Ophthalmology Research: An International Journal

10(2): 1-7, 2019; Article no.OR.48686
ISSN: 2321-7227

Study of Outcome of High Volume Manual Small Incision Cataract Surgery and Complications in Garhwal Himalayan Region

Achyut N. Pandey[1] and Manoj Tyagi[2*]

[1]Department of Ophthalmology, CIMS, Bilaspur, CG, India.
[2]Department of Ophthalmology, Government Medical College, Datiya, MP, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/OR/2019/v10i230100
Editor(s):
(1) Dr. Ahmad M. Mansour, Professor, Department of Ophthalmology, American University of Beirut, Lebanon.
Reviewers:
(1) Gabor Nemeth, Borsod-Abaúj-Zemplén County Hospital and University Teaching Hospital, Hungary.
(2) Italo Giuffre', Catholic University of Rome, Italy.
Complete Peer review History: http://www.sdiarticle3.com/review-history/48686

Original Research Article

Received 27 January 2019
Accepted 20 April 2019
Published 07 May 2019

ABSTRACT

Aim of the Study: To compare High Volume with Low Volume Cataract Surgery Outcomes in a tertiary eye care hospital in Garhwal Himalayan Region, over a 30-day period, in terms of Quality as gauged in terms of Intra-operative complications and their management and Post-operative complications and their management (on day 1 and day 30).
Materials and Methods: A prospective, randomized, observational study conducted on 300 eyes of 300 patients at a tertiary hospital, total duration of 4 months was taken for data collection. Patients were divided into 2 groups: A) those coming in the low volume season (summer months) and B) those coming in the high volume season (winter months). Normal standard protocols were followed pre/per/post operatively.
Results: Intra-operative complications between the two months (settings) by independent t-test the p value was 1.00 which was not statistically significant (mean of complication: August=0.86+1.83; December=0.86 + 1.29). 1 month post-operative complications between the two months (settings) by independent t-test the p value was 0.56 which was not statistically significant (mean of complication: August=0.09 + 0.30; December=0.18 + 0.4).

**Corresponding author: E-mail: drtyagimanoj@gmail.com;*

Conclusion: Intra-operative, post-operative complications on 1st day and at one month follow up, High Volume Cataract Surgery (greaterthan 40 Manual Small Incision Cataract surgeries) does not affect the quality when compared with Low Volume Cataract Surgery over a 30-days period in a tertiary institute in Central India.

Keywords: Cataract; manual small incision cataract surgery; phacoemulsification; small incision cataract surgery.

1. INTRODUCTION

Cataract, a leading cause of global preventable blindness, has prevalence (based on Indian definition) of over 12 million people in India and incidence (based on WHO definition) is around 3.8 million new cases per year [1,2,3]. The current levels of cataract surgery are around 2.7 million cases per year, and this is far below what needs to be done to clear the backlog and also tackle the incidence. The advent of Manual Manual Small Incision Cataract Surgery (MSICS) gave improved visual outcome, being cheaper and requiring lesser time [4-8]. Phacoemulsification was too expensive an affair and took more time than Manual Small Incision Cataract Surgery [9-12]. This shift was the genesis of the concept of 'high volume with high quality' in cataract surgery. The definition of high volume cataract surgery is variable.[13-15] But more important than the absolute daily volume of cataract surgeries done, is the number of cases operated per hour as increased Cataract surgery rate (CSR) caused more complications. A skillful surgeon operating quickly, not only reduces the backlog, but also minimizes surgical handling thereby reducing inflammation and improving outcomes.

1.1 Aim of the Study

To compare High Volume with Low Volume Cataract Surgery Outcomes in a tertiary eye care hospital in Garhwal Himalayan Region, over a 30-day period, in terms of Quality as gauged in terms of Intra-operative complications and their management and Post-operative complications and their management (on day 1 and day 30).

2. MATERIALS AND METHODS

A prospective, randomized, observational study conducted on 300 eyes of 300 patients at a tertiary hospital Garhwal Region, with a total duration of 4 months was taken for data collection. Patients were divided into 2 groups: A) those coming in the low volume season (summer months) and B) those coming in the high volume season (winter months). Normal standard protocols were followed pre/per/post operatively. Outcomes in these 2 groups were compared in terms of the above mentioned parameters after dividing the complications into sub groups: mild; moderate and severe (based on severity and morbidity).

