

A clinical study of post cataract surgery epiphora in relation to the type of cataract surgery and different types of post-operative topical medication

Rahul Deshpande^{1,*}, Madan Deshpande², Kuldeep Dole³, Khurshed Bharucha⁴, Richa Dharap⁵

^{1,3}Medical Director, ²Chief Medical Director, ⁴Consultant, ⁵Resident, Dept. of Oculoplasty, PBMA'S H.V Desai Eye Hospital, Pune, Maharashtra, India

***Corresponding Author:**

Email: rddeshpande71@gmail.com

Abstract

Aim: To assess incidence, determinants and outcome of epiphora after cataract surgery.

Methods: 650 eyes having uncomplicated senile cataract were enrolled routine preoperative evaluation, underwent phacoemulsification (n=462) or SICS (n=188). Post-operatively, patients were randomized into 2 groups according to the preservative status of steroid antibiotic drops. Symptomatic patients were assessed at 5 weeks, using slit lamp, investigated using Fluorescein Dye Disappearance Test (FDDT), sac syringing, probing and TBUT.

Results: At 5 weeks, the incidence of epiphora after phacoemulsification was 7.1%, and that after SICS was 6.9%. 41.38% complained of epiphora after phacoemulsification, and 54.54% after SICS. There was no difference in epiphora after phacoemulsification using preservative free or preservative containing drops. Epiphora after SICS was more in the preservative group, compared to preservative free group (4.4%), which increased with frequency of dosage. Epiphora after phacoemulsification was significantly more-14% in patients above 70 yrs of age, as compared to 4% in younger patients, and more in the female population-10.5% of total females as compared to 3.8% of males. Epiphora after SICS was significantly more-26.7% in patients above 70 yrs of age, compared to 4% in younger patients, and more in the female population-9.5% of total females as compared to 1.94% of males.

Conclusion: Epiphora occurs in 7% patients 5 weeks after cataract surgery, irrespective of phacoemulsification or SICS. It is significantly more in elderly age group and in females, after SICS was more with the use of preservatives, more frequent dosage and harder grade of cataract.

Keywords: Epiphora, Post cataract, Preservative.

Introduction

Epiphora is defined as watering of eyes due to an abnormal lacrimal drainage system in presence of normal tear secretion.¹ Another definition given by Myron Tanenbaum and Clinton D. McCord Jr² is excessive tearing due to lacrimal outflow deficiency.

Hamid Fesharaki et al³ studied the impairment of lacrimal drainage after cataract surgery, and reported an incidence of 35% post operative cases complaining of watering after one week and 20% cases after one month of follow up. The assessment of epiphora was done by tear drainage function tests, namely dye disappearance test and taste test duration, which were performed thrice on one patient- pre-operatively, one week post surgery and one month post surgery. There was statistically significant difference observed between the pre surgery and post operative values in the operated eye, with no impairment in the sound eye.

Ruiz-Calvo A et al⁴ conducted a study on epiphora after uncomplicated phacoemulsification after surgery and found that presence of epiphora two weeks after cataract surgery was infrequent but that there was a significant rise three months after surgery. In patients with "new onset" epiphora, the causes were blepharitis, low tear break-up time, high tear meniscus, partial nasolacrimal duct obstruction and punctal stenosis. Rahman MZ et al⁵ determined the effects of cataract surgery, both phacoemulsification and SICS, on

lacrimal drainage system in eyes with age related cataract.

The incidence of watering 1 week after phacoemulsification was 17%, and 19% after SICS. McNab AA et al⁶ described the association between the use of different topical ocular medications and acquired lacrimal canalicular obstruction, duration of exposure ranging from 3 weeks to 20 yrs. The study concluded that the obstruction could occur after a relatively short term exposure to the topical drugs or as a part of a widespread reaction in patients on long term use. The obstruction occurred most commonly at 2-5mm from the external punctum. Some cases were also associated with subconjunctival scarring, symblepharon, medial canthus keratinization and cicatricial medial entropion.

