

Original article

Glaucoma at a tertiary referral eye hospital in Nepal

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Background: Glaucoma is an important cause of blindness.

Objective: To report the distribution of various types of glaucoma among patients presenting to a tertiary eye hospital in Nepal.

Materials and methods: All new patients visiting the hospital between March 2007 and February 2008 underwent a comprehensive eye examination. Whenever glaucoma was suspected, patients were referred to fellowship-trained glaucoma specialists. Patients received a comprehensive glaucoma workup including applanation tonometry, stereoscopic examination of the optic nerve head performed by the glaucoma specialists, and a Humphrey visual field analysis (SITA 24 - 2).

Results: 447 patients were newly diagnosed with glaucoma. 171 (38.2 %) patients had primary open-angle glaucoma (POAG), while 143 (32 %) had primary angle-closure glaucoma (PACG). The average age of presentation of patients with POAG was 65.78 ± 9.1 years, while the average age for PACG patients was 54.6 ± 12.8 years. 30 (21 %) patients with PACG had acute angle-closure on presentation, while 113 (79 %) had chronic angle closure glaucoma. 107 (75 %) of these patients with PACG had visual acuity of less than 3/60 (20/400) in the worse eye at presentation. The most common form of secondary glaucoma was lens-induced (5.3 %), followed by neovascular (3.2 %) and uveitic glaucoma (3.2 %).

Conclusion: The most common glaucoma seen in a tertiary referral eye hospital of Nepal is primary open-angle glaucoma. Among the angle-closure glaucoma, chronic angle-closure is the most common. Lens-induced glaucoma is still the commonest cause of secondary glaucoma.

Keywords: glaucoma, open-angle, angle-closure, lens-induced

Introduction

Glaucoma is the second leading cause of blindness world-wide after cataracts (Thylefors 1995, Quigley 1996). The National Survey on Blindness in Nepal conducted in 1981 estimated glaucoma to be the third cause of blindness behind cataracts and corneal opacity. This 1981 study estimated that glaucoma

was responsible for 3.2 % of the total blindness in Nepal (Seva Foundation, 1981).

Nepal is a country with the Himalayan mountain range in the north forming the border with China. The southern border is contiguous with the Indian Gangetic plain. 83 % of the land is hills and mountains that are inaccessible by road. 51.57 % of the population resides in these areas. The population of Nepal, as per the census of 2001, was estimated to be 23.1 million people. The population the capital city, Kathmandu, was 1.6

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million (Central bureau of Statistics, 2003). The Tilganga Institute of Ophthalmology (TIO) is a subspecialty eye hospital located in Kathmandu. It is a non-profit, non-government, community-based hospital that sees and treats all patients equally, regardless of their ability to pay or not for the services provided.

This study was conducted to review the various types of glaucoma that are currently being seen at our tertiary referral eye hospital in Kathmandu, Nepal.

Materials and methods

All patients presenting to the Tilganga Institute of Ophthalmology for the first time between March 2007 and February 2008 underwent a comprehensive eye examination. The un-corrected and corrected visual acuities of all patients were obtained on a standard Snellen E chart by ophthalmic assistants. Patients were thereafter examined by one of the ophthalmologists. All patients underwent a complete examination including stereoscopic examination of the optic nerve head and intraocular pressure measurement using the Goldmann applanation method. All patients with intraocular pressure greater than 21 mm/Hg, a shallow anterior chamber (van Herrick's grade 2), optic nerve head cup-to-disc ratio greater than 0.3 and/or asymmetry of the cup-to-disc ratio of more than 0.2 between the eyes were referred to one of the two the fellowship-trained glaucoma specialists for further evaluation.

The glaucoma specialist repeated applanation tonometry on all patients. They performed gonioscopy using a Zeiss 4-mirror indirect gonioscope and indentation gonioscopy was performed on all patients with a shallow anterior chamber angle. The optic nerve was re-assessed with a 90 diopter lens. Any patient with an intraocular pressure of more than 21 mm/Hg, or a cup-to-disc ratio of greater than 0.3 for asymmetry of cup-to-disc greater than 0.2 between the eyes

underwent visual field testing (Humphrey visual field analysis, SITA C 24 - 2).

The diagnostic criteria for primary open-angle glaucoma included patients with more than 25 years of age after finding an elevated intraocular pressure of more than 21 mm/Hg in one or both eyes, optic nerve cupping of more than 0.3 with a reproducible visual field defect in the SITA C 24 - 2 program of the HFA, and an open-angle on gonioscopy.

The diagnostic criteria for primary angle-closure glaucoma was a gonioscopic finding of an angle with no view of the posterior trabecular meshwork for greater than 90° with or without the evidence of peripheral anterior synechia, an intraocular pressure greater than 21 mm/Hg, optic nerve cupping of more than 0.3, and a reproducible visual field defect in the SITA C 24-2 program of HFA.

