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Original Research Article

Study of Efficacy and Safety of Low and High Fluidic Settings in Phacoemulsification Cataract Surgery

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ABSTRACT

Purpose: To study and compare low and high fluidic settings during phacoemulsification cataract surgery in view of intraoperative efficacy and postoperative outcomes, in moderate grade cataracts.
Method: Out of 104 phacoemulsification cataract surgeries, 52 random patients were operated with low and 52 with higher fluidic settings. Preoperative assessment in terms of grading of cataract, baseline central corneal thickness and other prerequisite ocular and systemic investigations were done. Intraoperative efficacy of the two fluidic settings was assessed by comparing quantity of balanced salt solution (BSS) used, and phaco-tip time required. Postoperatively safety was assessed by comparing post-op visual acuity, central corneal thickness and clarity and anterior segment inflammation on post-operative days 1 & 7.
Results: Intraoperative efficacy can be convincingly considered to be greater with relatively higher fluidic settings as it requires significantly lesser amount of balanced salt solution and also lesser phaco-tip time to divide and conquer the cataractous nucleus, as compared to low fluidic settings of phacoemulsification. All the surgeries in both the study groups were uneventful and postoperative outcomes in terms of visual acuity, corneal oedema, anterior chamber inflammation and corneal clarity, though initially better with low fluidic settings, were eventually equally matched in both groups by one week postoperatively.
Conclusion: Switching from low to relatively high fluidic settings statistically significantly decreases the quantity of fluid used and time of surgery. The occlusion was accomplished more often with high than low fluidic settings. The aspiration of the quadrants was therefore more efficient with high fluidic settings, both fluidic settings are equally safe to use and enhanced pump speed in higher fluidic settings did not cause more tissue damage.
In a developing country like ours with limited resources and colossal load of cataracts it can be safely advisable to shift to relatively higher fluidic settings of phacoemulsification which are more efficient and equally safe as low fluidic settings, and require significantly less quantity of prized resources like balanced salt solution and time of the trained phaco-surgeon.

Key Words: Phacoemulsification, cataract surgery, fluidics, arpiration flow rate, vacuum, balanced salt solution, phaco time

INTRODUCTION

A Cataract is defined as any opacification of the eye's crystalline lens, and any of these changes that then lead to a degradation in the optical quality of the lens can cause visual symptoms (ICD-9 #366.1x). Worldwide, cataracts are the number one cause of preventable blindness and remain the leading cause of visual impairment (47.9%) in all areas of the world. [1] There is no medical treatment to prevent the development or progression of

cataracts. Surgical treatment consisting of removal of the cloudy lens and implantation of a clear artificial intraocular lens (IOL), is the only definitive treatment for cataracts. [2]

Phacoemulsification-introduced more than 50 years ago in the United States in 1967 by Dr. Charles Kelman. [3] Improvements in instruments and surgical technique have now made it the procedure of choice for all routine cataract surgery.

Three components constitute the heart of all phaco systems. [4]
These are:

I. Irrigation,
II. Aspiration (aspiration flow rate and vacuum) and
III. Ultrasound.

'Fluidics' is a term used to describe the balance of 1st two components, i.e. balance of irrigating fluid inflow and outflow, during phacoemulsification cataract surgery.

Inflow is determined by the bottle height of the irrigation fluid above the eye level of the patient.
Outflow is determined by two factors of aspiration that cause the emulsified lens material within the anterior chamber to leave or attempt to exit:
a. Aspiration flow rate (AFR) and/or
b. The vacuum.

Balance of these is key to successful phaco surgery. Ocular complications are held at a minimum when the irrigation, aspiration, vacuum, and venting can maintain pressurization of the globe. Turbulence in the anterior chamber occurs when the fluidic balance is not optimized. [5]

Surgeons have adopted several different approaches by the use of high, medium or low aspiration rates, vacuum levels, and irrigation flow rates in an attempt to improve the safety and efficacy of phacoemulsification.

Vacuum and aspiration are separate components in a peristaltic system and work hand-in-hand. Aspiration draws intracameral fluid and structures to the tip and as these partially or completely causes occlusion of the tip, vacuum builds up and tends to draw these into the aspiration tubing. These fluidic settings can be tailored to suit the surgeons' comfort, hardness of the cataract, chamber stability in order to increase the intraoperative efficiency of the phaco system and to provide a better surgical outcome. [6]

It is well known that the ultrasound power is an important risk factor for endothelial cell loss after phacoemulsification. [7] Fluidics may play a vital role in decreasing the total ultrasound energy used and dissipated during cataract surgery, thereby increasing the safety of phacoemulsification.

