

## Original Article

### Lens induced glaucoma in a tertiary eye care centre in Western Nepal

Ruchi Shrestha<sup>1</sup>, Manita Sunam Godar<sup>2</sup>, Shanti Gurung<sup>2</sup>, Prativa Devkota<sup>3</sup>, Laxmi Devi Manandhar<sup>2</sup>, Nirsara Shrestha<sup>4</sup>

<sup>1</sup>Reiyukai Eiko Masunaga Eye Hospital,

<sup>2</sup>Lumbini Eye Institute, Bhairahawa, Nepal

<sup>3</sup>Nepal Eye Hospital, Kathmandu, Nepal

<sup>4</sup>Children's Eye and Ear Rehabilitation Centre, Kathmandu, Nepal

#### Abstract

**Introduction:** Lens induced glaucoma due to hypermature cataracts is an important cause of secondary glaucoma in the developing world. The most common etiology of lens induced glaucoma is phacomorphic glaucoma from untreated senile cataract.

**Objectives:** To study the demographics, clinical presentations and surgical outcome of lens induced glaucoma (LIG).

**Materials and methods:** It is the prospective case series of fifty three patients eyes with LIG over a 6 months period from June 2015 to November 2015. All cases of lens induced glaucoma underwent cataract surgery. Data including demographics, clinical presentations, surgical outcome were analysed using Statistical Package for Social Studies 20.0.

**Results:** The mean age was 61.5 years (Standard deviation 8.9) with predominantly women (30, 56.6%) were affected. Phacomorphic glaucoma (38, 71.7%) was the main cause of lens induced glaucoma, followed by phacolytic glaucoma (15, 28.3%). The main clinical symptoms were reduced vision (100%), eye pain (96.2%) and redness of eyes (62.3%). All patients (100%) presented with visual acuity of <3/60 or worse and intraocular pressure (IOP) more than 40 mm Hg (34, 64.2%). All 53(100%) patients underwent cataract surgery and all of them had tremendously reduced intraocular pressure with a mean 13.9 mmHg and vision had improved from >6/18 as noted in 16 (30.2%) cases.

**Conclusions:** The main clinical presentations of LIG are triad of acute reduced vision, eye pain and redness. The better final BCVA is found when there is an early presentation and less IOP at the time of presentation. Public awareness, early detection and early intervention aids in good visual recovery and control of intraocular pressure in LIG.

**Key words:** Lens induced glaucoma (LIG); Phacomorphic glaucoma; Phacolytic glaucoma; Intraocular pressure (IOP); Best corrected visual acuity (BCVA)

**Financial Interest:** Nil

**Conflict of Interest:** Nil

Received: 21.07.2018

Accepted: 23.02.2019

**Corresponding author**

Dr. Ruchi Shrestha

Reiyukai Eiko Masunaga Eye Hospital, Banepa, Kavre, Nepal

E-mail: druchishrestha@gmail.com

Phone No.: 977-9847027650

#### Introduction

Lens induced glaucoma due to hypermature cataracts is an important cause of secondary glaucoma in the developing world (Astrid E Fletcher et al, 1999). Lens-related elevation in intraocular pressure (IOP) results from a

variety of mechanisms such as dislocation of lens, swelling of lens (intumescent cataract), inflammation due to phacoanaphylaxis and lens particle blocking the trabecular meshwork. Untreated high 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 (Yaakub et al 2014).

Cataract is the main cause of blindness (62.2%) in Nepal. Local factors such as quality of eye services, literacy of patients, availability, accessibility and affordability of eye care services, the approach of eye care staff, and socioeconomic situation in the zone, influence the uptake of cataract surgery (Sapkota YD, 2012).

Thus this study has been conducted to determine the demographics, clinical presentations and surgical outcome of lens induced glaucoma for creating awareness of the condition and its late consequences.

### Materials and Methods

This is a prospective case series study done in Lumbini Eye Institute and Research Centre, Bhairahawa, Nepal. All patients who attended the outpatient department with a diagnosis of lens induced glaucoma from the month of June to November 2015 were included in the study. 53 cases of lens induced glaucoma were analysed. Ethical consent was taken and proforma was filled for the patient with lens induced glaucoma. Topic was approved from the Institutional Review Board.

