

Pattern of Glaucoma in Patients Underwent Surgery in Makkah Eye Hospital, Aden, Yemen

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ABSTRACT

Background: Glaucoma is an irreversible eye disease that causes blindness worldwide.

Objective: To investigate the patterns of patients with glaucoma who underwent glaucoma surgery

Patients and Methods: This study is a retrospective study with all glaucoma patients who underwent surgery at Makkah Eye Hospital, in Aden, Yemen, between January 2024 and December 2025 and their medical records were reviewed.

The collected data were age, gender, residency, risk factors diabetes mellitus, arterial hypertension, family history, type of glaucoma and type of surgery. Statistical analyses were conducted using SPSS v. 22.

The data were analyzed using descriptive statistics frequency and percentage, mean and standard deviation (SD).

The chi-square test of statistical significance was used in the analysis, and the level of statistical significance was determined by a p-value of <0.05.

Results: The total affected eyes from the 140 study patients were 204. The study patients were (63.6%) males and (36.4%) females. The mean age was 41.6 ± 27.6

years. The age group > 60 years had the highest number of patients 46 (32.8%), Glaucoma patients affected by diabetes mellitus were (15%) and by arterial hypertension were (20.7%).

Primary open angle glaucoma represented the higher type of glaucoma in (46.5%) eyes. Trabeculectomy with Mitomycin C were the most applied type of glaucoma surgeries (55.4%).

About (31.9%) of the affected eyes were found among patient aged $\leq$ years.

We found (29.4%) of the affected eyes were in the age group > 60 years old in which (21.6%) of them were primary open angle glaucoma. The glaucoma types differed significantly among the age groups ($P=0.000$).

About (23.5%) of the affected eyes were treated by phacoemulsification + Trabeculectomy while (21.6%) were treated by Trabeculectomy with Mitomycin C. The glaucoma types of the total affected eyes differed significantly among the Type of glaucoma surgery ($P=0.000$).

Conclusion: Primary open angle glaucoma represented the higher type of glaucoma. Further studies are needed.

Keywords: Pattern, glaucoma, patients, underwent, surgery, Aden

INTRODUCTION

Glaucoma is an irreversible eye disease that causes blindness worldwide. It is estimated that, by 2040, there will be 111.8 million cases of glaucoma among those who are 40 to 80 years old [1].

According to a report published by the Lancet Global Health Commission on Global Eye Health named Vision Beyond 2020, glaucoma is one of the leading causes of visual impairment in adults [2], as it accounts for 2% of visual impairment and 8% of blindness in the world [3]. In terms of treatment, surgery is amongst the main options [4]. Glaucoma is a leading cause of vision impairment and irreversible blindness [5,6]. It is a complex eye disease characterized by elevated intraocular pressure that triggers optic disc cupping, progressive optic neuropathy, and apoptosis of the cells of the retinal ganglion [5]. This causes irreversible optic nerve damage, resulting in visual field loss, vision loss, and eventually blindness [5,7].

Early diagnosis of glaucoma is critical because when the condition is detected in its early stages, the progression of the disease can be slowed and optic nerve damage mitigated [5].

OBJECTIVE: To investigate the patterns of patients with glaucoma who underwent glaucoma surgery in Makkah eye hospital, Aden, Yemen.

MATERIALS & METHODS

This study is a retrospective study with all glaucoma patients who underwent surgery at Makkah Eye Hospital, in Aden, Yemen, between January 2024 and December 2025 and their medical records were reviewed. The collected data from their medical records were demographic data such as age, gender, residency, risk factors diabetes mellitus, AHT, family history, type of glaucoma and type of surgery.

Statistical Analysis:

Statistical analyses were conducted using Statistical Package for Social Sciences

(SPSS v. 22; IBM Corp., Armonk, NY, US). Collected data were analyzed using descriptive statistics such as frequency and percentage, mean and standard deviation (SD) for quantitative variables. The chi-square test of statistical significance was used in the analysis, and the level of statistical significance was determined by a p-value of <0.05.

