ORIGINAL ARTICLE

Lens-induced glaucoma in a tertiary centre in northeast of Malaysia

Yaakub A, Abdullah N, Siti Raihan I, Ahmad Tajudin LS

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Authors:

Azhany Yaakub
(Corresponding author)
MD (USM),M.MED (Ophthal) USM
Department of Ophthalmology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia
Email: azhany@usm.my

Norhayati Abdullah
MBBS (Malaya)
Department of Ophthalmology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia

Siti Raihan Ishak
MD, M.MED (Ophthal) USM
Department of Ophthalmology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia
Department of Ophthalmology, UniKL, Ipoh, Perak, Malaysia

Liza Sharmini AT
MBBS (Malaya), MMED (USM), PHD (UK)
1Department of Ophthalmology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia

Abstract

Objective: To determine the clinical presentations, management and outcome of lens-induced glaucoma (LIG) in Hospital Universiti Sains Malaysia.

Methods: A retrospective review was done among the existing patients of Hospital Universiti Sains Malaysia from January 2003 to December 2008. Patients with LIG were included and exclusion criteria were applicable for those who had glaucoma or other underlying causes of glaucoma. Demographic data, clinical presentations, management and outcome were recorded and analysed.

Results: Thirty-eight patients (38 eyes) with LIG were included. The mean age was 70.2 years and predominantly women (22, 57.9%) were affected. Phacomorphic glaucoma (28, 73.7%) was the main cause of LIG, followed by phacolytic glaucoma (8, 21.1%). The main clinical symptoms were reduced vision (94.7%), eye pain (84.2%) and eye redness (81.6%). Most patients (32 eyes) were presented with visual acuity of hand movements (84.2%, or worse) and intraocular pressure more than 40 mm Hg (21, 55.3%). Nineteen patients (50.0%) underwent extra capsular cataract extraction with primary posterior chamber lens implantation. In 28 cases (73.7%), patients were able to stay free from pressure-lowering drugs after the operation. Intraocular pressure (IOP) reduced tremendously upon discharge with a mean of 15.2 mm Hg and vision had improved exceptionally (more than 6/36) as noted in 17 cases (44.7%).

Conclusion: Triad of acute reduced vision, eye pain and redness are the main clinical presentations of LIG. The main cause of LIG is phacomorphic glaucoma stemming from untreated senile cataract. Public awareness and early detection by primary physician is important for an early intervention of cataract. Early intervention aids in visual recovery and IOP control of LIG.

Introduction

Lens-induced glaucoma (LIG) is common in developing countries owing to the delay in cataract removal.[1,2] In Malaysia, cataract is one of the leading causes of blindness and low vision.[3] Although LIG is prevalent in developing countries, it also occurs in developed countries.[4]

Lens-related elevation in intraocular pressure (IOP) results from a variety of mechanisms such as lens dislocation, lens swelling (intumescent cataract), inflammation due to phacoanaphylaxis and lens particle blocking the trabecular meshwork. Untreated increase in IOP damages the optic nerve mechanically, which inevitably leads to blindness. Elevation in IOP causes compression and backward bowing of lamina cribrosa, leading to obstruction of axoplasmic transport of retinal nerve fibre and ganglion cell death.

Cataract occurs when the crystalline lens loses its transparency normally as a part of the ageing process. Neglected cataractous lens may swell because of the osmotic effect of the degenerated lens proteins. In phacomorphic glaucoma, the swollen lens may block the anterior flow of the aqueous humor from the posterior chamber pushing the iris forward. Eventually, the trabecular meshwork gets blocked by the iris and leads to a sudden and extreme rise in IOP. Prolonged swelling of the lens and hypermature cataract may cause disruption or dysfunction of the zonular fibres of the lens leading to subluxation of the lens. The change in the lens position blocks the anterior flow of the aqueous humour and subsequently causes elevated intraocular pressure (IOP) through the same mechanism mentioned above.[5] Other causes of subluxated lens include trauma, pseudoexfoliation syndrome, high myopia, buphthalmos and hereditary causes such as aniridia, Marfans syndrome and homocysteinuria. Trauma remains the most common cause of subluxated lens.

Phacolytic glaucoma is a principal complication of hypermature cataract. Hypermature cataract may cause leakage of lens protein from an intact capsule. The lens protein causes intense inflammation and blockage of trabecular meshwork, subsequently responsible for elevation of IOP.[6] The lens proteins and particles were thought to be derived from materials formed during the early embryological stage of eye development. The release of this material from a ruptured lens at the later life is perceived as foreign body and initiates an intense autoimmune granulomatous reaction.[7]

Understanding the presentation, causes and management of LIG are important for blindness prevention strategy. The purpose of this review is to study and determine the clinical presentations, management and outcome of lens induced glaucoma at Hospital Universiti Sains Malaysia.