LIG was diagnosed on the basis of presence of elevated IOP and lens-related problem. The diagnosis of phacomorphic glaucoma was made on the basis of presence of the classical signs and symptoms such as pain and redness, shallow anterior chamber, cornea oedema and increased IOP with intumescent lens. Phacolytic glaucoma

was diagnosed clinically by the presence of the hypermature cataract with intact capsule, presence of lens protein and flare in anterior chamber. Goldman applanation tonometry was used to measure IOP. Visual acuity was taken by Snellen's chart. Inflammation and IOP was controlled with oral acetazolamide and topical anti glaucoma drugs (beta-blockers, alpha-2 adrenergic receptor agonists or combination of both) topical steroids (prednisolone). In cases of IOP more than 40 mmHg, it was controlled with intravenous mannitol 20% (1-2g/kg body weight). All patients with lens induced glaucoma underwent small incision cataract surgery after control of intraocular pressure.

Exclusion criteria included, primary glaucoma or other underlying causes of secondary glaucoma, inadequate or inconclusive diagnostic data and less than two weeks of follow-up. Statistical analysis was conducted using Statistical Package for Social studies (SPSS 20.0). Demographic data, clinical presentations, surgical outcome were analysed with descriptive statistics.

### Results

Fifty three patients (53 eyes) with lens induced glaucoma were included. Out of 53 patients, 23(43.4%) were men and 30(56.6%) were women (Table 1). The age of presentation was 38-85 years. The mean age was 61.5 years (Standard Deviation 8.9) and majority between 60-70 years (Table 1). Majority of patients were Indian (39/73.6%) and remaining was Nepali (14/26.4%). Phacomorphic glaucoma (38, 71.7%) was the main cause of lens induced glaucoma, followed by phacolytic glaucoma (15, 28.3%). The main clinical symptoms were reduced vision (100%), eye pain (96.2%), eye redness (62.3%), headache (34%), nausea (11.3%) and vomiting (7.5%) (Table 2). Although vision was reduced, majority of patients had delayed presentation to the hospital. Eye pain (96.2%) and redness (62.3%) were the main symptoms for the patients to attend

the hospital. Almost half of them, 30 (56.6%) looked for the treatment after two weeks of pain and redness. Visual acuity at presentation was poor <3/60 in 100% of patients. After cataract surgery 16 patients had good vision with BCVA 6/6-6/18. IOP at the time of presentation ranged from 24 to 80 mm Hg. A large number of them (64.2%) presented with IOP of >40 mm Hg. After preoperative medication IOP reduction below 20 mm Hg was achieved in 39 (73.6%) patients. At the time of discharge all of the 53 patients (100%) recorded IOP below 20 mm Hg with or without using topical pressure-lowering drugs. All patients underwent small incision cataract surgery (SICS) with and without intraocular lens (IOL) implantation. 50(94.3%) patients underwent uneventful SICS with posterior chamber IOL implantation. One (1.9%) patient underwent SICS with anterior chamber IOL and two (3.8%) patient underwent SICS only because of complication of posterior capsular rupture and vitreous loss. Twenty three patients were given preoperative topical steroid but two developed fibrin and no patients developed hypopyon. Among 30 patients who didn't receive preoperative steroid, seven developed fibrin and two developed hypopyon after surgery. In this study, after two weeks of follow-up 16(30.2%) of patients had good visual outcome with best corrected visual acuity (BCVA) of 6/6- 6/18, 17(32.1%) had BCVA 6/18-6/60 and five (9.4%) had BCVA <6/60-3/60 on the Snellen's chart. Unfortunately, 15 patients (28.3%) had poor BCVA OF <3/60. Out