2.1 Exclusion Criteria

i) Cataract surgery combined with any other procedure / type of surgery in the same sitting.
ii) All "Guarded Visual Prognosis "cases
iii) All patients with diabetes or any other systemic disease that would directly affect the surgical outcome.

Independent T test was used for analyzing the data.

3. RESULTS

Phacoemulsification (*phaco*) is the most common technique used in developed countries. It involves the use of a machine with an ultrasonic handpiece equipped with a titanium or steel tip. The tip vibrates at ultrasonic frequency (40,000 Hz) and the lens material is emulsified. A second fine instrument (sometimes called a "cracker" or "chopper") may be used from a side port to facilitate cracking or chopping of the nucleus into smaller pieces. Fragmentation into smaller pieces makes emulsification easier, as well as the aspiration of cortical material (soft part of the lens around the nucleus). After phacoemulsification of the lens nucleus and cortical material is completed, a dual irrigation-aspiration (I-A) probe or a bimanual I-A system is used to aspirate out the remaining peripheral cortical material.

Manual small incision cataract surgery (MSICS): This technique is an evolution of ECCE where the entire lens is expressed out of the eye through a self-sealing scleral tunnel wound. An appropriately constructed scleral tunnel is

watertight and does not require suturing. The "small" in the title refers to the wound being relatively smaller than an ECCE, although it is still markedly larger than a phaco wound.

This study had a total of 300 patients enrolled in the study, 150 each were present in the month of August (low volume month) and December (high volume month).

Table 1. Intra Op complications and management

MSICS Group				
Intra op complications	**August**	**Secondary interventions**	**December**	**Difference**
	No %		**No. %**	**Secondary interventions**
Morbidity causing complications				
Hyphema	0	0	0	0
Iridodialysis	0	0	0	0
Total no of complications	0	0	0	0
Total patients complicated	150		150	

Table 2. 1st day post-operative complications and management

MSICS group			
1st day post-op. complications	**August No. %**	**Secondary intervention**	**December difference No. % secondary intervention**
Temporary morbidity causing complications			
Wound gape/leak	**0 0**		**2 1.75 Sutures at 2 Tunnel**
Striate Keratopathy	5 4.35	Conservative	8 7.02 Conservative 3
Corneal oedema	10 8.70	Conservative	10 8.77 Conservative 0
Retained lens/ Cortical Matter	4 3.48	Conservative	1 0.88 Conservative -3
Significant AC cells (>+3)	0 0		17 14.91 Conservative 17
Significant AC flare(>+2)	0 0		2 1.75 Conservative 2
Shallow AC depth (< ¼;VH grading)	0 0		1 0.88 AC formation 1
Fibrin membrane/fibrin strand	1 0.87		0 0 0
Diffuse Hyphaema 5 4.35 Conservative 5 11.90 Conservative			
Total no. of Complications	25 21.74		46 40.35
Total No. of Patients	150		150

Table 3. 1st day post-operative complications and management

MSICS group				
1st day post-op. August Complications	**No. %**	**Secondary intervention**	**December No. %**	**Difference Secondary intervention**
Potentially vision threatening complications				
Vitreous in AC 1	0.87	AV	0 0	0
Severe Iritis 1	0.87	Conservative	1 0.88	Conservative 0
IOL drop 0	0		0 0	0
RD/Vh 0	0		0 0	0
Total no. of 2 1.74 Complications			1 0.88	
Total no. 115 Patients			114	
Total Patients 25 21.74 with Complications			43 37.72	

Table 4. Month post-operative complications and management

MSICS group						
1 month	**August**			**December**		**Difference**
Post-operative complications	**No. %**		**Secondary intervention**	**No. %**		**Secondary intervention**
Minor complications						
Persisting DM Detachment (peripheral)	0	0		0	0	0
Slightly Decentred IOL	1	2.22	No intervention	0	0	-1
Total no. of Complications	1	2.22		0	0	
Total No. of Patients	45			52		