Ethical Consideration:

The ethical approval of this study was obtained from the Ethics Committee of the Faculty of Medicine and Health Science at the University of Aden.

We confirmed to the Ethics Committee that any steps conducted on human participants in this study will be performed in accordance with the standards outlined in the Helsinki Declaration.

RESULT

This retrospective study conducted at Makkah Eye Hospital in Aden, Yemen, during the period January 2024 to December 2025.

The medical records of all patients diagnosed with confirmed of glaucoma and underwent surgery were retrospectively reviewed. The total eyes from the 140 study patients were 204.

Of the total, study patients, 89 (63.6%) were males and 51 (36.4%) were females, with a male -to-female ratio of 1.75:1 (Figure 1).

The mean age of study patients at admission was 41.6 ± 27.6 years and the age ranged between 0.1 to 79 years.

The age group > 60 years had the highest number of patients 46 (32.8%), followed by the age group ≤ 15 years 39 (27.9%) and the group 46 – 60 years with 35 (25.0), as shown in Table 1 and Figure 2.

Glaucoma patients affected by diabetes mellitus in our present study were 21 (15%) and affected by arterial hypertension (AHT) were 29 (20.7%). Additionally, 42 (30%) of glaucoma patients had family history (Table 1).

Table 1: Demographic characteristics of the study patients (n = 140)

Variables	Ratio	Mean & range	No	%
Sex:				
Males			89	63.6
Females			51	36.4
<i>Ratio male: female</i>	1.75: 1			
Age (years):				
Age range		0.1 - 79		
Total mean age $\pm$ SD		41.6 $\pm$ 27.6		
Age groups (years):				
≤ 15			39	27.9
16-30			12	8.6
31-45			8	5.7
46-60			35	25.0
> 60			46	32.8
Patient affected with DM:				
Yes			21	15
No			119	85
AHT:				
Yes			29	20.7
No			111	79.3
FH:				
Yes			42	30.0
No			98	70.0

SD = Standard Deviation

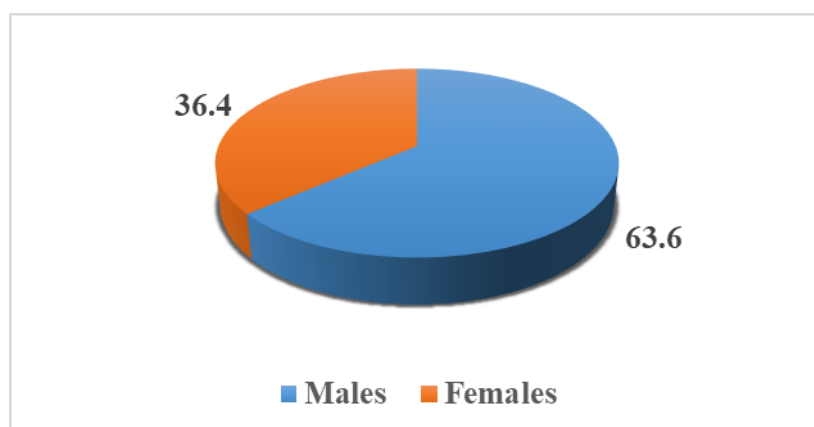


Figure 1: Proportion of study patients related to sex (n=140)

