Comparative Study of Dry Eye after Phacoemulsification and Manual SICS in Tertiary Centre of Jharkhand

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ABSTRACT

Introduction: Cataract is the major cause of blindness in the developing world. Study aimed at evaluation of tear film stability and tear secretion after phacoemulsification compared with MSICS.

Material and methods: This prospective comparative randomized study was performed in a tertiary centre of Jharkhand between June 2018 to March 2019. 187 patients with senile cataract were included in this study. Group A had 110 patients undergoing MSICS and group B 77 patients undergoing phacoemulsification. Dry eye symptoms(DES) characterizedby redness, burning, stinging, foreign body sensation, photophobia. Corneal fluorescein staining was performed. Basal Schirmer test was performed for assessment of aqueous tear production. Patients were examined post operatively on 1st week, 4th week and 3rd month.

Results: Out of 187 patients 103(55.08%) were male and 84(44.91%) were female. Grade of DES increased significantly 1 week after each procedure compared to pre-operative data and remained increased after 4 weeks of surgery. After 3 months the symptoms decreased and returned to baseline data.

Conclusion: MSICS is as effective as phacoemulsification with no difference between both techniques regarding tear film stability and tear secretion.

Keywords: Dry Eye Symptoms, MSICS, Phacoemulsification, Schirmer Test, Cornealfluroscein Stain

INTRODUCTION

Cataract is the major cause of blindness in the developing world accounting for three quarters of blindness. Cataract is complete or partial opacification in human lens or its capsule.[1] Phacoemulsification has become the preferred method of cataract extraction over last 15 years. It is preferred because of small incision, less post-operative astigmatism and early stabilization of refraction.[2,3] But still, MSICS is a good alternative to phaco in areas where high volume surgery with cheap instrumentation is required. The procedure is fast and has low rate of complications and can be performed in dense cataract.[2,3]

Phacoemulsification affects tear production post operatively in diabetic cataract patients, causing a risk for corneal damage and dry eye symptoms.

Study aimed at evaluation of tear film stability and tear secretion after phacoemulsification compared with MSICS.

MATERIAL AND METHODS

This prospective comparative randomized clinical study was performed in a tertiary care centre of Jharkhand between June 2018 to March 2019.

187 patients with senile cataract were included in this study. Group A had 110 patients undergoing MSICS and group B had 77 patients undergoing phaco.

Patients with history of diabetes, complicated cataract, pre existing ocular disease and ocular trauma or surgery were excluded from this study.

Complete ophthalmological examination including tear film break up time, (TF-BUT) measurement, Schirmer II test, corneal fluorescein staining was performed.

Dry eye symptoms (DES) characterised by redness, burning, stinging, foreign body sensation, photophobia and scored by the grade 0, 0.5, 1 or 2.

- Grade 0-no DES
- Grade 0.5-trace or seldom DES
- Grade 1-sometimes or mild DES
- Grade 2-frequent or moderate DES

Corneal fluorescein staining was performed. Corneal staining of area was graded as follows-

- Grade 0: no punctuate staining
- Grade 1: <1/8 stained
- Grade 2: >1/8 to <1/4 stained
- Grade 3: >1/4 to <1/2 stained
- Grade 4: entire area stained

Basal Schirmer 2 was performed for assessment of aqueous tear production.

Patients were examined post operatively on 1st week, 4th week and 3rd month. In every visit TF-BUT measurement, Schirmer 2 test and corneal fluorescein staining were done.

RESULTS

Out of 187 patients 103 (55.08%) were male and 84 (44.91%) were female.

Grade of DES increased significantly after 1 week of each procedure compared to pre-operative data and remained increased after 4 weeks of surgery. After 3 months the symptoms decreased and returned to baseline data as shown in table 1.