Hence the present study was done to evaluate how the change in fluidic settings affects the safety and efficacy of the surgery.

In view of current study, this study is an effort to analyse the safety and efficacy of low and relatively higher fluidic settings of aspiration, considering vital intraoperative and post-operative outcome parameters of phacoemulsification cataract surgeries.

MATERIALS AND METHODS

A hospital based study was done to analyse efficacy and safety of low and high fluidic settings in phacoemulsification cataract extraction surgery.

I. Study Setting:

This clinical study was conducted on 104 patients after taking written & informed consent in the department of Ophthalmology in a tertiary care hospital in central India.

II. Study design:

Prospective, randomized, single-blinded study.

III. Sample size: 104 patients.

Sample size has been calculated by using OPENEPI software version 3.01 considering the mean difference in effective

phacoemulsification time as 2.6 with 95% confidence interval, with 90% confidence interval, with 90% power, the minimal sample size was calculated to be 104, with minimum of 52 patients in each group.

IV. Study population:
Every consecutive patient or minimum 104 patients (whichever is more) fitting in inclusion criteria attending Ophthalmology OPD, during a period of 18
47 months of study, at a tertiary care hospital located at central India will be included in this study.

V. Study duration: 18 months.

VI. Inclusion criteria:

- Patients above the age of 50 years.
- Patients with unilateral or bilateral grade 2 nuclear sclerosis cataract,
- as per LOCS III.
- Patients giving valid informed consent

VII. Exclusion Criteria:

- Patients giving negative consent
- Patients less than 50 yrs old
- Patients with diabetes mellitus
- Patients with Traumatic cataract
- Patients with Complicated cataract
- Patients with Nuclear sclerosis grades 1,3 & 4.
- Patients with any current conjunctival or corneal infection.
- Patients with Scarred or Hazy cornea.
- Patients with corneal pathologies such as dystrophies, degenerations, opacities
- Patients with Shallow anterior chamber (<2.1 mm)
- Patients with Small pupils (<5 mm)
- Patients with History of previous intraocular surgery
- Patients with with glaucoma.

VIII. Statistical analysis:
Statistical analysis was done using SPSS software version 16.

IX. Method of measurement:
After approval from ethical committee and written informed consent of patients, this study was conducted in a tertiary care medical college and hospital in central India. 104 patients, above age of 50 yrs with unilateral or bilateral Nuclear sclerosis grade 2 cataract, were enrolled in this study. Patients were randomly divided into two groups, 52 patients in each group:
The two groups were:
1st group patients who underwent phacoemulsification with low fluidic settings viz:
Flow rate = 25 ml/min
Vaccuum = 250 mm of Hg.

2nd group patients who underwent phacoemulsification with high fluidic settings viz:
Flow rate = 35 ml/min
Vaccuum = 350 mm of Hg

All the patients according to inclusion and exclusion criteria were selected. Thorough preoperative evaluation was done and all the routine investigations (CBC, PMBS, Blood Urea, Serum Creatine, HIV, HbsAg) were carried out. After the required physician fitness, Informed & written consent was obtained from all patients after detail explanation of the procedure to be performed.

All the necessary Ocular preoperative investigations were done, including:

- Visual acuity
- Autorefractokeratometry
- Intra Ocular Pressure
- Sac syringing
- Slit lamp examination
- fundus examination
- A scan
- Pachymetry (for baseline preoperative central corneal thickness measurement)

After thorough pre-op preparation, pachymetry was done using Alcon pachymeter to measure central corneal thickness of the respective pre-operative eye, one day prior to the planned surgery.

3 consecutive readings were taken; average of the three was recorded as the pre-operative central corneal thickness of the subject.

Every consecutive patient was divided randomly into two groups.

Group-1 patients underwent cataract extraction with phacoemulsification with low fluidic settings and,

Group-2 patients underwent cataract extraction with phacoemulsification with high fluidic settings

All surgeries were performed by the same experienced surgeon.

All the patients, in both groups, were operated using the same phacoemulsification machine, by same technique and by keeping all the settings and parameters of the machine constant, except the fluidic settings (flow rate & vacuum), which were changed according to group 1 and group 2.

