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**Research Article**

# A COMPARISON OF MODIFIED MANUAL SMALL INCISION CATARACT SURGERY (M-MSICS) WITH PHACOEMULSIFICATION CATARACT SURGERY

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**A R T I C L E I N F O**

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**A B S T R A C T**

***Purpose:*** A Comparison of modified manual small incision cataract surgery (M-MSICS) with Phacoemusification in terms of intra and postoperative complications, best corrected visual acuity (BCVA), surgical duration, surgeon comfort and patient comfort. ***Methods:*** In this prospective study, the patients having cataracts with nuclear sclerosis of grade 1 to grade 4 were randomly assigned in 2-groups with 100- patients in each group [Group A (M-MSICS), Group B (PHACO)]. Following table explains the two techniques (Table 1) Both techniques were compared for each stage in terms of surgical duration and surgeon comfort [graded as comfortable (C1), convenient (C2) and difficult (C3)]. Also both techniques were compared in terms of Intra and postoperative complications, Best Corrected Visual Acuity (BCVA) and patient comfort. Follow ups in postoperative period were carried out on 1st day,1st week, 2wks and 6wks postoperatively. ***Results:*** Intraoperative complications were almost similar in 2-groups. As far as postoperative complications were concerned, in M-MSICS group the postoperative corneal edema on 1st POD was present in 8% cases as compared to 3% in PHACO.($p<0.05\%$). Postoperative surgical induced astigmatism at 6-weeks was +0.89D in M-MSICS group as compared to 0.40D in PHACO. Group ($p<0.05\%$). Average surgical duration for stage 1 in both techniques was almost similar, however for stage 2 it was more in PHACO. Group ($p<0.05$) and for stage 3 more in M-MSICS group..The surgeon comfort for both techniques in stage1&2 was similar, but for stage3 it was more comfortable for PHACO. Visual outcome was almost similar in both techniques at 6-weeks. ***Conclusion:*** PHACO is better technique than M-MSICS in terms of less postoperative corneal edema, fast visual recovery & less postoperative surgical induced astigmatism.



## INTRODUCTION

Cataract is leading cause of blindness in India accounting for 62.6% and the prevalence of blindness is 1.1%.1 An estimated 4 million people become blind because of cataract every year,2 which is added to a backlog of 10 million operable cataracts in India, whereas only 5 million cataract surgeries are performed annually in the country.3

Thus, a technique of cataract surgery that is not only safe and effective but also economical and easy for the majority of ophthalmologists to master, is the need of the hour.

MSICS is not only safe and economic but also have easy learning curve, so MSICS is ideal for developing countries. *MSICS* is being propagated as a high-quality, high-volume , low cost cataract surgery in a developing country like India. Pankaj Kumar, M. L. Pandey, K. P. Chaudhary, G. C. Rajput have done (2014)[81] a "Comparative study of conventional manual small incision cataract surgery (C-MSICS) with modified manual small incision cataract surgery (M-MSICS) in terms of intra and postoperative complications, Best Corrected Visual Acuity, surgical duration and surgeon comfort." in IGMC Shimla. The two techniques of MSICS being i.e. Conventional Manual Small Incision Cataract Surgery(C-MSICS)4 which included superior "straight scleral incision" (6.5mm), nucleus delivery with irrigating vectis technique technique and Modified Manual Small Incision Cataract Surgery (M-MSICS)5,6 which included relatively small superior "frown shaped" scleral incision (5.5mm), "hydrodelineation" and "viscoexpression of nucleus".

- Various modifications are described to enable MSICS comparable to phacoemulsification which is a high tech surgery requiring sophicticated costly machineryThe question is that can manual techniques beat or be equal to machine assisted surgeries???
- Which is better MSICS (with various modifications) or high tech Phacoemulsification cataract surgery
- So, this study was done to assess the success of :

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- *Modified Manual Small Incision Cataract Surgery (M-MSICS) the modification* include relatively small incision(about 5.5mm), hydrodelineation and viscoexpression of nucleus as compared to Phacoemulsification cataract surgery by Surgeons equally proficient in both phacoemulsification and SICS

The Intraoperative and postoperative complications were recorded and suitably managed. Surgery was divided into 3-stages and surgeon comfort along with surgery duration was recorded. Postoperatively, the visual outcome was recorded in the follow up period up to 6-weeks.