Methods

A retrospective review was conducted on the records of patients who were diagnosed with LIG and admitted to Hospital Universiti Sains Malaysia between January 2003 and December 2008. LIG was diagnosed based on the presence of elevated IOP and lens-related problem.[1] The diagnosis of phacomorphic glaucoma was based on the presence of the classical signs and symptoms such as pain and redness, shallow anterior chamber (AC), cornea oedema and increased IOP with intumescent lens. Phacolytic glaucoma was diagnosed clinically based on the presence of the hypermature cataract with intact capsule, presence of lens protein and flare in AC. Phacoanaphylactic glaucoma was diagnosed by the manifestation of the ruptured capsule, flare AC and increased IOP. The malposition of the lens (subluxation of the lens) was based on the slit lamp examination. Goldmann applanation tonometry was used to measure IOP.

Exclusion criteria were applicable for those who had primary glaucoma or other underlying causes of secondary glaucoma, inadequate or inconclusive diagnostic data and less than 6 months of follow-up. Demographic data, clinical presentations, management and outcomes were documented and statistical analysis was conducted using IBM SPSS 20.0.

Results

A total of 38 patients with LIG (16 men and 22 women) were included in the review. Majority were Malay (34 or 89.5%) and the remaining were Chinese (Table 1). Of the total patients, 28 (73.7 %) had phacomorphic glaucoma, 8 (21.1%) had phacolytic glaucoma, 1 (2.6%) had phacoanaphylactic glaucoma and 1 (2.6%) had subluxated lens (Table 1). The results showed an increasing trend in the number of patients admitted for LIG from the year 2004 to 2008 (Table 1). The age of patients at the time of presentation was 47 to 88 years with the majority (71%) between 61 and 80 years. Six (15.8%) patients were between 81 and 90 years (Table 1).

Table 1. Demographic data

	N (%)
Age in years (n = 38)	
81–90	6 (15.8)
71–80	13 (34.2)
61–70	14 (36.8)
51–60	4 (10.5)
41–50	1 (10.5)
Gender (n = 38)	
Male	16 (42.1)
Female	22 (57.9)
Ethnicity (n = 38)	
Malay	34 (89.5)
Chinese	4 (10.5)
Types of LIG (n = 38)	
Phacomorphic	28 (73.7)
Phacolytic	8 (21.1)
Phacoanaphylactic	1 (2.6)
Subluxated lens	1 (2.6)
Status of fellow eye (n = 38)	
Pseudophakic	8 (21.1)
Mature cataract	4 (10.5)
Immature cataract	26 (68.4)
Number of LIG cases according to year	
2004: 6	
2005: 5	
2006: 8	
2007: 8	
2008: 13	

Clinical presentation

Most patients with LIG presented with reduced vision (94.7%), eye pain (84.2%), eye redness (81.6%), headache (68.4%) and vomiting (36.8%) (Table 2). Despite the

presence of reduction in vision, majority of patients presented late to the hospital. Almost half (44.2%) of them looked for the treatment only after 6 months and 1 year of reduction in vision. Eye pain and redness (36.8%) were the main symptoms that brought the patients to the hospital. Presence of eye redness for more than 1 month was noted in 25.8% of patients (Table 3).

Table 2. Summary of clinical presentations of LIG

	N (%)
Symptoms (n = 38)[a]	
Reduced vision	36 (94.7)
Eye pain	32 (84.2)
Eye redness	31 (81.6)
Headache	26 (68.4)
Vomiting	14 (36.8)
Intraocular pressure in mm Hg (n = 38)	
≥20–29	4 (10.5)
≥30–39	4 (10.5)
≥40–49	12 (31.6)
≥50–59	7 (18.4)
≥60–69	8 (21.1)
≥70–79	3 (7.9)
Visual acuity affected eye (n = 38)	
6/12–6/18	2 (5.3)
6/24–6/36	1 (2.6)
6/60–1/60	2 (5.3)
CF (counting fingers)	1 (2.6)
HM (hand movement)	13 (34.2)
PL (perception of light)	12 (31.6)
Non-perceptive to light (NPL)	7 (18.4)
Visual acuity fellow eye (n = 38)	
6/6–6/18	23 (63.9)
6/24–6/36	6 (15.7)
6/60–1/60	3 (7.8)
CF	1 (2.8)
HM	1 (2.8)
PL	2 (5.6)
NPL	2 (5.6)

[a]Patients may have more than one symptom.