Surgical steps:

- pupillary dilation was achieved with tropicamide 0.8% and phenylephrine 5% eye drop
- Topical anaesthesia was induced using proparacaine 0.5% eye drop.
- Adequate aseptic precautions were taken. Topical antibiotics, preoperative periocular preparation with povidone-iodine combined with a sterile operating room protocol were followed.
- A single 0.9 mm side port was created using 15 degree lance tip.
- After injecting trypan blue dye, anterior chamber was washed with saline
- Anterior chamber was then formed with ophthalmic viscoelastic device (OVD).
- The main port was made using a biplanar clear corneal incision created temporally by a 2.2mm keratome.
- A continuous curvilinear capsulorrhexis was performed using a bent 26 gauge needle cystitome.
- After hydrodissection and hydrodelineation, phacoemulsification was performed using Alcon – Laureate phacoemulsification system by using stop and chop technique.
- After nucleus removal, cortical matter was removed with bimanual irrigation/aspiration (I/A) tip.
- Anterior chamber was then formed with OVD
- An aspheric, biconvex, hydrophilic, foldable, acrylic IOL was implanted into the eye with the recommended injector system.
- The residual OVD in the anterior chamber was then removed with bimanual irrigation and aspiration tips and the side port and main port were hydrated.
- Topical antibiotic was instilled.
- All surgeries of study cases were uneventful, with intraocular lens well centered and placed in the capsular bag. No intraoperative complications such as posterior capsular rent, zonular dehiscence, failure to place IOL in bag, vitreous loss and iris chaffing were encountered in any of the cases amongst both the groups
- The algorithm for postoperative topical pharmaceutical treatment included standard use of steroid drops every 4 hours for the first week and four times per day until week 4.
- Antibiotic drops were recommended for four times/day for the first 2 weeks
- The peristaltic phacoemulsification machine (Alcon Laureate) used for operating all patients in both groups, all the set-up was kept constant except for fluidic settings, which were adjusted according to the group of the patient.

Fig 1: peristaltic phacoemulsification machine used in our study.

The fluidic settings used to divide and conquer the nucleus in two groups were as follows:

Table no. 1: phaco-machine parameters in both groups.

Parameter	Group-1	Group-2
Phaco tip	Kelman 45 ° 2.8mm	Kelman 45 ° 2.8mm
Irrigating bottle height	90 cm	90 cm
Ultrasound power	40%	40%
maximum limit(linear)		
Aspiration flow rate	25 ml	35 ml
Vacuum	250 mmHg	350mmHg

To assess efficacy of the two fluidic settings, intraoperative parameters recorded in every patient were

1. Quantity of balanced salt solution used to divide and conquer the nucleus in millilitres (ml).
2. Amount of phaco-tip time required to divide and conquer the nucleus in seconds.

To assess safety of the two fluidic settings, following postoperative
parameters were noted:

1) Evaluation of visual acuity:

Visual acuity was recorded on post-operative days 1 and 7 using the readily available as well as quick and easy to perform - Snellen metric chart, and was converted to logMAR chart numerical values for statistical comparison, using the following standard chart:

Snellen metric and logMAR equivalents:

CONVERSION TABLE FOR LOGMAR TO SNELLEN'S EQUIVALENT

LOGMAR	SNELLEN EQUIVALENT
1.0	6/60
0.9	6/48
0.8	6/38
0.7	6/30
0.6	6/24
0.5	6/19
0.4	6/15
0.3	6/12
0.2	6/9.5
0.1	6/7.5
0.0	6/6
-0.1	6/5
-0.2	6/4
-0.3	6/3

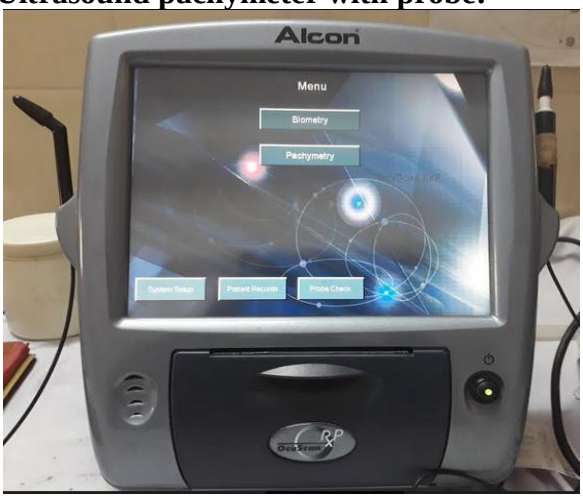
2) Evaluation of central corneal thickness:

Pachymetry was done using Alcon pachymeter to measure central corneal thickness of the respective post-operative eye, by the same observer, on each subject on post-operative days 1 and 7.

