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Original Research Article

A Clinical Profile of Secondary Glaucoma in a Tertiary Health Care System

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Abstract:

Background: Secondary glaucoma represents a heterogeneous group of disorders characterized by elevated intraocular pressure (IOP) due to identifiable ocular or systemic causes. It is an important cause of preventable visual morbidity, particularly in tertiary care settings where complex and advanced cases are frequently encountered.

Objectives: To analyze the clinical profile, etiology, and management patterns of patients with secondary glaucoma presenting to a tertiary health care system.

Methods: This hospital-based observational study was conducted in the Department of Ophthalmology of a tertiary care center. Patients diagnosed with secondary glaucoma during the study period were included. Demographic details, etiology, laterality, IOP at presentation, visual acuity, and management strategies were analyzed.

Results: A total of 120 eyes of 98 patients with secondary glaucoma were evaluated. Lens-induced glaucoma was the most common etiology, followed by neovascular and uveitic glaucoma. Majority presented with raised IOP and advanced visual impairment. Medical management was initiated in all cases, while a significant proportion required surgical intervention.

Conclusion: Secondary glaucoma constitutes a significant burden in tertiary care centers. Early identification of underlying causes and timely management are crucial to prevent irreversible vision loss.

Keywords: Secondary Glaucoma, Intraocular Pressure, Tertiary Care, Lens-Induced Glaucoma, Neovascular Glaucoma.

Introduction

Glaucoma is a leading cause of irreversible blindness worldwide, with secondary glaucoma accounting for a substantial proportion of cases encountered in clinical practice. Unlike primary glaucoma, secondary glaucoma arises due to identifiable ocular or systemic abnormalities that interfere with aqueous humor dynamics, leading to increased intraocular pressure (IOP) and optic nerve damage. The prevalence and pattern of secondary glaucoma vary widely depending on demographic characteristics, health-care access, and referral patterns [1].

Secondary glaucoma encompasses a broad spectrum of conditions including lens-induced glaucoma, neovascular glaucoma, uveitic glaucoma, traumatic glaucoma, steroid-induced glaucoma, and post-surgical glaucoma [2]. Many of these conditions are preventable or potentially reversible if detected early, emphasizing the importance of prompt diagnosis and management [3]. In developing countries, delayed presentation, limited access to eye care services, and a high burden of cataract contribute significantly to the occurrence of secondary glaucoma [4].

Lens-induced glaucoma remains a common cause of secondary glaucoma in regions where cataract surgery is delayed or inaccessible. Similarly, neovascular glaucoma is frequently associated with proliferative diabetic retinopathy and retinal vein occlusions, conditions that are increasingly prevalent due to the rising burden of diabetes mellitus [5,6]. Uveitic glaucoma poses additional diagnostic and therapeutic challenges due to fluctuating IOP levels and the coexistence of intraocular inflammation [7].

Tertiary health care centers often receive advanced and complicated cases of secondary glaucoma, making them ideal settings to study the clinical

spectrum and outcomes of this condition. Understanding the etiological profile and clinical characteristics of secondary glaucoma is essential for planning preventive strategies and optimizing management protocols [8].

The present study was undertaken to evaluate the clinical profile of secondary glaucoma in patients presenting to a tertiary health care system, with particular emphasis on etiology, clinical presentation, and management patterns.

Materials and Methods

This hospital-based observational study was conducted in the Department of Ophthalmology at a tertiary health care center. Patients diagnosed with secondary glaucoma during the study period were included after obtaining informed consent. Secondary glaucoma was defined as glaucoma with raised IOP associated with an identifiable ocular or systemic cause.

Inclusion Criteria

- Patients of all age groups diagnosed with secondary glaucoma
- Willingness to participate in the study

Exclusion Criteria

- Primary open-angle or primary angle-closure glaucoma
- Congenital or developmental glaucoma

A detailed history was obtained including demographic details, presenting complaints, duration of symptoms, and past ocular history. Comprehensive ocular examination included best-corrected visual acuity, slit-lamp biomicroscopy, applanation tonometry, gonioscopy, and fundus examination wherever possible. Ancillary investigations were performed as indicated.

Data were recorded in a structured proforma and analyzed using descriptive statistics.

Results

A total of 98 patients (120 eyes) diagnosed with secondary glaucoma were included in the study. Statistical analysis was performed using descriptive and inferential statistics. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were expressed as frequencies and percentages. A p-value <0.05 was considered statistically significant.