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	Group A				Group B			
	Grade of DES				Grade of DES			
	0	0.5	1	2	0	0.5	1	2
Preoperative	83	27	0	0	46	27	4	0
After 1 week	0	22	38	50	0	8	19	50
After 4 weeks	39	38	22	11	12	23	19	23
After 3 months	61	28	16	5	46	23	8	0

Table-1: Grade of DES

		Group A	Group B
Redness	Pre-operative	0	4
	After 1 week	105	69
	After 4 weeks	22	8
	After 3 months	0	0
Foreign body sensation	Pre-operative	11	12
	After 1 week	83	54
	After 4 weeks	61	50
	After 3 months	28	27
Stinging	Pre-operative	0	0
	After 1 week	55	42
	After 4 weeks	28	19
	After 3 months	6	0
Feeling of dryness	Pre-operative	28	27
	After 1 week	94	69
	After 4 weeks	66	62
	After 3 months	50	23
Secretions	Pre-operative	6	4
	After 1 week	39	35
	After 4 weeks	39	39
	After 3 months	33	0

Table-2: Symptoms of dry eye among studied patients

		Group A	Group B
Pre-operative	Grade 0	88(80%)	57(74%)
	Grade 1	22(20%)	20(26%)
After 1 week	Grade 0	17(15%)	4(5%)
	Grade 1	22(20%)	30(39%)
	Grade 2	60(55%)	35(45%)
	Grade 3	11(10%)	8(10%)
After 4 weeks	Grade 0	61(55%)	23(30%)
	Grade 1	5(5%)	19(25%)
	Grade 2	39(35%)	31(40%)
	Grade 3	5(5%)	4(5%)
After 3 months	Grade 0	77(70%)	50(65%)
	Grade 1	28(25%)	23(30%)
	Grade 2	5(5%)	4(5%)

Table-3: Corneal fluroscein staining

Schirmer test(mm)	Group A	Group B
Pre operative	15±3.6	16±3.4
After 1 week	11±3.2	12.25±3.2
After 4 weeks	12±3.4	13.35±3.4
After 3 months	13±3.5	14.05±3.5

Table-4: Schirmer test among studied patients

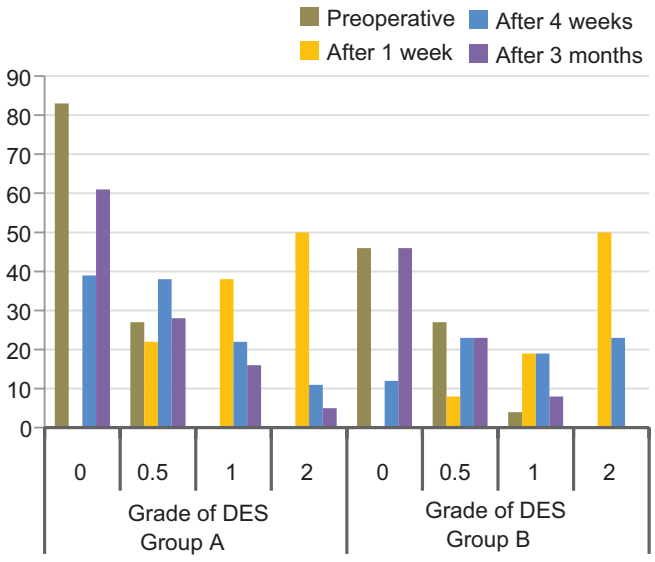

Figure-1: Comparison of pre and post operative grades of DES.

Preoperatively 83 patients (75%) in MSICS group had no dry eye which reached near baseline data after 3 months, 61 patients (55%) with no dry eye symptom (28 patients,25% with grade 0.5; 16 patients, 15% with grade 1 and 5 patients, 5% with grade 2) in MSICS group.

In phacoemulsification group 46 patients (60%) had no dry eye pre-operatively. 50 patients (70%) had grade 2 DES after 1 week, 23 patients (30%) in each grade 0.5 and grade 2 had

TF-BUT (seconds)	Group A	Group B
Pre operative	13.8±2.5	13.5±3.2
After 1 week	9.5±2.7	9.8±3.4
After 4 weeks	10.6±2.8	11.5±3.5
After 3 months	11.7±2.8	12.4±3.6

Table-5: TF-BUT among studied patients.