These angle-closure cases were then further subdivided into acute and chronic based on symptoms at presentation. Patients with acute angle closure presented with at least two of the following symptoms of ocular pain and/ or decreased visual acuity and/ or a history of colored haloes. Those patients with no symptoms were categorized as chronic.

The diagnostic criteria for normal-tension glaucoma (NTG) included patients more than 40 years of age who had optic nerve cupping of more than 0.3 with a reproducible visual field defect in the SITA C 24 - 2 program of the HFA, an open-angle on gonioscopy, and intraocular pressure within the statistically normal range of 11 - 21 mm/Hg.

Juvenile open-angle glaucoma was diagnosed on patients less than 25 years of age with all of the features for the diagnosis of POAG without the evidence of congenital glaucoma. Congenital glaucoma was diagnosed in children with buphthalmos, breaks in Descemet's membrane, and elevated intraocular pressure with associated optic nerve damage.



Secondary glaucomas were diagnosed according to the associated etiologic conditions such as trauma, lens swelling, uveitis, steroid induced and neovascularization.

Results

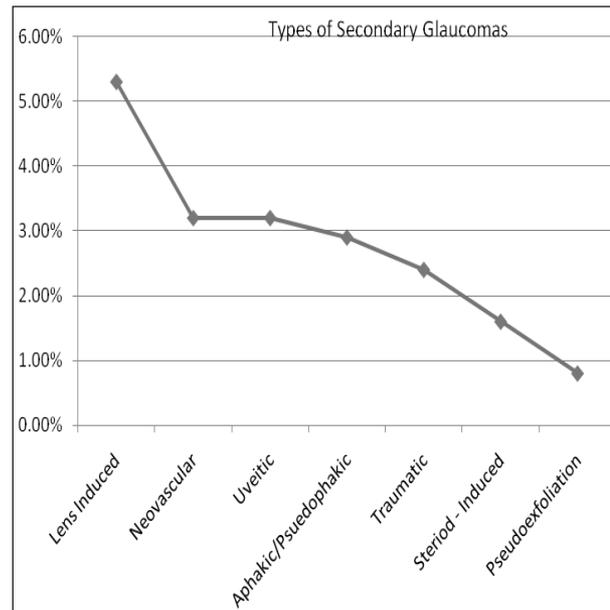
447 patients were diagnosed with glaucoma within the year. POAG was the most common etiology. It was diagnosed in 171 (38.2 %) patients. The average age of presentation for POAG was 65.78 ± 9.1 years. Males (93) were slightly more commonly affected than the females in the population presenting to the hospital (54.38 %). The primary chief complaint among the POAG patients was decreased near visual acuity. At presentation, 85 % of the POAG patients had a visual acuity better than 6/36 in both eyes. The average presenting intraocular pressure was 31.4 ± 8.7 mm/Hg for both eyes. The mean cup-to-disc ratio was 0.6 ± 0.2. 118 (82.5 %) of the POAG patients had visual field defects consistent with the disc finding on initial presentation.

PACG was diagnosed in 143 patients (32 %). The average age at presentation was 54.6 ± 12.8 years. PACG was seen more commonly in females (90 - 62.9 %). 107 (75 %) of the PACG patients had a visual acuity of less than 3/60 in one eye at the time of presentation. 30 (21 %) of these patients had Acute ACG at the time of presentation, while 113 (79 %) seemed to have Chronic ACG. The average intraocular pressure at presentation was 38.1 ± 10.6 mm/Hg in the worse eye. The average cup-to-disc ratio was 0.8±0.2 in the worse eye and 0.4 ± 0.2 in the better eye. 7 patients (1.5%) had congenital glaucoma, 21 (4.7 %) had juvenile open-angle glaucoma, and 19 (4.2 %) had normal-tension glaucoma.

Types of glaucoma

Types	Numbers (n = 447)	Percentage (100 %)
POAG	171	38.2
PACG	143	32
JOAG	21	4.7
NTG	19	4.2
Congenital	7	1.5
Secondary	86	19.4

The most common type of secondary glaucoma was lens-induced at 5.3 %. 3.2 % had neovascular glaucoma. Uveitic glaucoma was found to be in 3.2 %. 2.9 % of glaucomas were from previous cataract surgery (including aphakic and pseudophakic glaucomas). 2.4 % were post-traumatic glaucoma, only 1.6 % was steroid induced glaucoma and 0.8 % had pseudoexfoliation glaucoma.



Discussion

The most striking finding in our study was the high incidence of PACG (32 %). While our study did not examine the prevalence of PACG in the general population of Nepal, we found that PACG did occur in a nearly equal ratio to POAG at our referral eye center. Twenty-one percent of these patients presented during an acute attack.