3 consecutive readings were taken; average of the three was recorded as the post-operative central corneal thickness of the subject on post-operative days 1 and 7.

Ultrasound pachymeter probe

Ultrasound pachymeter with probe:



3) Evaluation of anterior chamber inflammation:

Post-operative anterior segment inflammation was determined using slit lamp evaluation for cells in the anterior chamber.

Cells in the anterior chamber were analysed by a single observer in all post-operative patients using a slit lamp beam of 1 X 1 mm in height and width, when thrown at an angle of 45-60°.

Based on the finding, the inflammation was categorized from 0 to 4+ grade using the nomenclatures developed by the Standardization of Uveitis

Nomenclature (SUN) [8] working group for grading inflammation in anterior and vitreous chambers, as follows:

The SUN working group grading system for anterior chamber cells

Grade	Cells in field
0	<1
0.5+	1-5
1+	6-15
2+	16-25
3+	26-50
4+	>50

4) Evaluation of corneal clarity:

Corneal oedema grading was done on slit lamp evaluation by a single observer according to the Oxford Cataract Treatment and Evaluation Team (OCTET) and was noted on post-operative days 1 and 7.

Corneal oedema was defined as an increase in central corneal thickness with or without descemet folds.

The OCTET grades corneal oedema as OCTET grading: [9]

Transient corneal oedema	(+)
Transient corneal oedema with descemet membrane folds of <10 in number	(++)
Transient corneal oedema with descemet membrane folds of >10 in number	(+++)

The two groups were further evaluated on basis of following parameters:

a) Intra operatively EFFICACY was assessed by:

1) Quantity of balanced salt solution used to divide and to conquer the nucleus in milliliters(ml)
2) Phaco-tip time (PTT) to divide and conquer the nucleus in seconds.

b) Postoperatively SAFETY was assessed on post-operative days 1 and 7 by evaluating:

1) Visual acuity in Snellen metric and logMAR scale on postoperative days 1 and 7.
2) Pachymetry (central corneal thickness in microns) on postoperative days 1 and 7.
3) Anterior segment inflammation in terms of cells in anterior chamber on postoperative days 1 and 7
4) Corneal clarity in view of corneal oedema and descemet membrane folds on postoperative days 1 and 7.

Statistical Methods

Data in this study are presented as the mean value±standard deviation or as the median (minimum; maximum). Normally distributed variables were evaluated using the *t* - test. Categorical data were presented as numbers (percentages) and was evaluated for significance by determining p - value of test of proportions.

Probability 'p' value < 0.05 was considered statistically significant.

Appropriate statistical software, including but not restricted to MS Excel, SPSS ver. 20 were used for statistical analysis. Graphical representation was done in MS Excel 2007.

RESULT & DISCUSSION

A hospital based study was done to evaluate safety and efficacy of low and high fluidic settings of phacoemulsification cataract surgery, 104 patients, above age of 50 yrs with unilateral or bilateral nuclear sclerosis grade II cataract, were evaluated in this study for their intra and postoperative parameters

Results comprise of:

1. Demographic comparison of two study groups in terms of age and gender.
2. Parameters to assess efficacy viz. quantity of BSS required to divide and conquer the nucleus and phaco tip time to do the same
3. Parameters to assess safety viz postoperative visual outcomes, postoperative changes in CCT, anterior chamber inflammation and corneal clarity.

Statistical Comparison of findings in the two groups considering intraoperative efficacy parameters and postoperative efficacy parameters:

Parameter For analysis of Safety & efficacy	**Group-1** (low fluidic)	**Group-2** (high fluidic)	**P-value**	**Statistical** test used	**Interpretation**
Quantity of BSS used to divide and conquer the nucleus (ml)	110.57 ±12.70	88.65 ±9.90	<0.0000001 *	t - test	Highly significant
Phaco-tip time to divide and conquer the nucleus (seconds)	79.28 ±5.15	62.46 ±3.67	<0.0000001 *	t - test	Highly significant
Visual acuity on post-op day-1 (LOGMAR)	0.30 ±0.08	0.35 ± 0.08	0.0102*	t - test	Significant
Central corneal thickness on preop day(microns)	529.65 ± 6.48	530.50 ± 6.56	0.507	t - test	Not significant
Central corneal thickness on post-op day-1 (microns)	554.63 ±7.08	565.73 ±8.11	<0.0000001 *	t - test	Highly significant
Central corneal thickness on post-op day-7 (microns)	530.69 ±6.90	531.88 ± 6.30	0.3937	t - test	Not significant
Anterior chamber reaction on post-op day-1	16/52 = 30.7%	28/52 = 53.8%	0.0176*	p - value of test of proportions	Significant
Subjects with OCTET grade >1 (with descemet folds)	1	8	0.0151*	p - value of test of proportions	Significant

*p<0.05

DISCUSSION

The mean age was 61.05 ± 3.97 years in entire study population, with mean age of 60.63±4.21 years in group-1, and 61.48±3.85 years in group-2, the difference being statistically insignificant (p=0.314), thus both groups being equally age matched.