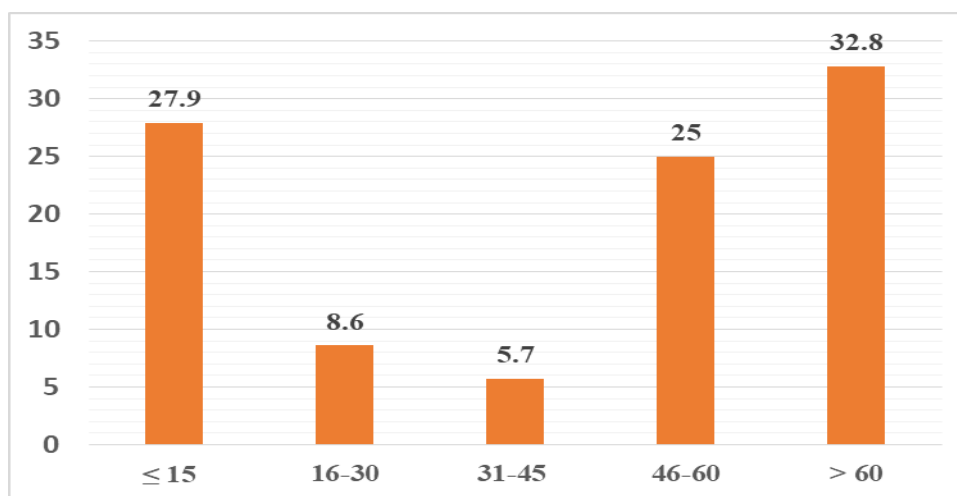


Figure 2: Proportion of study patients related to age groups (n = 140)

Table 2 revealed the distribution of the affected side, Types of glaucoma and types of surgery. Affected left eyes were found in 107 (52.5%) while 97 (47.5%) affected eyes were in the right sides (Figure 3).

Additionally, Table 2 summarized the types of glaucoma diseases among the total study eyes of the patients.

Primary open angle glaucoma (POAG) represented the higher type of glaucoma in 95 (46.5%) eyes followed by congenital glaucoma (CG) in 64 (31.4%) eyes, secondary open angle glaucoma (SOAG) in

24 (11.8%), primary angle closure glaucoma (PACG) in 11 (5.4%) and secondary angle closure glaucoma (SACG) in 10 (4.9%) eyes.

In addition, Table 2 showed the different types of glaucoma surgeries. Trabeculectomy with Mitomycin C were the most applied type of glaucoma surgeries 113 (55.4%) followed by phaco+FpcloL in 60 (29.4%), trabeculectomy + trabeculotomy in 19 (9.3%), cyclocryopexy + intracameral avastin in 7 (3.4%) and Ahmed glaucoma valve surgery 5 (2.5%).

Table 2: Distribution of the affected side, Types of glaucoma and types of surgery (Eyes =204):

Variables	No	%
Affected Side:		
Left	107	52.5
Right	97	47.5
Types of glaucoma:		
Primary open angle glaucoma	95	46.5
Congenital glaucoma	64	31.4
Secondary open angle glaucoma	24	11.8
Primary angle closure glaucoma	11	5.4
Secondary angle closure glaucoma	10	4.9
Type of surgery:		
Trabeculectomy with Mitomycin C	113	55.4
Phaco+FpcloL	60	29.4
Trabeculectomy + Trabeculotomy	19	9.3
Cyclocryopexy + Intracameral Avastin	7	3.4
Ahmed Glaucoma Valve surgery	5	2.5

Phaco+FpcloL = phacoemulcefication + foldable intraocular lens

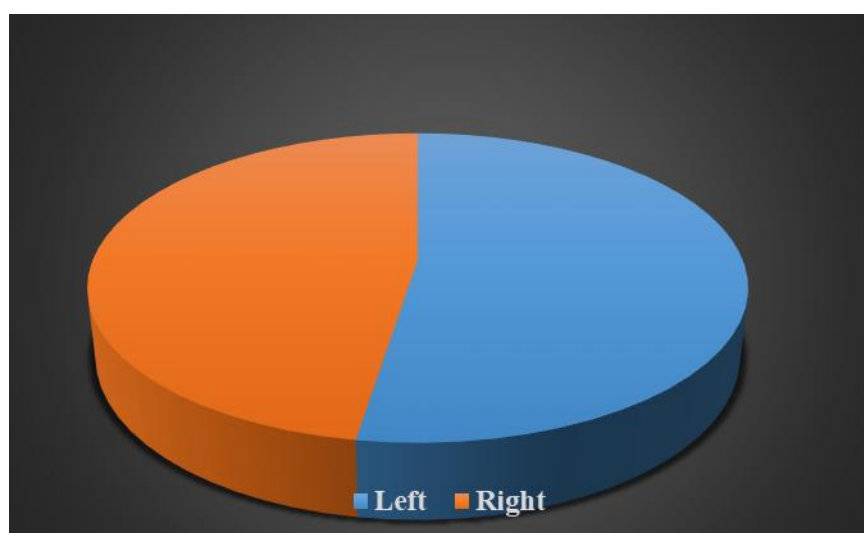


Figure 3: Proportion of study patients related to affected sides (eyes = 204)

