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Prevalence of glaucoma in pathological myopia

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Abstract---Purpose: To find association of glaucoma in pathological myopia for their early diagnosis and treatment and to prevent patients from glaucoma associated blindness. Settings and design: Cross sectional study. Materials and methods: 102 high myopic patients coming to the outpatient department at Dhiraj hospital, Waghodia, Piparia, Vadodara had undergone complete ophthalmic evaluation along with detailed ocular and medical history followed by examination. Results: A detailed clinical observation was done on 102 eyes with pathological myopia with an average axial length of 28 mm which showed an overall glaucoma prevalence of 25%. The study population was divided into four different groups which showed an increased prevalence of glaucoma up to 10-20% for the first group with an axial length of 26 mm; 30% for the second group with an axial length of >26 mm; 36% for the third group with an axial length >28 mm; and finally, 40% for the fourth group with an axial length of >29 mm. It becomes very important to rule out the co-existence of myopia

maculopathy and glaucomatous optic neuropathy (GON) in pathological myopia due to increased prevalence of glaucoma. Higher prevalence of glaucoma is associated with important risk factors such as a secondary enlargement of optic disc and large parapapillary delta zones detectable on optical coherence tomography. Therefore, it becomes extremely important to screen all pathological myopes for glaucomatous optic neuropathy. Conclusion: There is an increasing prevalence of glaucoma along with increasing axial length in pathological myopia, and it was found out to be up to 50%. Morphological risk factors are a secondarily enlarged optic disc and large parapapillary delta zones. Clinical evaluation techniques such as ophthalmoscopy, visual field assessment, applanation tonometry, optical coherence tomography can prove somewhat unreliable for a proper judgement.

Keywords---risk factors, optical coherence tomography, pathological myopia, primary open angle glaucoma.

Introduction

Glaucoma is considered as one of the most common causes of irreversible blindness in adults all over the globe. It is characterized by an abnormally high intra ocular pressure (IOP) > 25 mm Hg, optic nerve dystrophy, and a peripheral visual field loss. Its global prevalence is estimated to be 80 million. Primary open angle glaucoma (POAG) also known as chronic simple glaucoma is generally a bilateral entity not always symmetrical is a multifactorial optic neuropathy which is chronic and progressive with an acquired visual field loss in the presence of an open anterior chamber angle. It acts as direct evidence. The main mechanism of glaucoma remains unclear and early detection or prediction of POAG progression remains a challenging task.

Raised IOP is one of the major risk factors for causation of POAG. Research has shown that by reducing the IOP there is a significant delay in the progression of glaucoma. Other related risk factors such as age, gender, race, refractive error, genetic and systemic factors may be involved in its pathogenesis. Many studies have found that pathological myopia is associated with POAG and can also furthermore lead to the development of glaucomatous optic neuropathy. (GON)

Materials & Methods

Study setting

This study was conducted in Department of Ophthalmology, Dhiraj Hospital SBKS, MI&RC, Piparia, Vadodara from August 2020 to November 2021.

Study selection characteristics

Inclusion Criteria

- Patient's age >18 years, relatively young adults
- Cup to disc ratio more than equal to 0.6
- Visual field changes corresponding to optic disc
- Axial length >26 mm
- Patient willing to participate
- Presence of normal anterior chamber
- Secondary glaucoma (steroid induced, pigmentary, pseudo exfoliation, glaucoma associated with inflammation, traumatic glaucoma)

Exclusion Criteria

- Any other ophthalmic/neurological condition resulting in visual field defect
- Glaucomatous optic nerve damage
- History of diabetes mellitus
- Any corneal pathologies
- Angle closure glaucoma
- Pseudophakia/Aphakia
- Patient not willing to participate

Study Design

Cross-sectional study

This study was conducted at Ophthalmology department of Dhiraj hospital, SBKS MI &RC in Piparia, Waghodia, Vadodara. It is based on the principles of Blue Mountain eye study. Patients visiting the outpatient clinic were evaluated and 102 patients with pathological myopia who met the inclusion and exclusion criteria were studied. Patients were included in our study after receiving ethical approval from the institutional review board. Subjects were classified as low myopia (-1.0 D to -3.0 D), moderate (-3.0 D to -6.0 D) and high/pathological myopia. (>-6.0 D)

Glaucoma was diagnosed keeping in mind the characteristic visual field defects with optic disc cupping and rim thinning, applanation tonometry between 18 to 22 mmHg, cup to disc ratio between 0.6 to 0.8, gonioscopic findings mostly not of much significance. Ocular hypertension was diagnosed when the tonometry readings exceeded 22 mmHg in both eyes without any significant glaucoma changes.

Results

The prevalence of glaucoma was found to be 60% in patients of high and pathological myopia, signifying a moderately fair association between glaucoma and pathological myopia. There was a little association with ocular hypertension. In a myopic eye, IOP is 5 mmHg higher as compared to the emmetropic eye.

Discussion

From the studies conducted above, it is found out that the prevalence of glaucoma increases as the degree of myopia increases. Most of the research has shown that pathological myopia is associated with an increased risk of primary open angle glaucoma (POAG). The Blue Mountain eye study is one of the most important studies demonstrating a direct connection between myopia and glaucoma associated with risk factors like age, race, gender, refractive error, Odds ratio for the eye is 2.3 to 3.3 of eyes with low myopia as compared to high/pathological myopia. Beijing eye study was a demographic study conducted at China which demonstrated that high myopia of >-6.0 D and pathological myopia maybe a risk factor for glaucomatous optic neuropathy. One of the largest myopia and glaucoma screening was conducted during early manifest glaucoma trial. It involved approximately 32918 people aged 57 to 80 years. This study again showed a positive and strong association between pathological myopia and newly diagnosed glaucoma.

However, all studies have not demonstrated any association between glaucoma and pathological myopia. Ocular hypertension study found no association between myopia and POAG. Chao et al study involved 20 Chinese patients with pathological myopia (>-6 D) and it showed that axial length was not an important risk factor linked to glaucoma. These results suggest a possibility of risk factors other than axial length which come into play for the occurrence of glaucoma in pathological myopia, such as GON.

Several theories explain the association between glaucoma and pathological myopia. It can be due to a variety of mechanisms such as increased susceptibility of optic disc to any injury due to increased IOP. An important factor for detecting early structural changes in glaucoma is a proper assessment of retinal nerve fiber layer (RNFL) defects. Mostly it has been observed that RNFL measurements are sensitive to the detection of glaucoma and their magnitude correlates with the severity of visual field impairment. It was found that these parameters were excellent for diagnosis of glaucoma. These factors are independent of other glaucoma risk factors and intraocular pressure. Pathological myopia clinically unrelated shows slightly higher IOP as compared to emmetropia and hyperopia. Studies showed that at certain IOP's with POAG, optic nerve damage appears to be more prominent in pathological myopia with a large optic disc as compared to emmetropia, which is indicative that glaucomatous optic nerve fiber loss is more sensitive for pathological myopia.

Conclusion

This study confirms a strong relationship between pathological myopia and glaucoma. People with moderate to pathological myopia had a 2-3 times higher risk of glaucoma than in people with emmetropia. Risk was found to be independent of other glaucoma risk factors and intraocular pressure.

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