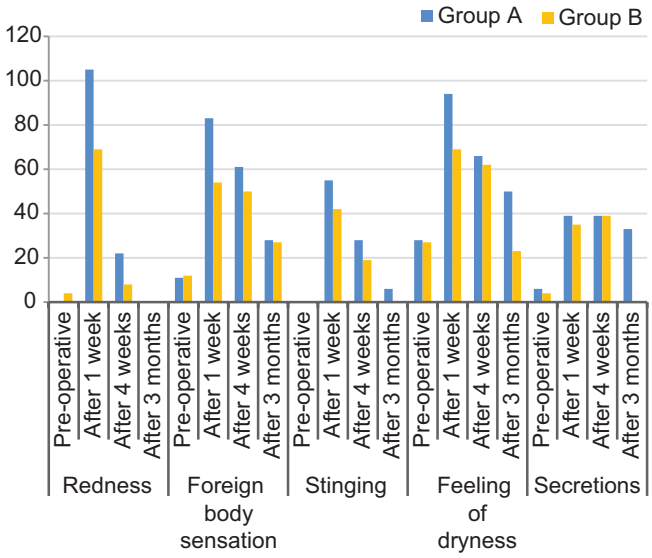

Figure-2: Symptoms of dry eye among studied patients.

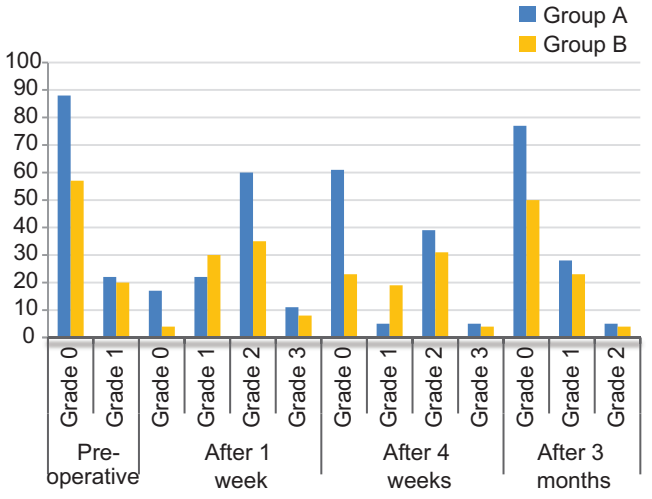

Figure-3: Corneal fluorescein staining test among studied patients.

DES. Baseline data was reached after 3 months (46 patients, 60% in grade 0; 23 patients, 30% in grade 0.5; 8 patients, 10% in grade 1 and none in grade 2.

There was no difference between both groups regarding symptoms at different point of time as shown in table 2.

Preoperatively redness was not seen in group A and only 4 patients (5%) in group B had redness preoperatively.

Redness increased after 1 week in both groups with 105 patients (95%) in group A and 69 patients (90%) in group B. In both the groups at the end of 3 months none of the patients complained of redness.

Foreign body sensation increased maximum after 1 week 83 patients (75%) and 54 patients (70%) in group A and B respectively.

No patient complained of stinging pre-operatively. 55 patients (50%) in group A and 42 patients (55%) in group B complained of stinging at the end of 1st week post-operative. After 3 months only 6 patients (5%) complained of stinging sensation in group A and none were observed in group B.

Pre-operatively 28 patients(25%) complained of dryness in group A and 27 patients (35%) in group B. After 1st week 94 patients (85%) in MSICS group complained of dryness and 69 patients (90%) in phaco had dryness. After 3 months in group A 50 patients (45%) had dryness and 23 patients (30%) in group B had dryness.

Secretions increased post-operatively in both the groups after 1st and 4th week with35% both after 1st week and 4th week in MSICS group and 45% and 50% respectively in 1st and 4th week in phacoemulsification group.

There was no difference between both groups regarding corneal fluorescein staining whether pre-operative or during follow up as shown in table 3.