Table 3 revealed the glaucoma-types of the affected eyes related to age groups. Sixty-five (31.9%) of the total affected eyes were found among patient aged $\leq$ years and most

of them were congenital glaucoma with 58 (28.4%). We found 60 (29.4%) of the affected eyes were in the age group > 60 years old in which 44 (21.6%%) of them

were POAG. In addition, 49 (24.0%) of the affected eyes were found among the age group 46-60 years old and most of them were affected by POAG with 30 (14.7%).

The glaucoma types of the total eyes differed significantly among the age group of the patients ($P=0.000$, chi-square test).

Type 3: Glaucoma types of the affected eyes related to age groups (eyes = 204)

Age group	Type of Glaucoma					Total No (%)
	CONG No (%)	PACG No (%)	POAG No (%)	SACG No (%)	SOCG No (%)	
≤15	58 (28.4)	2 (1.0)	4 (2.0)	0 (0.0)	1 (0.5)	65 (31.9)
16 – 30	3 (1.5)	0 (0.0)	10 (4.9)	1 (0.5)	5 (2.5)	19 (9.3)
31 – 45	0 (0.0)	2 (1.0)	7 (3.4)	0 (0.0)	2 (1.0)	11 (5.4)
46 – 60	0 (0.0)	4 (2.0)	30 (14.7)	5 (2.5)	10 (4.9)	49 (24.0)
> 60	3 (1.5)	3 (1.5)	44 (21.6)	4 (2.0)	6 (2.9)	60 (29.4)
Total	64 (31.4)	11 (5.4)	95 (46.6)	10 (4.9)	24 (11.7)	204 (100)

Chi-Square = 163.83; P-value = 0.000

Table 4 revealed, that POAG was the most frequent type of glaucoma in our study and 48 (23.5%) of the affected eyes were treated by phacoemulsification + Trabeculectomy while 44 (21.6%) were treated by Trabeculectomy with Mitomycin C. Patients with congenital glaucoma mostly 44 (21.6%) of the affected eyes treated by Trabeculectomy with Mitomycin C. Eyes

affected with secondary open angle glaucoma were 24 (11.8%) and were treated by different surgical procedures most of them 12 (5.9%) by Trabeculectomy with Mitomycin C. The glaucoma types of the total affected eyes differed significantly among the Type of glaucoma surgery ($P=0.000$).

Table 4: Association between types of glaucoma and types of glaucoma surgeries (eyes = 204)

Type of glaucoma	Type of glaucoma surgery					Total
	AGV	Cyclo	PHFpTMMC	TTWITHMM	TWITHMMC	
POAG	1 (0.5)	2 (1.0)	48 (23.5)	0 (0.0)	44 (21.6)	95 (46.5)
CONG	0 (0.0)	1 (0.5)	1 (0.5)	18 (8.8)	44 (21.6)	64 (32.0)
SOAG	1 (0.5)	3 (1.5)	8 (3.9)	0 (0.0)	12 (5.9)	24 (11.9)
PACG	0 (0.0)	0 (0.0)	1 (0.5)	0 (0.0)	10 (5.0)	11 (5.5)
SACG	3 (1.5)	1 (0.5)	2 (1.0)	1 (0.0)	3 (1.5)	10 (5.0)
Total	5 (2.5)	7 (3.4)	60 (29.4)	19 (9.3)	113 (55.4)	204 (100)

Chi-square = 119.32; P-value = 0.000

DISCUSSION

The term glaucoma refers to group of condition that have a characteristic of optic neuropathy associated with visual field defect and elevated intraocular pressure [8]. There are several types of glaucoma, the two main types are open-angle and angle closure. Open angle glaucoma; the most common form of glaucoma, is caused by the slow clogging of the drainage canals resulting in increased eye pressure; has a wide and open angle between the iris and cornea. It develops slowly and is a lifelong condition and has symptoms and damage that are not noticed. Angle-closure

glaucoma is a common form of glaucoma caused by blocked drainage canals resulting in sudden rise in intraocular pressure. It has closed angle between the iris and cornea. It develops very quickly [9]

Of the 140 patients, whom underwent glaucoma surgery in this study, 63.6% were males and 36.4% were females (male-to-female ratio of 1.75:1).