Aim: To assess incidence, determinants and outcome of epiphora after cataract surgery.

Objectives

1. To compare the incidence of postoperative epiphora at 5 weeks after uncomplicated small incision cataract surgery with that of phacoemulsification.
2. To compare the incidence of postoperative epiphora at 5 weeks after using steroid antibiotic combination with preservative with that after preservative free steroid antibiotic combination.

- To assess the factors associated with postoperative epiphora.

Materials and Methods

Inclusion Criteria:

- Age above 40 yrs
- Patients having uncomplicated cataract of any grade and willing to undergo cataract surgery-phacoemulsification or SICS, under topical or local anaesthesia
- Patients having normal preoperative examination, but complaining of watering post operatively, weeks after surgery.

Exclusion Criteria:

- Age below 40 yrs.
- Patients having watering pre operatively due to any cause.
- Patients complaining of discharge pre operatively.
- Patients having preoperative lid malpositions, lid inflammations and infections.
- Those having complicated and traumatic cataract.
- Patients having cataract associated with other ocular co morbidities.
- Patients with intra-operative & post-operative complications.

Patients fulfilling the inclusion criteria were selected. The subjects underwent a detailed pre-operative assessment- history, general and systemic examination, ocular examination, and routine pre-operative investigations, which included Regurgitation on Pressure on Lacrimal Sac (ROPLAS).²²

Diagnosis of Epiphora: Dr. G. C. Shekhar¹ gave a practical approach to diagnosing epiphora, starting from

ruling out two conditions mimicking epiphora-dry eye syndrome diagnosed by tear break up time test and schirmer's test, and blepharitis, diagnosed on slit lamp examination. For 1 M and Busse H⁷ describe basic diagnostics of tear duct diseases and state that the goal of the basic examination is to differentiate between epiphora and hyperlacrimation. Clinical history, palpation, inspection, diagnostic probing and syringing are enough to find out the function of the lacrimal drainage system or to determine the extent and location of the obstruction.

Immediately after surgery each arm (SICS and phacoemulsification) was randomized using random number table software into- 1. Those receiving steroid-antibiotic drops containing preservative.

(MOSI-D, FDC) 2. Those receiving steroid-antibiotic drops which were preservative-free. (Apdrops DM, Ajanta Pharma) The necessary dose depending on the clinical needs was given to the patient and was advised to come for follow up after 7 days.

At the 7 day follow up

- Leading question regarding complaint of watering was asked. Since it is assumed to be due to functional impairment postoperatively, patient was given reassurance.
- Flourescein dye disappearance test (FDDT) was performed in those cases having a quiet anterior segment, to confirm presence of epiphora.

At the 5 week follow up

- All patients were asked a leading question of complaint of watering. Those patients complaining of watering of the operated eye were selected for further evaluation and management:

Results

Table 1: Distribution of prescribed postoperative drug after phacoemulsification and SICS

Drug given	Number of eyes in Phacoemulsification group	Number of eyes in SICS group	P value (Chi square test)
Preservative free	266 (57.6%)	59 (31.4%)	p<0.01
With preservative	196 (42.4%)	129 (68.6%)	
Total	462 (100%)	188 (100%)	

This table shows us the distribution of prescribed postoperative drug after phacoemulsification and SICS. On applying Chi square, it was found that the drug given between the two groups undergoing Phacoemulsification and SICS were significantly different (p<0.01). Significantly more number of patients undergoing SICS received antibiotic-steroid eye drops with preservatives.

The above table shows the various causes of watering in both phacoemulsification group and SICS group at 5 weeks. In the phacoemulsification group, 7.1% eyes had epiphora, and in SICS group, 6.9% had

epiphora. Out of the no epiphora group, hyperlacrimation was present in 6.4% in phacoemulsification group, and 3.8% of the SICS population, of which low tear break up time was the most frequent cause of hyperlacrimation in both groups, followed by meibomitis and blepharitis in decreasing order.