The Nepalese people have two major ethnicities. A large sector of the population is of Mongolian heritage. The majority of the rest are of Indo-Aryan descent (central bureau of statistic 2003). Prevalence studies undertaken in Mongolia have shown that PACG is more commonly encountered than POAG (Foster et al 1996). Similarly, other studies undertaken in Southeast Asian countries have revealed that PACG is more common in Asian eyes (Shiose et al 1991). In the hospital-based study from Lahan, Nepal, the results showed that 35.3

% eyes had primary angle-closure glaucoma and 22.6 % eyes primary open-angle glaucoma (Sarkar, Martin 2010). Studies undertaken in India, where the population is primarily Indo-Aryan, have revealed that POAG is more common than PACG (Dandona et al 2000, Ramakrishnan et al 2003). Thus, our finding of a high prevalence of PACG may not be unusual, considering the ethnic diversity in Nepal.

Patients presenting with PACG had more severe loss of vision from the disease at presentation when compared to POAG patients. This finding of our study is not different from a study in southern India where patients with PACG were found to be blind in one or both eyes (Dandona et al 2000). Indeed, the majority of our patients presenting with POAG were asymptomatic, with continued excellent vision, and only sought service at the eye hospital because of presbyopic symptoms. These presenting symptoms lead us to postulate that POAG may still be under-diagnosed in our population. The high incidence of PACG is important when one considers treatment modalities and the possibility of prophylactic iridectomies and clear lens extraction.

POAG was slightly more common in the males presenting to our hospital, while PACG was more prevalent in females. This matched with findings in the Aravind comprehensive eye survey (Ramakrishnan et al 2003). Several socioeconomic factors may contribute to this finding including the need for working males to obtain presbyopic correction. However, the full reasons are not clear.

The majority of patients with PACG presented with advanced disease. This was supported by the severity of visual loss, the very high intraocular pressure, and the markedly enlarged cup-to-disc ratio and severe visual field defects found in this population. This may be due to the silent nature of CACG in many of the patients. Our study revealed a large number of patients presenting with acute angle closure glaucoma. This was directly related to the symptoms that lead a patient to seek treatment.

Among the secondary glaucomas, lens-induced glaucoma was the most common. As cataracts still remain the major cause of blindness in Nepal and other developing countries, this finding is not surprising.

Glaucoma remains an under-diagnosed disease in Nepal. Nepal is an under-developed country in the Himalayas. 80 % of the country is inaccessible by road. The majority of the Nepalese people are farmers and the literacy rate, which is 53.7 %, is one of the lowest in the world (Central Bureau of Statistics, 2003). Due to the difficult geographic terrain and poor economy in the country, the health care infrastructure is not yet well-established. People living in remote regions of Nepal often have to walk for several days to reach the nearest health facility. In most areas there are no eye doctors, and eye diseases are treated by under-trained health workers. Glaucoma is usually only detected when a significant amount of vision has been lost. Most glaucoma patients in Nepal cannot afford a lifetime of medications and are at risk for glaucomatous visual loss and blindness.

The Nepal Blindness Survey of 1981 estimated glaucoma to account for 3.2 % of the total blindness. This is indeed very low. The reason for this low estimation is probably because of the method of examination used in the survey that lead to glaucoma not being diagnosed as the cause of the blindness. An ophthalmologist used a head loupe for examination of the anterior segment in all patients and the pupil was dilated in patients with a visual acuity of less than 6/18 and the fundus was then evaluated by a direct ophthalmoscope. The intraocular pressure was measured only in patients that presented with signs of glaucoma. As our study reveals that most of the PACG was of the chronic variety which presents without signs and obvious symptoms, many of these patients could have been missed simply on the basis of the criteria used for measuring intraocular pressure to reach a diagnosis. Furthermore patients with very dense cataracts could not have possibly undergone a proper



evaluation of the optic disc to confirm the signs of glaucoma by a direct ophthalmoscope.

This study provides information on the types of glaucoma seen at a tertiary referral eye hospital in the largest city of Nepal. It delineates both the types of glaucoma seen when people come to the eye hospital and the severity of the disease on presentation. It can aid in developing a strategy to combat glaucomatous blindness. One weakness of this investigation is that it is not an epidemiologic study which would determine the actual prevalence of glaucoma throughout Nepal.

Conclusion

The most common glaucoma seen in a large tertiary referral eye hospital of Nepal is primary open-angle glaucoma. Among the angle-closure glaucomas, chronic angle closure is the most common. Lens-induced glaucoma is still the commonest cause of secondary glaucoma. In the future, with the development of the country, and more people having better access to health care in remote regions, a population-based study should be conducted to estimate the overall prevalence of glaucoma in Nepal.

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