Sex distribution of the 104 patients in our study population, there were 53 males (50.96%) and 51 females (49.04%), the male: female ratio being 1.03:1. Therefore both groups were equally matched in demographic parameters of age and sex.

The cataract surgery was uneventful in all eyes. No patient had any signs of corneal burn or intra and/or postoperative complications.

Analysis of efficacy:

The efficacy was analysed by comparing the quantity of BSS required to divide and conquer the nucleus and the phaco-tip-time required to divide and conquer the nucleus.

a) Quantity of BSS required to divide and conquer the nucleus:

In our study, patients operated with lower fluidic setting (group-1) required 110.50±12.70 ml. of BSS, which was 19.82% more than that required in patients operated with higher fluidic setting (group-2) who required 88.65±9.90ml.

This difference being statistically highly significant (p<0.0000001)

The 19.82% of additional fluid required with lower fluidic settings can be explained

by the more duration of surgery required to divide and conquer the nucleus and the same bottle height in both settings. Also, phaco-tip occlusion is accomplished more often with higher fluidic settings and hence BSS consumption is lesser. [10,11] Therefore, even though higher fluidic settings used 40% more AFR, the amount of BSS required was lesser by 19.82%.

b) Phaco-tip time:

In our study, patients operated with lower fluidic setting (group-1) required 79.28 ±5.15sec. to divide and conquer the nucleus, which was 26.92% more than that required in patients operated with higher fluidic setting (group-2) who required 62.46 ± 3.67sec.

The difference in phaco-tip time was statistically highly significant ($p<0.0000001$).

Group-2 patients required 26.92% lesser phaco-tip time as occlusion must be accomplished more often with high than with low fluidics. This is in close concordance with findings of Schriefl SM et al. [12] in a institutional study which required 30% lesser time with higher fluidic settings.

Analysis of safety:

The safety of phacoemulsification cataract surgery with low and higher fluidic settings were analysed by comparing the post-operative visual acuity, central corneal thickness to assess the endothelial injury, cells in anterior chamber and corneal clarity on post-operative days 1 and 7.

a) Post-operative visual acuity on day-1 and 7:

The mean pre-operative visual acuity was same in both groups [LOGMAR = 0.53] The mean post-operative vision on POD-1 in LOGMAR in group-1 was 0.30±0.08 = 6/12 (in Snellen metric) and 0.35 ± 0.08 = >6/12 (P) in group-2 The difference in visual outcomes in patients of two groups on post-operative day-1 was statistically significant ($p = 0.0102$)

On post-operative day 7, the BCVA in patients with both groups were same.

Similar results were found in studies conducted by Kamra D et al [13] and Das S et al [14] in which no statistically significant difference in mean logMAR BCVA on post operative day 7 ($p=0.816$ and $p=0.062$ respectively.)

This improvement in visual acuity by 1 week post-operatively can be attributed to resolution of corneal oedema, improved corneal clarity and resolution of intraocular inflammation [15-17]

b) Post-operative central corneal thickness on day-1 and 7:

Both our study groups were equally matched in terms of pre-operative central corneal thickness. The mean pre-operative central corneal thickness (in microns) in groups 1 and 2 were 529.65 ± 6.48 µm and 530.50 ± 6.56 µm respectively. The difference being statistically insignificant ($p=0.507$)

The overall mean baseline (pre-op) CCT in entire study population was 530.07±6.52 µm, which increased by 5.68% on post-operative day-1, similar to the institutional study findings by Salvi SM et al. [18] who found a CCT rise by 6.04% on post op day-1 of phacoemulsification of same grade of cataract. On post-operative day-1, the mean CCT increased to 554.63±7.08 µm in group-1 and 565.73±8.11 µm in group-2 The difference between the rise of CCT in two groups was statistically highly significant ($p<0.0000001$)

This post operative rise in central corneal thickness after phacoemulsification cataract surgery was due to corneal endothelial injury, the function of which is to maintain deturgescence of the corneal stroma. [19]

