the FDA was used with a loupe gonioscope Goldmann 3 mirrors in the 360° of the trabecular meshwork. The power used was 2000 mW and a spot size of 200 µm. As a result, a total of 29 eyes of 18 patients were analyzed: 10 women and 8 men. The mean age of the study was 61.52 ± 10.87 years, it was considered from 41 to 82 years. The greatest decrease in IOP was observed seven days after MDLT. IOP had a rapid and significant decrease that was maintained at twelve months with mean IOP values of 16.48 ± 2.21 , which means that there was a 26.83% decrease in IOP. It has been proven that this laser trabeculoplasty treatment does not cause cell destruction, scarring or collateral damage since it uses a stimulus of 810 nm wavelength in a pulsed manner. Although to date the mechanism of action by which the laser acts on the trabeculate and lowers IOP is unknown, proposed theories include mechanical changes in the trabecular meshwork and/or induction of biological changes at target sites, which may include trabecular cell division and migration and increased expression of cytokines and matrix metalloproteinases. Although several therapeutic alternatives are available for POAG, new horizons can be reached thanks to technology. This study demonstrates that applying MDLT as the first line of treatment in POAG patients is safe and effective. Micropulse diode laser trabeculoplasty is a procedure that has become widespread in recent years and is well tolerated by patients. The application of MDLT makes it possible to achieve target IOP values to prevent progression of POAG without medication and without the need for additional surgery in most cases. It is a quick and minimally invasive procedure that, due to the safety parameters and the period of time that manages to maintain IOP, is an important tool when treating primary open-angle glaucoma. (14)

The article "Selective laser trabeculoplasty versus eye drops as first choice treatment for ocular hypertension and glaucoma" was carried out to compare these two treatments and identify which one gives better results. Trabeculoplasty appears to be a safer technique, but it is rarely used as a first-line treatment. An observational study was carried out in patients with open-angle glaucoma or ocular hypertension and no ocular comorbidities between 2012 and 2014 in six hospitals in Great Britain. Of 718 patients involved in the study, 356 were selected for laser trabeculoplasty and 362 for eye drop treatment. As a result after 36 months of treatment, patients in the trabeculoplasty group no longer required eye drop treatment to maintain IOP at adequate levels, in addition to having better IOP results than patients with eye drop treatment in patients with glaucoma surgery for IOP reduction. It turned out that laser trabeculoplasty selective treatment had a 97% probability of being selected as the treatment of first choice over eye drops, mainly because of the cost-benefit that it provides patients with, it is more effective and economical than eye drops. (fifteen)

The article "Racial differences in the effects of hormonal therapy in open-angle glaucoma" was carried out based on a randomized trial of 25,535 women, to basically try to prove whether hormonal therapy alters the risk of suffering from open-angle glaucoma. open angle and whether risks vary by racial group. Data from 25,535 women within the Women's Health Initiative center were used. Women without a uterus were given oral conjugated estrogens or placebo, and women with a uterus received medroxyprogesterone acetate or placebo. an important risk factor for the incidence of POAG, results were also found that there is no benefit of hormone therapy in reducing the incidence of POAG. Likewise, the use of conjugated estrogens was shown to have a positive relationship in African-American women, since the risk of contracting POAG was reduced when treated with conjugated estrogens compared to placebo. (16,17).

DISCUSSION

We are aware that glaucoma is a silent disease in early stages that affects a large part of the world population, with affected people being diagnosed in late stages and with less chance of improvement. That is why we carried out this research, in order to help people who are suffering from or who are at high risk of suffering from glaucoma with timely diagnosis and treatment. Here we argue if what we intended to investigate is justified by our authors, if so, cite if they disagree and criticize their feelings or the bias that information may have had.

In general terms, the articles reviewed agree with the purpose of the work, since they reflect that a good diagnosis and adequate timely treatment mostly have beneficial effects on patients.

The risk factors were very important for the investigation since they help us to assess whether a patient is prone to POAG, these in particular are black race, hereditary family history since the genetic risk is high such as autosomal dominant hereditary mutations, as well as being older than 40 and having visual acuity less than 20/40 at the time of diagnosis, but the most important thing would be to have elevated intraocular pressure, therefore it is very important to treat this pressure when you have a diagnosis positive for glaucoma, since for every 1 mmHg less of IOP, the prognosis is better to avoid blindness.

Also discussed are conjunctive therapies that are well tolerated and have been shown to improve IOP in angle-closure glaucoma. In addition, there is also talk of surgical procedures that in the same way reflect that they provide an improvement in the eyes of patients.

On the other hand, there are also other less common procedures such as selective laser trabeculoplasty that can be used as first-choice treatments for this pathology and that tend to be more effective than conventional treatments such as eye drops. Likewise, it has also been shown that the risk of suffering from open-angle glaucoma can vary according to

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racial group, since in studies carried out in African-American women who are at risk of presenting GAAP and were treated with conjugated estrogens for gynecological disorders, they had a decrease in the development of this pathology.

Finally, in one of the articles he confirms with other relevant authors that the prognosis in patients diagnosed with advanced glaucoma is not very favorable even after treatment, and even if one of the patient's eyes is already blind, the chances of that the other progresses the same are extremely high.

CONCLUSION

In this investigation, it was observed that presentation with advanced glaucoma is a fairly significant risk factor for lifelong blindness. The asymptomatic nature of glaucoma, particularly in the early stages of the disease, means that substantial vision loss in one eye does not always translate into a perceptible loss of visual function. This, along with the lack of an effective screening strategy, contributes to late presentation. Access to care, baseline visual acuity less than 20/40, and poor IOP control, as well as the role of genetics were the main risk factors associated with POAG blindness. Future studies should examine earlier and more effective approaches to glaucoma detection, such as identifying potential triggering risk factors and clinical picture in order to inform patients about it and have early diagnosis and therefore treatment follow-up more personalized with a better quality of life delaying the course of evolution of blindness or even avoiding it.

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