



OUTCOME OF LENS EXTRACTION AS A MANAGEMENT OPTION IN PRIMARY ANGLE CLOSURE DISEASE.

Ophthalmology

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ABSTRACT

Aim: To evaluate the outcome of lens extraction as a management option in primary angle closure disease (PACD) with visually significant cataract.

Methods: Thirty eyes of 30 patients having PACD of different stages constituted material for this prospective, non randomized, interventional study. Group A had 15 eyes of Primary Angle closure suspect (PACS), Group B had 8 eyes of Primary Angle closure (PAC) and Group C had 7 eyes of Primary Angle closure Glaucoma (PACG). All cases underwent phacoemulsification with foldable IOL implantation and followed for at least 3 months. Outcome measures included intra ocular pressure (IOP), best corrected visual acuity (BCVA), need for anti glaucoma medication, and gonioscopic appearance. Statistical analyses were performed using SPSS software and epicalc 2000.

Results: Before lens extraction, the mean IOP in groups A, B and C was found to be 19.06, 31.25 and 37.14 mm Hg, respectively. After lens extraction, the mean IOP in groups A, B and C was found to be 16.0, 18.25 and 20.57 mm Hg, respectively. Gonioscopy after lens extraction showed that one case (12.5%) in group B and 2 cases (28.57%) in group C had PAS >180 degree; these 3 cases required anti glaucoma medication after lens extraction.

Conclusion: lens extraction in cases of Primary Angle closure Disease should be considered as a treatment option. However, presence of Peripheral Anterior Synechiae more than 180 degree is a limiting factor for adequate control of intra ocular pressure following lens extraction.

KEYWORDS

Lens extraction, Primary Angle closure Disease, Prospective, and non randomized, interventional study.

Introduction:

Lens continues to grow in size and hardness which can compromise the filtration by angle closure in a predisposed eye.¹ Removing the lens creates more space in anterior chamber and widens the angle,² which may be enough to achieve intraocular pressure (IOP) control.³ Lens extraction should logically eliminate papillary block, lens related mechanisms and plateau iris. Hence, this prospective study has been under taken to evaluate the outcome of lens extraction as a management option in primary angle closure disease (PACD) with visually significant cataract.

Material and Method:

Thirty eyes of 30 patients having PACD were recruited in this prospective, non randomized, interventional study. Based on IOP, gonioscopic findings and optic disc evaluation, the patients were divided into three groups:

Group A; Primary Angle closure suspect (15 cases); IOP <20, Iridotrabecular contact (ITC) >270 degree.

Group B; primary angle closure (8 cases); IOP >20, appositional or synechial closure without glaucomatous disc damage.

Group C; primary angle closure glaucoma (7 cases); IOP >20, appositional or synechial closure and glaucomatous disc damage.

After obtaining informed consent, all the cases underwent phacoemulsification with foldable IOL implantation under local anaesthesia and followed for at least 3 months. Outcome measures included intra ocular pressure, best corrected visual acuity (BCVA), need for anti glaucoma medication, and gonioscopic appearance.⁴ Statistical analyses were performed using SPSS software and epicalc 2000. Differences of mean $\pm$ standard deviation (SD) between pre operative and post-operative values were assessed by means of the paired t-test. A p-value of less than 0.05 was considered statistically significant.¹

Results:

The mean age of 30 patients was 54.20($\pm$ 4.81) years. The sex distribution was 20 female and 10 male patients, with 23 right eye and 7 left eye. The findings were compiled and analyzed as follows:

Table 1: Intra ocular pressure before and after lens extraction.

Group	Intra Ocular Pressure		P value	Student's t test
	Before lens extraction	After lens extraction		
Group A	19.06 (SD 1.27)	16.00 (SD 1.69)	0.0000050	5.61
Group B	31.25 (SD 1.83)	18.25 (SD 3.28)	0.0000001	9.79
Group C	37.14 (SD 2.54)	20.57 (SD 5.85)	0.0000170	6.87

It was observed that in all the groups, P value as well as student's t test was highly significant.

Table 2: Best corrected visual acuity (BCVA) before and after lens extraction.

	Pre op BCVA		Post op BCVA		Causes of subnormal BCVA ≥ 0.3 (i.e. $\leq 6/12$)
	≤ 0.2 (i.e. $\geq 6/9$)	≥ 0.3 (i.e. $\leq 6/12$)	≤ 0.2 (i.e. $\geq 6/9$)	≥ 0.3 (i.e. $\leq 6/12$)	
Group A	0	15	14	1	Amblyopia
Group B	0	8	6	2	ARMD, Amblyopia
Group C	0	7	1	6	Glaucomatous optic neuropathy (ARMD, Chronic CME and Amblyopia were contributory factors)

The causes of post operative subnormal vision (≥ 0.3 i.e. $\leq 6/12$) were analyzed. In group A, 1 case (6.66%) was found to have subnormal BCVA due to Amblyopia. Likewise, in group B, 2 cases (25%) had subnormal BCVA due to ARMD (1 case) and Amblyopia (1 case). In group C, 6 (85.71%) cases were found to have subnormal BCVA due to glaucomatous optic neuropathy. In group C, 1 case was found to have chronic cystoid macular edema, 2 cases had Amblyopia & 2 cases had ARMD.

Table 3. Need for anti glaucoma medication before and after lens extraction.