## MATERIAL AND METHODS

- This study was conducted in the department of ophthalmology, I.G.M.C, Shimla for a duration of 1 year (July 2013-June 2014). 200 patients of cataract were selected at random irrespective of their sex and place of residence. 2-groups with 100 patients in each group were made as follows-
- Group A (M-MSICS) - 100 Patients
- Group B (Phaco.) - 100 Patients

### *Inclusion Criteria*

1. Cases having operable cataract of different types with nucleus hardness7 of any of these grades-I, II or early III.
2. Age group selected was between 35-65 yrs.

### *Exclusion Criteria*

1. Any evident ocular disease or complicated cataract
2. Patients having preoperative astigmatic error more than 0.75D.

### *Comparison of Stages of Surgery in M-Msics and Phaco*

| STEPS | M-MSICS | PHACO. |
|---|---|---|
| 1. Incision, Tunnel making up to entry into AC (In Stage-1) | 5.5mm superior straight incision 1 side port (FIG.1) | 2.8 mm superior straight incision 2 side ports (FIG.2) |
| | Anterior capsule staining with trypan blue | Anterior capsule staining with trypan blue |
| | Dye wash with balanced salt solution | Dye wash with balanced salt solution |
| | Viscoelastic injected to form AC | Viscoelastic injected to form AC |
| | CCC by 26G needle | CCC by 26G needle |
| | AC entry with 3.2 keratome | AC entry with 2.8 keratome |
| | Tunnel extension from 10.30-2'oclock | |
| 2. Nucleus delivery/Phacoemulsification (In Stage-2) | Hydrodissection | Hydrodissection |
| | Hydrodelineation(PHOTO. A) | Hydrodelineation |
| | Nucleus delivery by viscoexpression (PHOTO. B) | Phacoemulsification by divide and conquer technique |
| 3. Cortical wash and PCIOL implantation (In Stage-3) | Cortical wash with simcoe's irrigation and aspiration cannula | Cortical wash with phaco irrigation and aspiration probe(I/A mode) |
| | PMMA PCIOL Implantation | Foldable PCIOL Implantation |

### *Surgeon Comfort*

Operating surgeon's comfort for various steps of Phaco. surgery was accessed. Statement of the operating surgeon regarding the comfort level during the various steps of Phaco. was recorded in the operation theatre on the performa and grading of the surgeon comfort was done as per the table given below:`

| STEPS | C1(comfortable) | C2(convenient) | C3 (difficult) |
|---|---|---|---|
| 1.Tunnel making (In Stage-1) | | | |
| 2.Nucleus delivery/ phacoemulsification (In Stage-2) | | | |
| 3.Cortical wash and PCIOL implantation (In Stage-3) | | | |

### *Patient Comfort*

Patient's symptoms was accessed by the pain felt by the the patient at the first postoperative day through the two procedures mentioned and was graded as:

P1: No pain felt by the patient
P2: Mild to moderate pain
P3: Severe pain felt by the patient

- At the end of surgery in both of the techniques, surgeon comfort and surgery duration recorded as per the Performa.
- PRE And Postoperative Assesment
- VA,VA with Pin hole, BCVA
- SLE, IOP, Fundus examination
- K1 and K2, Mean and Surgical induced Astigmatism(in dioptres) was calculated by simple subtraction method ( postoperatively at 6-wks)

## RESULTS

The data were analysed by using Chi square test. In Chi square test, p value was calculated and a value of less than 0.05 implied Statistically Significant (SS) at 95% Confidence Interval (CI). The Chi square test was done by using SPS version-15.

The following conclusions were drawn from analysing the data that were collected during the study:

1. In M-MSICS group, 66% were male and 34% were female patients. In PHACO. group, 57% were male and 43% were female patients.