Table 3. Summary of duration each of symptoms

	N (%)
Blurring of vision (n = 36)	
Less than a week	8 (22.2)
1 to <2 weeks	5 (13.9)
2 to <4 weeks	2 (5.6)
1–3 months	2 (5.6)
3–6 months	2 (5.6)
>6 months	17 (44.2)
Eye pain (n = 32)	
Less than a week	14 (43.8)
1 to <2 weeks	4 (12.5)
2 to <4 weeks	7 (21.9)
1–3 months	5 (15.6)
3–6 months	1 (3.1)
>6 months	1 (3.1)
Eye redness (n = 31)	
Less than a week	14 (45.2)
1 to <2 weeks	5 (16.1)
2 to <4 weeks	4 (12.9)
1–3 months	5 (16.1)
3–6 months	1 (3.2)
>6 months	2 (6.4)
Headache (n = 26)	
Less than a week	11 (42.3)
1 to <2 weeks	6 (23.1)
2 to <4 weeks	5 (19.2)
1–3 months	4 (15.3)
3–6 months	–
>6 months	–
Vomiting (n = 14)	
Less than a week	7 (28.6)
1 to <2 weeks	2 (14.3)
2 to <4 weeks	3 (21.4)
1–3 months	2 (14.3)
3–6 months	–
>6 months	–

Visual acuity in affected eye and fellow eyes

At first presentation, 7 (18.4%) patients with affected eye were already non-perceptive to light (NPL) and 2 (5.6%) were NPL with the fellow eye. Majority of patients (29, 76.3%) had acceptable vision with the fellow eye ranging from 6/6 to 6/36 and 8 (21.1%) patients had the history of previous cataract

extraction of the fellow eye (Table 1). IOP at the time of presentation ranged from 22 to 78 mm Hg (Table 2). A large number of them (79.0%) presented with IOP of 40 mm Hg and above. All patients were treated medically prior to cataract operation. Fourteen (36.8%) patients had IOP above 30 mm Hg prior to the operation (Table 4).

Table 4. IOP prior operation, day 1 post-operation and on discharge

	N (%)
IOP (mm Hg) prior to operation (n = 38)	
<10	2 (5.3)
≥10–19	12 (31.6)
≥20–29	10 (26.3)
≥30–39	8 (21.1)
≥40–49	4 (10.5)
≥50–59	2 (5.3)
IOP (mm Hg) post-operation, Day 1 (n = 38)	
<10	7 (18.4)
≥10–19	22 (57.9)
≥20–29	6 (15.8)
≥30–39	2 (5.3)
≥40–49	1 (2.6)
≥50–59	–
IOP (mm Hg) on discharge (n=38)	
<10	6 (15.8)
≥10–19	28 (73.7)
≥20–29	2 (5.3)
≥30–39	2 (5.3)
≥40–49	–
≥50–59	–

Intraocular pressure, surgery and outcome

Majority of patients underwent extracapsular cataract extraction (ECCE) with and without IOL implantation. Other operations performed were intracapsular cataract extraction (ICCE). Majority of patients were implanted with IOL either posterior chamber intraocular lens (PCIOL) or anterior chamber type (ACIOL) (Table 6). Uneventful operations were noted in majority (71.0%) of cases. The main complication was posterior capsule rupture (21.0%) (Table 6).

Table 5. Visual acuity on admission, discharge and 6 months follow-up

	N (%)
Visual acuity on admission (n = 38)	
6/6–6/9	–
6/12–6/18	2 (5.3)
6/24–6/36	1 (2.6)
6/60–1/60	2 (5.3)
CF	1 (2.6)
HM	13 (34.2)
PL	12 (31.6)
NPL	7 (18.4)
Visual acuity on discharge (n = 38)	
6/6–6/9	1 (2.6)
6/12–6/18	5 (13.2)
6/24–6/36	12 (31.6)
6/60–1/60	3 (7.9)
CF	6 (15.8)
HM	–
PL	2 (5.3)
NPL	7 (18.4)
Missing data	2 (5.3)
Visual acuity 6 months post-operation (n = 38)	
6/6–6/9	13 (34.2)
6/12–6/18	9 (23.7)
6/24–6/36	2 (5.3)
6/60–1/60	2 (5.3)
CF	–
HM	2 (5.3)
PL	–
NPL	8 (21.1)
Missing data	2 (5.3)

Table 6. Type of surgeries, intraoperative complications and vertical cup–disc ratio on discharge

	N (%)
Type of surgeries (n = 38)	
Plain ECCE	12 (31.6)
ECCE/PCIOL	19 (50.0)
ECCE/ACIOL	4 (10.5)
ICCE	3 (7.9)
Intraoperative complications (n = 38)	
Uneventful	27 (71.0)
Posterior capsule rupture	8 (21.0)
Zonular dialysis	1 (3.0)

	N (%)
Vertical cup disc ratio (VCDR) on discharge (n = 38)	
0.3	13 (34.2)
0.4	2 (5.3)
0.5	2 (5.3)
1.0	5 (13.2)
No data	16 (42.1)

On day 1 post-operation, IOP reduction below 20 mm Hg was achieved in 29 (76.3%) patients (Table 4). Upon discharge, most patients (34, 89.5%) recorded IOP below 20 mm Hg with or without using topical pressure-lowering drugs (Table 4). There was an inadequate documentation of vertical cup-to-disc ratio of 16 patients upon discharge. Corneal haziness was the main reason for the failure of optic disc evaluation.