On applying Chi square, the difference in the incidence of watering at 5 weeks between the two groups undergoing Phacoemulsification and SICS was not significant statistically.

Table 2: Epiphora at 5 weeks according to drug used in phacoemulsification group

	Number of eyes in Preservative free group	Number of eyes in with preservative group	P value* (Chi square test)
Epiphora:	18 (7.7%)	11 (6.4%)	p= 0.117
Functional Block	8 (3.4%)	4 (2.3%)	
Punctal Stenosis	5 (1.70%)	4 (2.31%)	
Canalicular block	3 (1.27%)	2 (1.16%)	
Nasolacrimal obstruction	2 (0.85%)	1 (0.58%)	
No epiphora:	217 (92.89%)	162 (93.13%)	
Total	235 (100%)	173 (100%)	

This table compares the incidence of epiphora 5 weeks after phacoemulsification, in patients using preservative free postoperative drugs (7.7%) versus drugs with preservative (6.4%). On applying Chi square, it was found that in those with

phacoemulsification, watering of eyes at 5 weeks was similar between those with and without use of preservative drug (p=0.117).

Table 3: Epiphora occurring after SICS with respect to preservative containing versus preservative free drugs

	Number of eyes in Preservative free group	Number of eyes in with preservative group	P value* (Chi square test)
Epiphora:	2 (4.4%)	9 (7.8%)	p= 0.595
Functional Block	1 (2.2%)	5 (4.3%)	
Punctal Stenosis	0 (0%)	2 (1.73%)	
Canalicular block	1 (2.22%)	2 (1.73%)	
Nasolacrimal Obstruction	0 (0%)	0 (0%)	
No epiphora:	43 (95.6%)	106 (92.2%)	
Total	45 (100%)	115 (100%)	

Above table compares epiphora occurring after SICS with respect to usage of preservative free drug versus drug with preservative. Preservative free drug use has an incidence of 4.4% of postoperative epiphora, and drug use containing preservative has a comparatively higher incidence of 7.8%. Functional blocks are seen more in the 'with preservative' group (4.3%) versus only 2.2% in preservative free group. Punctal stenosis was seen in 1.73% of with preservative group, and none in the preservative free group. Canalicular block is observed similar in both groups and there is no nasolacrimal obstruction seen.

As can be seen, after SICS, 'with preservative' group has more incidence of epiphora, namely functional block and punctal stenosis. The following could be a possible explanation for this occurrence. There is some amount of subclinical inflammation in SICS. Yeoun-Hee Kim et al⁸ have suggested that steroid preparations containing preservatives are less efficacious in preventing inflammation. So, the postoperative subclinical inflammation, along with the steroids not acting up to their potential, and an additive insult to the mucosa in the form of the preservative in postoperative drug could have precipitated epiphora in these cases.

Increasing frequency of drug with preservative had 20% epiphora as compared to 6.8% after using routine doses. Increasing the frequency of the drops in turn increases the exposure of the ocular surface and lacrimal drainage pathway to the eye drops and preservatives, which can potentially cause more toxicity as compared to a routine dosing schedule.

The distribution of epiphora, i.e. anatomical and functional block after 5 weeks of SICS in different age groups. All anatomical block was seen above 70 years of age, functional block was seen in 15% patients above 70 years of age, as compared to 3.2% below 70 years.

Discussion

Evaluation of watering at 1 week: It showed that 1.3% patients in SICS whereas 0.7% in phacoemulsification group had epiphora one week after surgery. This difference was not statistically significant at 1 week. The epiphora was assumed to be due to a functional block that may occur after surgery. Decreased blink rate immediately after surgery is said to reduce the lacrimal pump function, which normally aids in propelling the tears from the ocular surface through the outflow tract. Further evaluation of epiphora at this time was not performed as sac syringing or any other contact procedure is invasive and

best avoided in the early postoperative period. Study conducted by Ruiz Calvo et al⁴ gives incidence of postoperative epiphora 2 weeks after uncomplicated phacoemulsification as 3.2%.