Table 5. Month post-operative complications and management

MSICS group						
1 month	**August**			**December**		**Difference**
Post-operative complications	**No. %**		**Secondary intervention**	**No. %**		**Secondary intervention**
Temporary morbidity causing complications						
wound gape/ leakage	0	0		0	0	0
Diffuse Hyphaema	0	0		0	0	0
Total no. of Complications	0	0		0	0	
Total No. of Patients	45			52		

Table 6. 1 month post-operative complications and management

MSICS group					
	August			**December**	**Difference**
Post-operative Complications	**No. %**		**Secondary intervention**	**No. %**	**Secondary intervention**
potentially vision threatening complications					
Uveitis	0	0		0 0	0
Vitreous in AC	0	0		0 0	0
Corneal decom -pensation/ bullous keratopathy	0	0		0 0	0
IOL drop	0	0		0 0	0
RD/CME/Vh	0	0		0 0	0
Late –onset Endophthalmitis	0	0		1 1.92	IV antibiotics 1
Any other (DM Loss With CO)	0	0		1 1.92	Conservative 1
Total no. of Complications	0	0		2 3.84	
Total patients	45			52	
Total Patients with Complications	1	2.22		2 3.84	

Of the 150 patients operated in one of the low volume month, intra- operative complication was found in 12(10.43%). Premature entry was seen in 1 case (0.87%). Peripheral Descemets Membrane Detachment occurred in 1 case (0.87%), Capsulorrhexis extension in 6 case (5.22%) and posterior capsular rupture with vitreous loss in 4 cases (3.48%).

Similarly, of the 150 patients operated in the high volume month (December), intra-operative complication was found in 12 cases (10.43%).

Premature entry was seen in 4 cases (3.48%). Descmets Membrane Detachment was present in 1 cases (0.87%), Iris chaffing was present in 3 cases (2.61%), Capsulorrhexis extension was present in 1 case (0.87%), Posterior capsular tear (PCR) with vitreous loss was present in 2 case (1.74%) and zonular dialysis was seen in 1 case (0.87%).

4. DISCUSSION

The present study showed total complications at 1 month post-operative period met were 2.22% (1/45) and 3.84% (2/52) in the low and high volume month respectively. Parikshit Gogate et al. compared, in 200 patients, complications by 4 surgeons equally proficient in both Manual Small Incision Cataract Surgery and Phacoemulsification. The table below compares their various findings with that of our study: Schein et al. and other studies too mentioned little effect of surgical technique and volume of cases [21-24]. Ruit et al. reported 2.9% surgical complications at 2 months. Also Chaim M. Bell et al. and Jacobs PM mentioned lesser complications with larger number of surgeries in a day while Ninn-Pedersen K et al. mentioned otherwise (*i.e.*, a 2.9-fold greater risk in low-volume surgeons). In our study in the high volume settings, we had a solitary case of late onset post-operative endophthalmitis [25-28]. The present study shows a higher percentage of endophthalmitis in our high volume setting as compared to other similar settings in India also. This may be due to the reason that in the present study the sample size is small compared to other studies which were basically designed to study endophthalmitis incidence. Also there may be an attrition bias as the records of our hospital show a 0.3%- 0.5% of endophthalmitis rate. Also this study was done as an 'intention to treat' analysis and therefore the incidence of endophthalmitis cannot be represented by this study which is just comparison of high volume and low volume month complications. In the present study, the complication rates are either comparable or lower (with the exception of the sole endophthalmitis case in the manual Small Incision Cataract Surgery group), than other studies- in both the surgical groups.

Also different studies showed that the various complications did not have a specific pattern. They also showed that individual complications were independent of the surgical volume difference and seemed to be more dependent on each surgeon's skill and technique. On further analyzing the present study it was seen that outcomes of complications did not have a statistical difference (both Phaco group and Manual Small Incision Cataract Surgery) by change in volume of surgeries performed as some complications occurred more in low volume setting while others in high volume settings.

5. CONCLUSION

As gauged in terms of intra-operative, post-operative complications on 1st day and at one month follow up, High Volume Cataract Surgery (greater than 40 Manual Small Incision Cataract surgeries) does not affect the quality when compared with Low Volume Cataract Surgery over a 30-days period in a tertiary institute in Central India.

CONSENT AND ETHICAL APPROVAL

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle3.com/review-history/48686