Number of cases on anti glaucoma medication				
Group	Pre op		Post op	
	Number	%	Number	%
Group A	0	00	0	00
Group B	8	100	1	12.5
Group C	7	100	2	28.57

In group A, there was no need for any anti glaucoma medication in any case. In group B only 1 case (12.5 %) required anti glaucoma medication in the form of monotherapy (Timolol 0.5% bid). In group C, 2 cases (28.57%) required anti glaucoma medication as a combination therapy (Timolol and Brimonidine).

Table 4. Gonioscopic appearance after lens extraction:

Group	Angle open/ PAS <180 degree		PAS > 180 degree	
	No.	%	No.	%
Group A	15	100.00	00	00.00
Group B	07	87.50	01	12.50
Group C	05	71.43	02	28.57

All patients in group A, 7 patients (87.5%) in group B and 5 patients (71.43%) in group C showed wide open angle or peripheral anterior synechiae (PAS) <180 degree after lens extraction. One case (12.5%) in group B and 2 cases (28.57%) in group C showed PAS >180 degree in post-operative period. These 3 cases who had PAS >180 degree, required anti glaucoma medication after lens extraction.

Table 5. Null Hypothesis

Applying Chi Square test we assume that there is no significant difference between expected and observed values (Null Hypothesis).

Group	Number of cases	Improvement Expected	Improvement Observed	Chi Square Value	P value
A	15	15	15	0	1
B	8	8	7	0.125	0.9394
C	7	7	5	0.571	0.7516
Total	30	30	27	0.300	0.8607

Degree of Freedom = 2

Applying Chi square formula, it is evident that all the p values are > 0.05 which are non-significant indicating the difference is not significant but is due to chance or other factors.

Thus, null hypothesis is true.

Discussion:

The primary angle closure disease (PACD) has been classified as primary angle closure suspect (PACS) or occludable angle, primary angle closure (PAC) and primary angle closure glaucoma (PACG). The PACS is defined as non visibility of pigmented trabecular meshwork in >270 degree with normal intraocular pressure (IOP) and no peripheral anterior synechiae (PAS). When high pressure and/or PAS are added the condition is termed as PAC and when glaucomatous optic neuropathy and/or field defects are added the condition is termed as PACG.^{4,5} It is understood that the crystalline lens has a pivotal role in primary angle closure (PAC), both in the pathogenesis of pupil block and by exacerbating the effect of non-pupil block mechanisms such as peripheral iris crowding. Eyes with angle closure tend to have shallow anterior chambers and thick, anteriorly positioned lenses when compared with normal eyes.⁶ Removing the lens creates more space in the anterior chamber and widens the angle,² which may be enough to achieve intraocular pressure (IOP) control.³

The role of lens extraction as a treatment for angle closure has been debated for many years. But with the knowledge that the lens is the single most important contributing factor to the angle closure process, and having acquired the technology and skills to perform relatively safe phacoemulsification surgery, should we now be thinking about performing early lens extraction in angle closure patients with the aim of preventing the development of glaucomatous optic neuropathy. Theoretically, removing the lens at an early stage will deepen the anterior chamber and open the angle, thus hindering the formation of peripheral anterior synechiae (PAS) and improving the prospects for good long term IOP control. In addition, many of these patients will eventually require surgery for visually significant cataract at some stage.⁶

Hence the present study has been undertaken to find out the role of lens extraction in management of PACD.^{3, 7} from the observation it is evident that PACS or occludable angles are cured by lens extraction very easily. Cases of PAC and PACG who do not have extensive synechiae are also cured. However cases having >180 degree PAS are the crucial cases.^{8, 1} It is hypothesized that during the phaco surgery injecting lot of visco during CCC may help in visco dissection of PAS.³ Besides lens extraction itself which may create more space in the chamber angle allowing some more trabeculum available for the drainage of aqueous.^{2,8} In present series 3 cases were found to have PAS >180 degree that persisted after the lens extraction. These cases having PAS >180 degree required anti glaucoma medication post-operatively.⁸ It is suggested that the goniosynechiolysis in these cases at the conclusion of lens extraction should be done to improve the

outcome of the procedure. The goniosynechiolysis can be performed with the help of cyclodialysis spatula after injecting visco in the anterior chamber.⁴ The results of EAGLE study⁹ favour early lens extraction based on the findings that the mean intraocular pressure was 1.18 mm Hg lower after clear-lens extraction than after standard care in the form of laser peripheral iridotomy (LPI). EAGLE study concluded that Clear-lens extraction showed greater efficacy and was more cost-effective than laser peripheral iridotomy, and should be considered as an option for first-line treatment. The determining factor in the success of lens extraction is the stage of the disease at which it is performed. At a relatively early stage, prior to the formation of synechiae > 180 degree, or significant functional damage to trabecular meshwork not affected by synechiae, lens extraction alone works well.¹⁰

Conclusion:

lens extraction in cases of Primary Angle closure Disease should be considered as a treatment option. However, presence of Peripheral Anterior Synechiae more than 180 degree is a limiting factor for adequate control of intra ocular pressure following lens extraction.

Clinical Significance:

Lens extraction is a viable treatment option in cases of Primary Angle Closure Disease. But, presence of Peripheral Anterior Synechiae more than 180 degree may result into poor control of intra ocular pressure following lens extraction.

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