Evaluation of watering at 5 weeks: 7.1% in phacoemulsification group whereas 6.9% patients in SICS had epiphora 5 weeks after surgery.

Table 4: Different causes of postoperative epiphora

Causes of epiphora:	Number of eyes in Phacoemulsification group	Number of eyes in SICS group	P Value*
Functional Block	12 (41.38%)	6 (54.54%)	p=0.454
Punctal Stenosis	9 (31.03%)	2 (18.18%)	p=0.416
Canalicular block	5 (17.24%)	3 (27.27%)	p=0.479
Nasolacrimal obstruction	3 (10.35%)	0 (0%)	NA
Total epiphora	29 (100%)	11 (100%)	

Above table lists the different causes of postoperative epiphora that we came across in our study.

Functional block was seen in 41.38% of epiphora after phacoemulsification and 54.54% of epiphora after SICS. Punctal stenosis made up 31.03% cases of epiphora after phacoemulsification, and 18.18% of epiphora after SICS. 17.24% cases of epiphora after phacoemulsification and 27.27% cases of epiphora after SICS were due to canalicular block.

Nasolacrimal obstruction was found in 10.35% of epiphora after phacoemulsification and none after SICS. The occurrence of different causes of epiphora had no statistical difference in phacoemulsification and SICS groups. Our findings are consistent with the study conducted by Ruiz-Calvo A4, in which after two weeks of surgery, the incidence of high tear meniscus was 50%, and punctal stenosis was 25%. It can be noted in both the groups that the proximal lacrimal system is more affected than the distal outflow tract, which correlated with the findings of Farzad Pakdel et al.⁹

Incidence of epiphora in both groups was marginally different with no statistically significance. The reasons for epiphora to occur are hypothesized to be the following-

1. Decreased blinking post operatively reduces the pump functioning, causing a functional block.
2. Surgical trauma induces ocular surface inflammation. This inflammation is said to extend to the lacrimal drainage system especially the proximal portion i.e. punctum, canaliculi. This inflammation can cause stasis without an actually stenosis, and thus increase the retention of the tears. Low grade inflammation can also cause partial to complete blockage of the lacrimal outflow tract, initially due to edema and later due to fibrosis, on resolution of the inflammation.¹⁰ This block can be anywhere, from punctum to nasolacrimal duct, but it is more likely to be proximally located.

SICS known to be more traumatic than phacoemulsification, is said to cause more postoperative inflammation and is expected to cause more watering. The findings of our study revealed

otherwise, which might imply that surgical trauma and its effects of the lacrimal drainage system may be similar in both phacoemulsification and SICS. The findings of our study are consistent with another study by Ruiz-Calvo et al,⁴ who evaluated the incidence of postoperative epiphora 3 months after uncomplicated phacoemulsification. They found it to be 7% epiphora 3 months after surgery.

Functional block is seen in 4.9% of patients above 70 years of age who underwent phacoemulsification as compared to 1.9% below 60 years of age. 16% of patients above 70 years of age who underwent SICS have functional block, as compared to 3.2% patients under the age of 60 years. Our findings are consistent with studies done by Hamid Fesharaki et al³ and Rahman MZ et al¹¹ that have found functional block to occur more frequently in the elderly age group. Decreased ability of lacrimal pump due to senile changes and asymptomatic lid laxities are most likely to cause age related functional block.

Conclusion

1. The incidence of epiphora was found to be similar five weeks after phacoemulsification and SICS.
2. The incidence of epiphora after using preservative free drug and drug with preservative after phacoemulsification was similar in both the groups. There was no statistical difference seen after using different frequencies of the either of the drugs.
3. Although not statistically significant, the incidence of epiphora after SICS was more after using drug with preservative, as compared to using preservative free drug. Similarly, more incidence of epiphora was seen in the 'with preservative' group as frequency of drug increased.
4. The incidence of functional and anatomical block increased significantly with increasing age, and this was consistently seen after phacoemulsification and SICS.
5. Females had more incidence of epiphora than men, and difference in anatomical block was more than difference in functional block, after both phacoemulsification and SICS.