of six cases(11.3%) who presented within one week, three(50%) had good vision >6/60 while remaining three(50%) had poor visual acuity of <3/60.17(32.1%) cases presented within one to two weeks in which 11(64.7%) cases had good vision >6/60 and six(35.3%) cases had poor visual acuity <3/60.Out of 20(37.7%) cases who presented within a month 15(75%) cases had good vision >6/60 and five(20%) cases had poor vision <3/60.Ten(18.9%) cases presented after a month, 9(90%) had visual acuity >3/60 and 1(10%) had <3/60.The final BCVA of 6/18 or better was achieved in 14(87.5%) cases out of 16 cases with symptoms less than four weeks and only two(12.5%) with symptoms more than a month. The causes of poor BCVA were optic atrophy in 11 patients (20.8%), post-operative uveitis in two patients (3.8%) and macular scar in two patients (3.8%). The high IOP at the time of presentation was the reason for optic atrophy. The better final BCVA is found when there is an early presentation and less IOP at the time of presentation (Table 3) Out of 11 patients with optic atrophy eight patients had IOP >40 mm Hg (Table 5). In this study all patients (100%) presented with visual acuity of <3/60 or worse and IOP more than 40 mmHg (34, 64.2%). All of the 53(100%) patients underwent SICS and with tremendously reduced IOP after surgery with a mean 13.9mmHg( Standard Deviation 6.30) and vision had improved from >6/18 as noted in 16 (30.2%) cases. Also those who received preoperative steroid had fewer incidences of fibrin and hypopyon.

**Table 1: Demographic data**

Age	Male	Female	Total Percent
30-40	1	0	1(1.9%)
40-50	0	4	4(7.5%)
50-60	5	4	9(17%)
60-70	12	16	28(52.8%)
70-80	4	5	9(17%)
80-90	1	1	2(3.8%)
Total	n=23(43.4%)	n=30(56.6%)	n=53(100)%

**Table 2: Symptoms of lens induced glaucoma**

Symptoms of LIG	n=53
Reduced vision	53(100)%
Eye pain	51(96.2)%
Eye redness	33(62.3)%
Headache	18(34)%
Nausea	6(11.3)%
Vomiting	4(7.5)%

**Table 3: Duration of symptoms and final BCVA**

Duration of symptoms	Final BCVA			
	6/6-6/18	<6/18-6/60	<6/60-3/60	<3/60
<1week	1	2	0	3
1-2weeks	5	4	2	6
>2-4weeks	8	7	0	5
>1-3 months	2	4	3	1
<b>Total</b>	<b>16</b>	<b>17</b>	<b>5</b>	<b>15</b>

**Table 4: Preoperative IOP and final BCVA**

Pre op IOP(mmHg)	Final BCVA			
	6/6-6/18	<6/18-6/60	<6/60-3/60	<3/60
0-21	0	0	1	0
22-30	6	3	1	2
31-40	2	1	1	2
>40	8	13	2	11
<b>Total</b>	<b>16</b>	<b>17</b>	<b>5</b>	<b>15</b>

**Table 5: IOP at presentation versus optic atrophy**

IOP in mm hg	Optic atrophy
0-21	0
22-30	2
31-40	1
>40	8
<b>Total</b>	<b>11</b>

### Discussion

This study is a prospective case series study of 53 patients of lens induced glaucoma in a tertiary care centre in western region of Nepal which is situated near the border of Nepal and India. There are few studies done on LIG in eastern region of Nepal and none done in Western region of Nepal. Most patients are illiterate with poor socioeconomic background and most patients come from distance, across

the borders of India. Thirty nine (73.6%) patients came from India in our study.

Analysis showed females were more affected than males similar to studies by Rijal et al (2006), Pradhan et al (2001) and Prajna et al (1996). They attributed this to the lesser attention received by old women for medical treatment in rural India and also the fact that anatomically, females have a shallower anterior chamber depth thus making them more prone