Follow-up

Five patients developed absolute glaucoma and 15 patients had cup-to-disc ratio (CDR) of less than 0.5 (Table 6). In this study, after 6 months of follow-up, 34.2% of patients had good visual outcome of 6/9 or better and 23.7% had 6/18 or better on the Snellen chart (Table 5). Unfortunately, eight patients (21.2%) lost their vision (non-perceptive to light) (Table 5).

Discussion

The National Eye Database (2007) Annual Reports indicated that out of 18,426 patients who had undergone cataract operation in various centres in Malaysia, 0.7% were the cases of phacomorphic and phacolytic glaucoma.[8] In the present study, the phacomorphic lens is the most common cause of LIG followed by the phacolytic lens. In India, phacomorphic glaucoma was found in 3.9% of all cataract surgeries.[9] Based on the retrospective review, it was concluded that there was an alarming increase in the incidence of LIG in Hospital Universiti Sains Malaysia (HUSM). This increasing incidence of LIG may be attributed to the exponential increase in the elderly population because of the improvement in health care.

The findings were similar to those of the previous studies, which indicated that women are more predisposed to LIG[10,11] due to higher prevalence of cataract in them.[12,13] Inaccessibility to eye care and lack of awareness may contribute to late presentation of LIG even with the presence of pain. Early detection of lens-related problem may prevent elevation of IOP, which may lead to optic neuropathy. Public awareness on the benefits of early detection and treatment of cataract is important in the prevention of LIG. The saying 'poor vision is associated with old age' needs to be eradicated.[14]

Conclusion

LIG is an important vision-threatening disease presenting as a painful red eye. A phacomorphic lens disease secondary to a neglected senile cataract is the major cause of LIG. Removal of the cataractous lens results in prompt reduction in IOP and a favourable visual outcome.

References

1. Jain IS, Gupta A, Dogra MR, et al. Phacomorphic glaucoma Management and visual prognosis. *Ind J Ophthalmol*. 1983;31:648–53.
2. Nilo Vincent DG, florcruz II, Raquel JQ, et al. Profile of glaucoma cases seen at tertiary referral hospital. *Philipp J Ophthalmol*. 2005;30(4):161–5.
3. Zainal M, Ismail SM, Ropilah AR, et al. Prevalence of blindness and low vision in Malaysian population: Results from the National Eye Survey 1996. *Br J Ophthalmol*. 2002;86(9):951–6.
4. Sowka J. Phacomorphic glaucoma: Case and review. Optometry. (2006);77:586–9.
5. Jonathan PE, Ellant, Stephen A, et al. Lens induced glaucoma. *Documenta Ophthalmia*. 1992;(81):317–38.
6. Johns KJ, Feder RS, Hamill MB, et al. Lens and cataract. *American Academy of Ophthalmology*. 2002–2003.
7. Zimmerman LE. Lens induced inflammation in human eyes. In: Maumenee AE, Silverstein AM, eds. *Immunopathology of Uveitis*. New York: Lippincott Williams & Wilkins;1964:221–32.
8. The first annual reports of the national eye database; 2007. Available at: http://www.acrm.org.my/ned/documents/20090302_nedReport.pdf. Accessed November 2008.
9. Pradhan D, Hennig A, Kumar J, et al. A prospective study of 413 cases of lens-induced glaucoma in Nepal. *Indian J Ophthalmol*. 2001;49:103–7.
10. Angra SK, Pradhan R, Garg SP. Cataract induced glaucoma—An insight into management. *Indian J Ophthalmol*. 1991;39:97–101.
11. Mohinder S, Hassan A, Revathy K. Intraocular lens implantation in phacomorphic glaucoma. *Bahrain Medical Bulletin*. 2002;24(3):88–90.
12. Chatterjee A, Milton R, Thyle S. Prevalence and aetiology of cataract in Punjab. *Br J Ophthalmol*. 1982;66:35–62.
13. Khan M, Hoque M, Khan MR. Prevalence and causes of blindness in rural Bangladesh. *Indian J Med Res*. 1985;82:257.
14. Applegate WB, Miller ST, Elam JT, et al. Impact of cataract surgery with lens implantation on vision and physical function in elderly patients. *JAMA*. 1987;257(8):1064–6.