Pre-operatively in group A 88 patients (80%) had grade 0 staining and 22 (20%) had grade 1 staining. After 3 months 77 patients (70%) had grade 0, 28 patients (25%) had grade 1 and 5 patients (5%) had grade 2 staining.

In group B, pre-operatively, 57 patients (74%) had grade 0 staining, 20 patients (26%) had grade 1 staining. After three months it returned to near normal with 50 patients (65%) in grade 0, 23 (30%) in grade 1 and 4 patients (5%) in grade 2.

There was no difference in both groups in Schirmer test whether pre-operative or during follow up.

After 1 week Schirmer score decreased considerably in both the groups. But after 3 months post-operative period the readings were approximately same as that of pre-operative level in both the groups.

No difference was noted in both groups in TF-BUT whether pre-operative or in follow up as shown in table 5.

Lowest TF-BUT was noted 1st week following surgery in either groups, with return to near baseline level after 3 months.

DISCUSSION

As regarding symptoms of dry eye, the present study has shown that there was significant increase in symptoms of dry eye 1 week after post operative period in both groups and returning to baseline pre-operative prevalence after 3 months.

This was applied for all symptoms including foreign body sensation, eye redness, stinging, feeling of dryness. No difference was noted between both groups.

Grade of dry eye symptoms (DES) has significantly increased 1 week after each procedure compared to pre-operative data and remained increased after 4 weeks of surgery. After 3 months, the grade of DES has decreased again and returned to near baseline data. There was no statistically significant difference between both groups during any point.

We have used three objective tests for assessment of tear film changes and tear film secretions following each procedure. These tests were tear film break-up time, corneal fluorescein staining test and Schirmer test.

As concerning tear film break up time, the present study did not report any significant changes following each procedures whether 1 week or after 3 months and also there was no significant difference between both groups.

Unlike the current study, Liu et al, (2008)[4] have shown that phacoemulsification resulted in significant reduction of tear film break up only for 1 day post-operatively.

Corneal flurescein staining test has shown different results. Pre-operative most of the studied patients (80% and 74% in group A and B respectively) have shown no staining (grade 0). Only after 1 week of surgery the condition has turned out that most of the patients has >1/8-<1/4 corneal staining (grade II). However, after 3 months most of the patients have returned to pre-operative state and showed no corneal staining.

There was no statistically significant difference between both groups regarding corneal fluorescein staining grade whether pre-treatment or during the whole follow-up period.

Similar to the present study, Liu and colleagues (2008)[4] have shown that post-operatively, there is significant increase in number of patients showing corneal staining after phacoemulsification then it eventually reduced.

As regarding Schirmer test, in both groups it has been reduced 1 week following surgery and returned to near baseline value after 3 months in both the groups, it is still significantly lower in both the groups. Liu et al[4] have shown different results as it has reported that Schirmer test has increased significantly after phacoemulsification.

Previous studies have examined the effect of cataract surgery on tear film parameters and reported short term disruptions in tear function. Consistently Ram et al (2002)[5], Li et al (2007)[6] in 23 and 37 post cataract surgery patients respectively demonstrated decreased Schirmer scores and at various time points upto 2 months post-operative compared to pre-operative values, same as the present study. As we have found that Schirmer test scores decreased significantly till 4 weeks post-operative.

However, unlike the present study, Ram et al[5], Li et al[6] have shown significant decrease in tear-film break-up (TF-BUT) while the present study has shown no significant change in TF-BUT till 3 months post-operative.

Venincasa and colleagues (2013)[7] have conducted a study to evaluate the difference in tear film parameters more than 3 months post-surgery in eyes with cataract surgery versus eyes without cataract surgery. They have found that after 3 months of surgery there was no statistically significant difference between surgical and non surgical eyes regarding corneal staining,TF-BUT, Schirmer test. This supports the current evidence as after 3 months we have found that all evaluated parameters have returned to pre-operative values.