6. Harder cataracts had more incidence of epiphora after SICS, but it was not statistically significant.
7. Different types of anaesthesia had similar incidence of epiphora after phacoemulsification.
8. Most of the patients having epiphora after phacoemulsification or SICS had postoperative BCVA of >6/12 at 5 weeks.
9. More than 50% of epiphora cases after phacoemulsification were successfully treated after one month by conservative management, whereas more than 50% of eyes after SICS suffering from epiphora still continued to have epiphora after one month of conservative management.
9. Pakdel F, Kashkouli MB. Lacrimal Drainage Obstruction Associated with Topical and Systemic Medications. *Journal of ophthalmic & vision research.* 2009 Oct;4(4):270.
10. Rose GE, Verity DH. Functional nasolacrimal duct obstruction—a nonexistent condition? Concepts in lacrimal dynamics and a practical course of treatment. *Expert Review of Ophthalmology.* 2011 Dec 1;6(6):603-10.
11. Rahman MZ, Hasan Z, Aleem MA, Begum N. Effects of Cataract Surgery on Lacrimal Drainage System. *Journal of Armed Forces Medical College, Bangladesh.* 2015 Dec 31;10(2):80-4.

Recommendations

Our study shows that there is no significant difference in epiphora after phacoemulsification and SICS, and after using preservative free and 'with preservative' postoperative drugs. However, there is a significant increase in epiphora in elderly age group and female gender. Also, Epiphora after SICS is more difficult to treat than is epiphora after phacoemulsification.

Hence more meticulous preoperative counseling, especially of an elderly female undergoing SICS will be helpful to anticipate and deal with any epiphora that occurs post operatively. Also, for short term use, preservative free drops do not seem to have an advantage, over preservative containing preparations. Thus they may not be preferably prescribed in all cases after cataract surgery.

References

1. Sekhar GC. Practical approach to a patient with epiphora. *Indian journal of ophthalmology.* 1994 Sep 1;42(3):157.
2. Tanenbaum M, McCord CD. Lacrimal Drainage System. 2006 CD-ROM edition. *Duane's Ophthalmology: Lippincott Williams & Wilkins; 2006.*
3. Fesharaki H, Razmjoo H, Aghajani M. Impairment of lacrimal drainage after cataract surgery. *Journal of Research in Medical Sciences.* 2007 May 8;12(1):34-7.
4. Ruiz-Calvo A, Troyano-Rivas JA, Martinez-Chico R, Romo-Lopez A. Epiphora after Uncomplicated Phacoemulsification: Study of Prevalence and Associated Factors. In *Seminars in ophthalmology 2016 May 3 (Vol. 31, No. 3, pp. 271-274).* Informa Healthcare.
5. Rahman MZ, Hasan Z, Aleem MA, Begum N. Effects of Cataract Surgery on Lacrimal Drainage System. *Journal of Armed Forces Medical College, Bangladesh.* 2015 Dec 31;10(2):80-4.
6. Nagy ZZ. New technology update: femtosecond laser in cataract surgery. *Clinical ophthalmology (Auckland, NZ).* 2014;8:1157.
7. Förl M, Busse H. [Basic diagnostics of tear duct diseases]. *Der Ophthalmologe: Zeitschrift der Deutschen Ophthalmologischen Gesellschaft.* 2008 Apr;105(4):346-50.
8. Kim YH, Jung JC, Jung SY, Yu S, Lee KW, Park YJ. Comparison of the Efficacy of Fluorometholone With and Without Benzalkonium Chloride in Ocular Surface Disease. *Cornea.* 2016 Feb;35(2):234.