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Original Research Article

Profile of Secondary Glaucoma in Tertiary Care Centre

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Abstract

Purpose: To study the clinical profile and to evaluate the ocular and systemic risk factors associated with secondary glaucoma.

Method: The present observational study was conducted in the Department of Ophthalmology, Himalayan Institute of Medical Sciences (HIMS), Swami Rama Himalayan University, Dehradun over a period of 12 months. Seventy-two clinically diagnosed cases of secondary glaucoma aged ≥ 12 years with intraocular pressure in the affected eye ≥ 21 mm Hg were included and patients who were diagnosed with primary open angle glaucoma, primary angle closure glaucoma and corneal pathologies like scarring and opacity were excluded. Detailed history and ophthalmic examination including visual acuity, slit lamp examination, posterior segment examination, intraocular pressure and gonioscopy was done and the data was analyzed using appropriate statistical tests.

Results: Twenty-two (30.5%) patients had glaucoma secondary to trauma followed by neovascular glaucoma (n=11, 15.27%). The geographical distribution of patients, accounted for 24 patients (33.30%) from hilly region and 48 patients (66.60%) from plains. Most common ocular risk factor for secondary glaucoma was ocular trauma (n=22, 31.88%) followed by uveitis (n=9, 13.04%). Most common systemic risk factor for secondary glaucoma was hypertension (n=17, 36.95%) followed by diabetes mellitus (n=16, 34.78%). Cataract surgery (n=11, 36.66%) was found to be the most common surgical risk factor for patients to develop secondary glaucoma.

Conclusion: Traumatic glaucoma was the most common type of secondary glaucoma followed by neovascular glaucoma. Hypertension and diabetes mellitus were the major systemic risk factors associated with secondary glaucoma.

Keywords: Secondary Glaucoma, Neovascular Glaucoma, Traumatic Glaucoma, Uveitis.

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Introduction

Glaucoma is a progressive optic neuropathy characterized by structural alterations at the optic nerve head with characteristic visual field changes with or without raised intraocular pressure. In 2020, people affected with glaucoma were about 76 million and the number has been estimated to rise upto 111.8 million by 2040 [1]. According to World Health Organisation, 4.5 million individuals are blind due to glaucoma. India bears the largest regional burden of global blindness (23.5%). In India, glaucoma ranks third in terms of causes of blindness, behind refractive error and cataract.[2, 3].

The etiology of primary glaucoma is idiopathic in nature. Secondary glaucoma occurs as a consequence of underlying ocular or systemic disorder which includes pseudoexfoliation glaucoma, pigmentary glaucoma, neovascular glaucoma, uveitic glaucoma, lens-induced glaucoma, malignant glaucoma, post-surgical glaucoma, traumatic glaucoma, steroid-induced glaucoma".

Early identification of the ocular and systemic conditions that predispose to secondary glaucoma and treatment of underlying pathology is important to prevent permanent vision loss. Most of the primary glaucoma can be well treated by medical management but in order to prevent secondary glaucoma, primary pathology has to be diagnosed and treated properly". Our study focused on finding the common causes, demographics, clinical features, ocular and systemic risk factors in various

types of secondary glaucoma patients who presented in a tertiary eye care centre."

Materials and Methods

The present observational study was conducted in the Department of Ophthalmology, Himalayan Institute of Medical Sciences (HIMS), Swami Rama Himalayan University, Dehradun over a period of 1 year. Seventy-two (72) clinically diagnosed cases of secondary glaucoma aged ≥ 12 years with intraocular pressure in the affected eye ≥ 21 mm Hg were included and patients who were diagnosed with primary open angle glaucoma, primary angle closure glaucoma and corneal pathologies like scarring and opacity were excluded. Detailed history was taken from patient regarding any type of ocular trauma, previous episodes of pain and redness in eyes, any ocular surgery, intravitreal injections and lasers, use of medications like steroids and chronic systemic illness like diabetes mellitus, hypertension. Visual acuity was recorded for every patient with the help of Snellen's distant visual acuity chart and converted to LogMAR values. Anterior segment was examined thoroughly with the help of a slit lamp. Fundus was evaluated with slit lamp biomicroscopy with a +90D lens. Intraocular pressure was recorded with Goldmann applanation tonometry for each patient and gonioscopy was done with the help of Zeiss 4-mirror goniolens.