Kasetsuwan et al[8] stated that severity of dry eye peaked seven days post phacoemulsification and was measured by OSDI questionnaire and three clinical tests. Within 30 days and 3 months post surgery symptoms showed rapid improvement which is in accordance with our study.

Dry eye post phacoemulsification was not significantly associated with sex and systemic hypertension.[8]

Another study conducted in 2010[9] has compared phacoemulsification versus MSICS but regarding surgical complications, operative time, uncorrected and corrected visual acuity and surgically induced astigmatism and has not addressed the issue of tear film stability and tear secretion. Because SICS is signinifantly faster, less expensive and less technology dependent it is more appropriate technique.

A problem with trials in which the same surgeon is randomized to both techniques under investigation is that the surgeon may not be equally skilled in both techniques.

The cost of surgery should have been questioned also, as it is important issue in developing countries like Egypt.[10-14]

Another limitation of the present study was a small sample size. To detect small differences, a huge sample size is required.

Another limitation is that we have evaluated patients for a short term (3 months) and did not evaluate for longer effects.

CONCLUSION

MSICS is as effective as phacoemulsification with no difference between both techniques regarding tear film stability and tear secretion.

REFERENCES

1. Andrikopoulos GK, Alexopoulos DK, Gartaganis SP. Pseudoexfoliation syndrome and cardiovascular diseases. World J Cardiol. 2014;6:847-54.
2. Kanski JJ, Bowling B (2011) Clinical ophthalmology: A systematic approach. (7th ed). Saunders/ Elsevier, New York.
3. Kanski JJ, Bowling B. Clinical ophthalmology: A systematic approach. Dry eye disorders (7th ed), Elsevier/ Saunders, New York. 2011;4:122.
4. Liu X, Gu YS, Xu YS. Changes of tear film and tear secretion after phacoemulsification in diabetic patients. J Zhejiang Univ Sci B 2008;9:324-328.
5. Ram J, Gupta A, Brar GS, Kaushik S, Gupta A. Outcomes of phacoemulsification in patients with dry eye. J Cataract Refract Surg 2002;28:1386-1389.
6. Li XM, Hu L, Wang W. Investigation of dry eye disease and analysis of the pathogenic factors in patients after cataract surgery. Cornea 2007;26:S16-S220.
7. Venincasa VD, Galor A, Feuer W, Lee DJ, Florez H, et al. Long term effects of cataract surgery on tear film parameters. The Scientific World Journal 2013:1-4.
8. Kasetsuwan N, Satitpitakul V, Changul T, Jariyakosol S. Incidence and pattern of dry eye after cataract surgery. PLoS One 2013;9:e78657.
9. Venkatesh R, Tan CS, Sengupta S, Ravindran RD, Krishnan KT, et al. Phacoemulsification versus manual small incision cataract surgery for white cataract. J Cataract Refract Surg 2010;36:1849-1854.
10. Amer SAK, Saif MYS, Abd El-Khalek MO, Tawfik A. Prevalence of Dry Eye Syndrome in Beni-Suef Population. Cataract cornea 2012;18:2-13.
11. Abueleinen KG, El-Mekawey H, Saif MYS, Khafagy A, Rizk HI, et al. Sociodemographic factors responsible for blindness in diabetic Egyptian patients. Clin Ophthalmol 2011;5:1593-1598.
12. Saif MYS, Saif ATS, Amer SK, Abueleinen KG. Prevalence of Ophthalmic Disease in the Egyptian Oasis. Tanta Medical

Sciences Journal 2012;7:21-28.

13. Elsaftawy HS, Ahmed MH, Saif MY, Mousa R. Sequential Intracorneal Ring Segment Implantation and Corneal Transepithelial Collagen Cross-Linking in Keraticonus. Cornea 2015;34:1420-1426.
14. Said DG, Elalfy MS, Gatzioufas Z, El-Zakzouk ES, Hassan MA, et al. Collagen cross-linking with photoactivated riboflavin (PACK-CXL) for the treatment of advanced infectious keratitis with corneal melting. Ophthalmology 2014;121:1377-1382.

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