Demographic Profile: The mean age of the study population was 58.4 ± 12.6 years (range: 22–82 years). Males constituted 56 patients (57.1%), while females constituted 42 patients (42.9%), with a male-to-female ratio of 1.33:1. The age and gender distribution of patients is shown in Table 1. There was no statistically significant association between age group and gender distribution ($\chi^2 = 0.12$, $p = 0.94$).

Table 1: Age and gender distribution of patients with secondary glaucoma.

Age group (years)	Male n (%)	Female n (%)	Total n (%)
<40	6 (10.7)	4 (9.5)	10 (10.2)
41–60	28 (50.0)	22 (52.4)	50 (51.0)
>60	22 (39.3)	16 (38.1)	38 (38.8)

Etiological Distribution: Lens-induced glaucoma was the most common cause of secondary glaucoma, accounting for 42 eyes (35.0%), followed by neovascular glaucoma in 30 eyes (25.0%) and uveitic glaucoma in 22 eyes (18.3%). The etiological distribution is summarized in Table 2 and illustrated in Figure 1. The difference in frequency among etiological categories was statistically significant ($\chi^2 = 18.6$, $p = 0.001$).

Table 2: Etiological distribution of secondary glaucoma (n = 120 eyes).

Etiology	Number of eyes	Percentage (%)
Lens-induced glaucoma	42	35.0
Neovascular glaucoma	30	25.0
Uveitic glaucoma	22	18.3
Traumatic glaucoma	16	13.4
Steroid-induced glaucoma	10	8.3

Table 3: Distribution of intraocular pressure at presentation.

IOP range (mmHg)	Number of eyes	Percentage (%)
21–30	34	28.3
31–40	46	38.4
>40	40	33.3

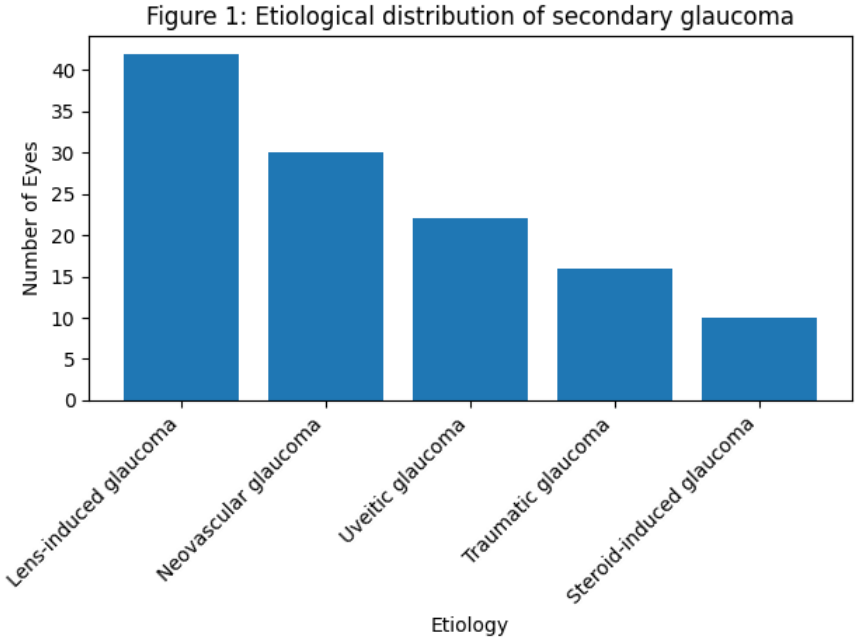

Figure 1: Bar diagram showing etiological distribution of secondary glaucoma.

Intraocular Pressure at Presentation: The mean intraocular pressure (IOP) at presentation was 36.8 ± 8.9 mmHg. Majority of eyes (71.7%) presented with IOP greater than 30 mmHg. Eyes with neovascular glaucoma had a significantly higher mean IOP (41.2 ± 6.5 mmHg) compared to other etiologies ($p < 0.01$). The distribution of IOP at presentation is shown in Table 3 and Figure 2.