Statistical Analysis: Entry, interpretation and analysis of the data were done in Microsoft Excel and Statistical Package for Social Sciences (SPSS) version 22.0. Data was summarized using mean, standard deviation and range for continuous variables and percentage for categorical variables. Comparison between groups was done using t-test for continuous variables and chi-square test for categorical variables. Correlation was done between ocular trauma and secondary glaucoma presenting in different age groups. P-values less than 0.05 was considered as statistically significant.

Results

Seventy-two (72) patients were studied out of which 53 were males (73.6%) and 19 females (26.38%). Males were found to be affected more as compared to females and in the ratio of 2.78:1.

Majority of cases were seen in 56-65 years of age group. Out of 72 patients, 24 (33.3%) belonged to hilly regions and 48 (66.6%) belonged to plain areas. (Table 1)"

Out of 69 patients having ocular risk factors, secondary glaucoma was seen in patients having history of ocular trauma (n=22, 31.88%) followed by uveitis (n=9, 13.04%) and pseudoexfoliation (n=9, 13.04%), post laser (n=9, 13.04%), use of steroids (n=7, 10.14%), ocular syndromes (n=7, 8.69%), history of intravitreal anti-vascular endothelial growth factor (VEGF) injections (n=5, 7.24%), lens related (n=1, 1.44%), hyphaema (n=1, 1.44%) (Table 2)"

Out of 46 patients having systemic risk factors, secondary glaucoma was seen in hypertension (n=17, 36.95%) followed by diabetes mellitus (n=16, 34.78%), hypothyroidism (n=8, 17.39%), chronic kidney disease (n=2, 4.34%) and other conditions like herpes simplex infection (n=1, 2.17%), cardiac illness (n=1, 2.17%), leprosy (n=1, 2.17%). (Table 3)"

Out of 30 patients having history of ocular surgery, secondary glaucoma was seen in post cataract surgery (n=11, 36.66%), post vitreoretinal surgery with silicon oil insertion (n=9, 30%), post penetrating keratoplasty (n=9, 30%), post primary eye injury repair (n=1, 3.33%). (Table 4)"

Out of the total 72 patients of secondary glaucoma studied, traumatic glaucoma was seen in 22 patients (30.5%), neovascular glaucoma was seen in 11 patients (15.27%), pseudoexfoliation glaucoma was seen in 9 patients (12.5%),steroid induced glaucoma was seen in 7 patients (9.7%), SG associated with ocular syndromes was seen in 5 patients (6.9%) out of which 3 patients (4.16%) had ICE syndrome, 1patient (1.38%) had Eale's disease and 1 patient (1.38%) had Sturge Weber syndrome.

Post penetrating keratoplasty secondary glaucoma was seen in 4 patients (5.55%), uveitic glaucoma was seen in 4 patients (5.5%). Secondary glaucoma associated with systemic diseases was seen in 4 patients (5.5%) out of which 2 patients (2.7%) had hypertension and 2 patients (2.7%) had hypothyroidism.

Secondary glaucoma following cataract surgery was seen in 3 patients (4.16%), following vitreoretinal surgery was seen in 2 patients (2.7%). Phacomorphic glaucoma was seen in 1 patient (1.38%). (Table 5)

Ocular trauma was significantly associated with secondary glaucoma presenting in 12 to 24 years of age group. (p-value = 0.009).

Table 1: Geographical distribution

Areas	Number (n)	Percentage (%)
Hilly areas	24	33.30
Plains	48	66.60
Total	72	100

Table 2: Ocular risk factors

Ocular risk factors	Number (n)	Percentage (%)
Trauma	22	31.88
History of uveitis	9	13.04
Pseudoexfoliation	9	13.04
Previous lasers	9	13.04
Steroids	7	10.14
Ocular syndromes	6	8.69
Anti –Vascular endothelial growth factor	5	7.24
Lens related	1	1.44
Hyphaema	1	1.44
Total	69	100

Table 3: Systemic risk factors

Systemic risk factors	Number (n)	Percentage (%)
Hypertension	17	36.95
Diabetes mellitus	16	34.78
Hypothyroidism	8	17.39
Chronic kidney disease	2	4.34
Cardiac illness	1	2.17
Herpes zoster	1	2.17
Leprosy	1	2.17
Total	46	100