Similar findings to our result were reported previously by Thabet et al [10] from Yemen with males 41 and females 30, Eissa Iman from Egypt [11] found in her study, females were 49 and males were 101. Jafari et al [12] from Dubai, United Arab Emirates (UAE),

reported in their study that the majority of patients were males (60%) compared to (40%) of females.

In a study by Khandekar et al., involving 940 patients from Saudi Arabia, males were found to have a higher prevalence of glaucoma than females [13].

A study by Abu-Shaheen et al. published in 2025 in Saudi Arabia, found that females had a higher prevalence of glaucoma (54.2%) [14].

In our present study, we found the mean age of study patients at admission was 41.6 ± 27.6 years and the age ranged between 0.1 to 79 years.

This result was not in concordance with studies, conducted in UAE, where the mean age was 53.3 ± 14.0 years [12] and in China where the mean age was 61.51 ± 14.43 years [15].

In the current study, the age group > 60 years had the highest number of glaucoma patients 46 (32.8%). The risk of developing glaucoma increases notably with age. While the condition may affect younger individuals, it becomes significantly more prevalent in those over the age of 60 [16].

Glaucoma patients affected by diabetes mellitus in our present study were (15%) and affected by arterial hypertension (AHT) were (20.7%). Additionally, (30%) of glaucoma patients had family history

Mitchell et al [17] reported in their study, that co-morbidities such as diabetes and hypertension were also found to be prevalent in their study population, corresponding to 19.9% and 17.4%, respectively.

In our present study, primary open angle glaucoma (POAG) is the most common form of glaucoma, making up 46.5% (95) of the total affected eyes, followed by congenital glaucoma (CG) in 64 (31.4%) eyes, secondary open angle glaucoma (SOAG) in 24 (11.8%) eyes.

Similar to our findings were reported from others [18-22].

Veeraraghavan [23] reported that primary open-angle glaucoma (POAG) is the most common type of glaucoma, characterized by

increased resistance to drainage in the trabecular meshwork. However, the drainage angle between the cornea and iris remains open. Previous published studies, reported that increasing age is a major risk factor for developing Glaucoma [24-26].

In this study, trabeculectomy with mitomycin C were the most applied type of glaucoma surgeries (55.4%) followed by phaco+FpeloL in (29.4%).

Previous studies [27,28] mentioned that, the primary aim of glaucoma treatment is to halt disease progression and prevent ongoing damage to the optic nerve, which can lead to permanent visual field loss and irreversible blindness. Current treatment primarily focuses on reducing intraocular pressure (IOP).

However, several factors must be considered in managing glaucoma patients, including the stage of the disease, quality of life, patient factors, and life expectancy. For patients with early to moderate stages of the disease, anti-glaucoma medications or selective laser trabeculoplasty are typically recommended. In contrast, surgery is recommended for patients with advanced stages of glaucoma who cannot tolerate medications or whose IOP remains insufficiently controlled, leading to the deterioration of both the patient's functional visual field and structural optic nerve [27-29].

De Fendi et al [30] reported that the application of anti-metabolites, such as Mitomycin C (MMC), can modify wound healing processes and increase the success rate of surgery. The overall success rate of trabeculectomy with MMC is reported to be 80–90% at 1 year [31].

CONCLUSION

In this retrospective study, primary open angle glaucoma represented the higher type of glaucoma followed by congenital glaucoma, secondary open angle glaucoma and primary angle closure glaucoma. Further studies are needed to determine the prevalence of glaucoma types among

different population age groups in Aden governorate.

Declaration by Authors

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Conflict of Interest: No conflicts of interest declared.

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