for angle closure (Shibal Bhartia et al, 2009). The mean age of presentation was 61.5 years in our study. Similarly in M Sharanabasamma (2016) study the mean age was 60.68 years. In contrast, Yaakub et al (2014) study had a higher mean age was 70.2 years. This shows that lens induced glaucoma is a disease of old age. Phacomorphic glaucoma(71.7%) was more common than phacolytic glaucoma(28.3%) in our study which is similar to other studies conducted in Nepal. Rijal et al (2006) had 65% phacomorphic and 35% phacolytic glaucoma in their study and Pradhan et al (2001) also had higher percentage of phacomorphic glaucoma(72%). Pant Sitoula et al (2016), in their study had 57.5% phacomorphic and 42.5% phacolytic glaucoma. In contrast, M. Sharanabasamma (2016) had slightly higher cases of phacolytic than phacomorphic glaucoma. All cases had poor vision of <math><3/60</math> at presentation. The BCVA of 6/18 or better were achieved in 30.2% of patients which is similar to Pradhan et al (2001) where BCVA 6/18 or better was achieved in 31.4% of patients but BCVA was less compared to M. Sharanabasamma (2016) where BCVA of 6/18 or better is slightly higher (54%) and B.Ushalatha(2016). BCVA of 6/12 was higher in B.Ushalatha (2016), 80% study because most patients attended within 10 days of symptoms but in our study, 43.4% of cases presented within two weeks of symptoms and 56.6% cases presented after two weeks. 28.3% were blind with BCVA OF <math><3/60</math> which is worse compared to Pradhan et al (2001) where 21% were blind with BCVA of <math><3/60</math>. [4]Optic atrophy(73.3%.) was the main cause of blindness in our study which is similar to Rijal AP (2006), Pradhan D (2001), Prajna NV et al(1996) study. The final BCVA of 6/18 or better was achieved in 14(87.5%) cases out of 16 cases with symptoms less than four weeks and only two(12.5%) with symptoms more than a month. The duration of symptoms had linear relation with visual outcome similar to study done by and M Sharanabasamma (2016)

and Chandrasekhar G (2015).

The mean IOP at presentation was 42.74 mmHg( Standard Deviation 11.16) similar to B.Ushalatha (2016) mean IOP 42.5 mmHg and Kothari et al (2013) mean IOP 46.2 mmHg. The mean IOP at last follow up was normal. In our study 100% received IOP reduction of <math><21</math> mmHg after surgery similar to Rijal (2006) study, M Sharanabasamma (2016). In Pradhan D et al (2001) study, IOP reduction of <math><22</math>mmHg was achieved in 84.8% of patients. Thirteen cases presented with IOP of <math><30</math>mmHg, six (46.2%) had good visual acuity >6/18 and two (15.9%) had poor visual acuity <math><3/60</math>. Out of 24 cases with IOP >40 mmHg only eight (33.3%) cases had good visual acuity >6/18 and 11(45.8%) had poor visual acuity <math><3/60</math>.The higher the IOP at presentation the poorer the BCVA and the lower the IOP at presentation the better the visual acuity, similar to studies done by M Sharanabasamma (2016) and Chandrasekhar G (2015).

Although vision was reduced, majority of patients had delayed presentation to the hospital. Eye pain (96.2%) and redness (62.3%) were the main symptoms that brought the patients to the hospital. Almost half, 30 (56.6%) of them seek treatment after two weeks of pain and redness. Payal Gupta (2012) reported maximum duration of ocular pain of 16 days. Similarly eye pain and redness were the main symptoms that brought the patients to the hospital in Yaakub et al (2014) study.

All patients underwent SICS with and without IOL implantation. Uneventful operations were noted in majority (94.3%) which is higher to Yaakub (2014) study (71%). The success rate of surgery was higher compared to Malaysia study because the duration of presentation in our study was earlier to Yaakub (2014), Chandrasekhar G (2015) and Mohinder S (2002).The main complication was posterior capsular rupture in our study similar to Yaakub (2014).



Some of the patients developed complications like fibrin and hypopyon after surgery. A fibrin comparative study done by Irfan Q M (2011) showed that seven eyes developed hypopyon without receiving preoperative steroids and no eye showed hypopyon on receiving preoperative steroids while Chandrasekhar G (2015) found 11 cases (22%) of hypopyon in his study. Out of 23 patients who were given preoperative steroid two developed fibrin and no developed hypopyon. Among 30 patients who didn't receive preoperative steroid, seven developed fibrin and two developed hypopyon after surgery.