Table 4: Surgical risk factors

Surgical risk factors	Number (n)	Percentage (%)
Cataract	11	36.66
Vitreoretinal surgery with Silicon oil insertion	9	30
Penetrating keratoplasty	9	30
Primary eye injury repair	1	3.33
Total	30	100

Table 5: Pattern of secondary glaucoma

Pattern of secondary glaucoma	Number (n)	Percentage (%)
Traumatic	22	30.5
Neovascular	11	15.27
Pseudoexfoliation	9	12.5
Steroid induced	7	9.7
Ocular syndrome • ICE syndrome • Eale's disease • Struge weber syndrome	5 3 1 1	6.9
Post Penetrating keratoplasty	4	5.55
Uveitic	4	5.5
Systemic causes • Hypertension • Hypothyroidism	4 2 2	5.5
Post cataract surgery	3	4.16
Post vitreoretinal surgery with silicon oil insertion	2	2.77
Phacomorphic	1	1.38
Total	72	100

Discussion

In our study, 48 patients (66.60%) were from plains and 24 patients (33.30%) were from hilly areas. There were 9 patients with pseudoexfoliation glaucoma, out of which 6 belonged to hilly areas and 3 belonged to plains. Raj S et al conducted a study where 51.4% patients were from urban areas and 48.6% were from rural areas [4].

The most common ocular risk factor in our study was trauma (n= 22, 31.88%) followed of history of uveitis (n=9, 13.04%) and pseudoexfoliation (n=9, 13.04%). Most common systemic risk factor associated with secondary glaucoma was hypertension (n=17, 36.95%) and diabetes mellitus (n=16, 34.78%)". The most common surgical risk factors associated with secondary glaucoma were post cataract surgery (n=11, 36.66%) followed by post vitreoretinal surgery with silicon oil insertion (n=9, 30%) and post penetrating keratoplasty sugery (n=9, 30%). Gadia R et al found that the most common cause for secondary glaucoma was post vitreoretinal surgery followed by trauma [5].

Sirisha Senthil et al found that the most common cause of secondary glaucoma was hypertension followed by diabetes mellitus. [3] The pattern of secondary glaucoma that is found in our study was traumatic glaucoma (n=22, 30.5%), neovascular glaucoma (n=11, 15.27%), pseudoexfoliation glaucoma (n=9, 12.5%), steroid induced glaucoma (n=7, 9.7%), ocular syndromes (n=5, 6.9%) including ICE syndrome (n=3, 4.16%), Eales disease (n=1, 1.38%) and Struge Weber syndrome (n=1, 1.38%) , post penetrating keratoplasty glaucoma (n=4, 5.5%), uveitic glaucoma (n=4, 5.5%), post cataract surgery glaucoma (n=3, 4.16%), secondary glaucoma post vitreoretinal surgery with silicon oil insertion (n=2, 2.77%), phacomorphic glaucoma (n=1, 1.38%) and other systemic causes (n=4, 5.5%) such as hypertension (n=2, 2.7%) and hypothyroidism (n=2, 2.7%).".

Liu Q et al found that secondary glaucoma caused by neovascular glaucoma was seen in 43.26% cases, trauma in 17.27% cases, posterior segment surgery in 16.75% cases, lens-related in 7.60% cases, uveitis in 4.84% cases, anterior segment surgery in 1.81% cases, ocular syndromes in 0.69% cases, intraocular tumor in 0.61% cases, drug-induced in 0.35% cases, infection in 0.26% cases and others in 6.56% cases. [6]

Conclusion

The most common risk factor for the development of secondary glaucoma was ocular trauma. Traumatic glaucoma was the most common type of SG seen in our study followed by neovascular glaucoma and pseudoexfoliation glaucoma. The predominant systemic risk factor associated with secondary glaucoma was hypertension followed by diabetes mellitus. Secondary glaucoma needs an index of suspicion in high-risk cases, screening, early recognition, regular follow ups and prompt intervention to prevent blindness related to secondary glaucomas worldwide.

Limitations

1. The study included a small sample size.
2. Better visual outcome and progression of the disease could have been assessed if the patients were followed up for longer duration of time.

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