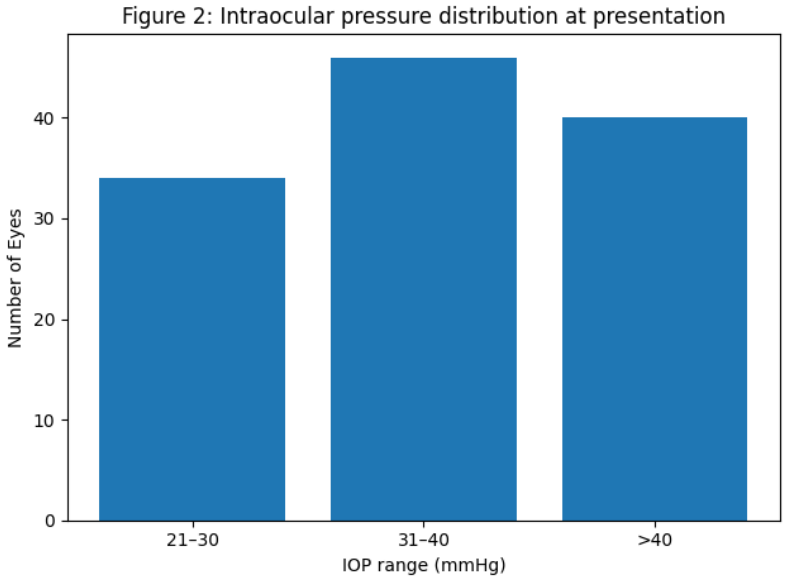

Figure 2: Histogram depicting intraocular pressure distribution at presentation

Management Pattern: All patients were initially managed with antiglaucoma medications. Surgical intervention was required in 48 eyes (40.0%). Trabeculectomy was performed in 30 eyes (62.5%), glaucoma drainage device implantation in 12 eyes (25.0%), and cyclodestructive procedures in 6 eyes (12.5%). Eyes presenting with IOP greater than 40 mmHg had a significantly higher requirement for surgical intervention ($p = 0.003$).

Discussion

Secondary glaucoma remains an important cause of visual morbidity, particularly in developing countries where delayed presentation is common. In the present study, the majority of patients were middle-aged to elderly, consistent with previous reports [9,10]. Male predominance observed in this study may reflect higher exposure to trauma and better health-seeking behavior among males [11].

Lens-induced glaucoma emerged as the most common etiology, highlighting the persistent burden of untreated cataract in the community. Similar findings have been reported in several Indian studies, underscoring the need for timely cataract surgery to prevent secondary complications [12,13]. Neovascular glaucoma constituted the second most common cause, frequently associated with diabetic retinopathy and retinal vascular occlusions, in agreement with earlier studies [14,15].

Uveitic glaucoma accounted for a significant proportion of cases and posed therapeutic challenges due to the dual requirement of controlling inflammation and IOP. The prevalence observed in this study is comparable to that reported in tertiary care settings elsewhere [16]. Traumatic and steroid-induced glaucomas were less common but clinically significant due to their potential for prevention through public awareness and judicious steroid use [17,18].

A large proportion of patients presented with very high IOP and poor visual acuity, reflecting delayed referral and advanced disease at presentation. This emphasizes the importance of early detection and appropriate referral from primary and secondary care centers [19].

Management of secondary glaucoma requires an etiological approach. While medical therapy plays an important initial role, many cases ultimately require surgical intervention to achieve adequate IOP control. The relatively high surgical rate observed in this study is consistent with reports from other tertiary centers managing advanced disease [20,21].

Overall, the findings of this study reinforce the need for strengthening preventive ophthalmic services, improving awareness about cataract and diabetic eye disease, and ensuring timely access to specialized care to reduce the burden of secondary glaucoma [22–25].

Conclusion

Secondary glaucoma constitutes a significant proportion of glaucoma cases encountered in tertiary health care systems and remains an important cause of preventable visual morbidity. In the present study, lens-induced glaucoma was the most common etiology, followed by neovascular and uveitic glaucoma, reflecting delayed presentation and the burden of cataract and retinal vascular diseases in the community. Most patients presented with markedly elevated intraocular pressure and advanced disease, necessitating aggressive medical therapy and, in many cases, surgical intervention.

Early identification of the underlying cause, timely referral, and appropriate management are crucial in preventing irreversible optic nerve damage and vision loss. Strengthening primary eye care services, improving awareness regarding cataract surgery and diabetic eye disease, and ensuring access to specialized ophthalmic care can substantially reduce the burden of secondary glaucoma. Future studies with larger sample sizes and long-term follow-up are recommended to evaluate visual outcomes and treatment efficacy.

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