### Conclusion

Lens induced glaucoma is a disease of elder population with higher prevalence in female population. The main clinical presentations of LIG are triad of acute reduced vision, eye pain and redness. The main cause of LIG is phacomorphic glaucoma from untreated senile cataract. The better final BCVA is found when there is an early presentation and less IOP at the time of presentation. The use of preoperative steroids is helpful to decrease the level of fibrin and hypopyon. Public awareness and early detection is important for an early intervention of cataract. Early intervention aids in good visual recovery and IOP control of LIG. Late presentation results in optic atrophy and poor visual morbidity.

### Acknowledgement

We would like to sincerely thank all the colleagues and staff of Lumbini Eye Institute and Research Centre as well as Dr Amin Kumar Shrestha for the constant support during the study.

### References

Astrid E Fletcher et al (1999). Low uptake of eye services in rural India: A challenge for programs of blindness prevention. *Arch Ophthalmol*; 117:1393–1399.

B.Ushalatha, B.Chandrasekhar, M.V.Bhavani (2016). A Study of Visual Outcome in Lens Induced Glaucoma. *IOSR Journal of Dental and Medical Sciences*; 4(15): 58-61.

Chandrasekhar G, Kumar S, Varalakshmi U, Shaik MV (2015). Management and final visual outcome of various types of the lens induced glaucoma's attending to Narayana Medical College Hospital. *International Archives of Integrated Medicine*; 2(9): 33-39.

Irfan Qayyum Malik, M. Moin, A. Rehman, Mumtaz Hussain (2011). Role of Initial Preoperative Medical Management in Controlling Post-Operative Anterior Uveitis in Patients of Phacomorphic Glaucoma. *Pak J Ophthalmol*; 27(2): 78-83.

Mohinder S, Hassan A, Revathy K (2002). Intraocular lens implantation in phacomorphic glaucoma. *Bahrain Medical Bulletin*; 24(3): 88–90.

N Venkatesh Prajna, K Vaibhav (1996). Lens Induced Glaucomas: Visual Results and Risk Factors for Final Visual Acuity. *Indian Journal of Ophthalmology*; 44:149-155.

Pradhan D, Hennig A, J Kumar, Foster A (2001). A prospective study of 413 cases of LIG in Nepal. *Indian J of Ophthalmol*. 2001; 49:103-7.

Pant Sitoula R, Indrajit S, Devdutta, Sanjay KS (2016). Lens induced glaucoma in eastern Nepal. *Nepal J Ophthalmol*; 8(16): 161-166.

Payal Gupta et al (2012). Pattern and Visual Outcome in Lens Induced Glaucoma. *JK Science*. Oct -December; 14(4): 181-184.

Rijal AP, Karki DB (2006). Visual outcome and IOP control after cataract surgery in lens induced glaucomas. *Kathmandu University Medical Journal*; 4(1): 30-33.

Raghunandan Kothari, Sandeep Tathe, Pratik Gogri, Akshay Bhandari (2013). Lens-Induced Glaucoma: The Need to Spread Awareness about Early Management of Cataract among Rural Population. *ISRN Ophthalmology*; 2013: 1-3.

Sapkota YD. *The Epidemiology of Blindness in Nepal*: 2012. Kathmandu: Nepal Netra Jyoti Sangh: 2012.

Sharanabasamma M, Vaibhav K (2016). *Management and Visual Outcome in Patients*

of Lens-induced Glaucomas at a Tertiary Eye Care Hospital in South India. *Journal of current glaucoma practice*; 10(2): 68-75.

Shibal Bhartiya, Mahesh Kumar HM, Mohit Jain (2009). Phacomorphic glaucoma: evolving management strategies. *J Curr Glaucoma Prac*; 3(2): 39-46.

Yaakub A, Abdullah N, Siti Raihan I, Ahmad Tajudin LS (2014). Lens-induced glaucoma in a tertiary centre in northeast of Malaysia. *Malays Fam Physician*; 9(2): 48-52.