Corneal thickness increases when the pump and barrier function of endothelium are compromised. Measuring CCT helps gauge the extent of surgically induced endothelial trauma. There was an acute, significant increase in the CCT on postoperative day-1 in both the groups. Our findings are in concordance with Vasavada

V et al. [20]

The mean post-op CCT (in microns) on POD-7 were 530.69 ± 6.90 µm in group-1 and 531.88 ± 6.30 µm in group 2, almost same, with no statistically significant difference. (p=0.393)

This corneal oedema reduced to be nearly equal to the pre-operative state by post-operative day-7

In our study, the above reversible pachymetric changes in CCT were in agreement with findings of Bolz M et al. [21] and Salvi SM et al. [18] according to which the post-operative rise of CCT almost reaches the baseline pre-operative pachymetric values 1 week after surgery.

c) Anterior chamber reaction:

Anterior chamber cells were graded as per Standardization of Uveitis Nomenclature (SUN) working group criteria, on slit lamp evaluation.

On post operative day 1, none of the patients had grade 3 or grade 4 cells. Only 1 patient operated in group-2 had grade 2 cells, in 43 other patients grade-1 cells were seen in entire study population.

The proportion of post-operative patients with Anterior chamber reaction cells on POD-1 in groups 1 Group 1 was 16 / 52 = 30.7% and in group 2 was 28 / 52 = 53.8%

The difference in proportions of patients with cells in anterior chamber is statistically significant (p = 0.017)

Similar findings were observed in an institutional study by Vasavada V et al. [20]

The cells in anterior chamber subsided by post operative day-7. Various studies suggest that aqueous flare and cells were greatest on the first postoperative day and then declined rapidly in the first week. [22,23]

Tsuramiki et al. [23] found a similar peak in flare and cells on the first post operative day with a decline thereafter in follow up of 7 days.

d) Post operative Corneal clarity:

The corneal clarity post operatively was assessed in terms of corneal oedema and presence or absence of descemet membrane (DM) folds and the number of DM folds as observed on slit lamp evaluation on postoperative days 1 and 7

The grading was done according to the Oxford Cataract Treatment and Evaluation Team (OCTET) criteria which evaluate transient corneal oedema and number of DM folds. [9]

All the patients in both groups had transient corneal oedema on postoperative day-1, thus falling in minimum grade 1+ of OCTET criteria.

Eight patients operated with high fluidic settings, that is 17.03% of group-2, had presence of DM folds <10 in number thus falling in OCTET grade 2+ as compared to only one patient in group-1.

The corneal oedema and DM folds subsided completely by post-operative day-7 in our study.

Significant number of patients had reduced corneal clarity in patients operated with higher fluidics than with low fluidic settings. The difference being statistically significant (p = 0.015)

Due to transient corneal oedema with DM folds on 1st postoperative day, group-2 patients had less clearer corneas as compared to group-1, these findings were in concordance with those in study by Vasavada V et al. [20] which states Anterior chamber flare, cells and corneal clarity at day-1were significantly better in group-1 patients operated with low fluidic settings, than in group-2 of higher fluidic settings.

CONCLUSION

Analysis of efficacy:

Intraoperative efficacy can be safely and convincingly considered to be greater with relatively higher fluidic settings as it requires significantly lesser amount of balanced salt solution and also lesser phaco-tip time to divide and conquer the cataractous nucleus, as compared to low fluidic settings of phacoemulsification

Analysis of safety:

All the surgeries in both the study groups were uneventful, with intraocular

lens well centered and placed in the capsular bag, with no intraoperative complications.

Postoperative outcomes in terms of BCVA, corneal oedema, anterior chamber inflammation and corneal clarity, though initially better with low fluidic settings, were eventually equally matched in both groups by one week postoperatively.

Our results show that switching from low to relatively high fluidic settings statistically significantly decreases the quantity of fluid used and time of surgery. The occlusion was accomplished more often with high than low fluidic settings. The aspiration of the quadrants was therefore more efficient with high fluidic settings.

There was no significant difference in postoperative visual acuity and corneal clarity eventually between the two groups suggesting that low and high fluidic settings are equally safe to use and enhanced pump speed in higher fluidic settings did not cause more tissue damage.

Thus to conclude, in a developing country like ours with limited resources and colossal load of cataracts it can be safely advisable to shift to relatively higher fluidic settings of phacoemulsification which are more efficient and equally safe as low fluidic settings, and require significantly less quantity of prized resources like balanced salt solution and time of the trained phaco-surgeon.

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