2. The mean age of the patients in M-MSICS group, was 60.07 years while in PHACO. group, it was 59.94 years. Most of the patients were from rural area (79.5%).
3. In M-MSICS group, R/E was operated in 50% cases and L/E was operated in 50% cases. In PHACO. group, R/E was operated in 62% and L/E was operated in 38% cases.
4. Maximum no. of the patients were having VA <6/60 in the eye to be operated. In M-MSICS group, the preoperative visual acuity was <6/60, in maximum no. of patients (81%). The same is true for PHACO. group (79%).
5. In M-MSICS group, the mean preoperative astigmatic error was 0.46D. In PHACO. The mean preoperative astigmatic error was 0.42 D. The preoperative cylindrical axis axis in both the groups was more of 'against the rule' (ATR) 55% & 57% followed by 'with the rule' (WTR) 43% & 41% in M-MSICS and PHACO. Group, respectively and lastly 'neutral' type, 2% in each group.
6. Most common Intraoperative complication was subconjunctival haemorrhage, seen in 9% cases in M-MSICS and 6% cases in PHACO. Group which is considered a minor complication. PCR without vitreous loss was seen in 1% case each in M-MSICS and PHACO. group.
7. Surgeon comfort was of grade C1 (comfortable) in all cases both in 'stage1' and 'stage 2' in M-MSICS group while it was of grade 'C1'(comfortable) in 86% cases and 'C2' (convenient) in 14% cases for 'stage3'of surgery.

Surgeon comfort for PHACO. Was of grade 'C1' (comfortable) for all the 3-stages of surgery.

The difference in surgeon comfort grading for stage-3 between M- MSICS group and PHACO. Group is statistically significant (p value<0.001%).

So it can be concluded that the surgeon comfort for surgery stage-3 (cortical wash) is bit less in M-MSICS as compared to PHACO. group.

The mean surgical duration to complete stage-1 was comparable in both M-MSICS and PHACO. Groups.

8. The mean surgical duration to complete surgical stage 2 is more in PHACO. Group as compared to M-MSICS group (statistically significant, p value is 0.00). It was observed that it takes more time for trenching and dividing the nucleus in PHACO. group specially the harder nucleus. Viscodelivery of nucleus in M-MSICS is relatively quick.

The mean surgical duration to complete stage-3, (Cortical wash) was more in M-MSICS as compared to PHACO. (SS,p value is 0.00). The surgical duration to perform stage-3 (cortical wash) was more in M-MSICS group as compared to PHACO. Group can be explained from the fact that in M-MSICS technique as viscoexpression technique is performed for nucleus delivery; it is observed that after performing viscoexpression of nucleus there remains a sheet of lens matter behind over the posterior capsule after the nucleus delivery. So it takes slightly more time to remove this sheet as compared to other group. Cortical wash with phaco. irrigation aspiration mode is quicker than with simcoe's irrigation and aspiration cannula in M-MSICS specially the subincisional cortex.

The difference in the total surgery duration between the 2-groups is not statistically significant.

9. Striate Keratopathy was most common postoperative complication in both the groups. Incidence of Striate keratopathy was significantly less in PHACO. group (3%) than in the M-MSICS group(8%) ( SS, p value)
10. The percentage of patients attaining 6/18 or better vision on day one (1st POD) postoperatively, was significantly higher in PHACO. Than in M-MSICS group (96% Vs 87%) (SS, p value 0.01,)
11. This means that visual rehabilitation was significantly early in PHACO. group as compared to M-MSICS group.
12. The visual acuity with pin hole (VAPH) after 1-week, 2-weeks and 6-weeks postoperatively, was comparable in 2-groups.
13. The best corrected visual acuity (BCVA) at 6-weeks was 6/6 or better in 84% cases in M-MSICS group and in 88% cases in PHACO. Group. This means that in PHACO. There are slightly higher chances of gaining BCVA of 6/6 but not statistically significant.
14. The best corrected visual acuity (BCVA) at 6-weeks was 6/18 or better in 98% cases in M-MSICS group and in 99% cases in PHACO. Group. It means that the final visual outcome is comparable or almost same between the two groups.
15. The surgical induced astigmatism (SIA) was significantly higher in M-MSICS group (0.89D Vs 0.40D) as compared to PHACO. Group (SS, p value 0.00).
16. There was increase in no. Of cases having 'Against the rule' (ATR) astigmatism in both groups, postoperatively while there was a decrease in no. of cases having 'With the rule' (WTR) astigmatism in both the groups.

***Final Conclusion***

***Finally it can be concluded that PHACO.Is better technique than M-MSICS in terms of***

(a) Postoperative Corneal edema is significantly less
(b) Visual recovery is significantly early
(c) Surgical induced astigmatism is significantly less
(d) Surgeon comfort for stage-3 (cortical wash) is more

One drawback of PHACO. Was that the mean surgical duration to complete surgical stage 2 is more in as compared to M-MSICS group.

***M-MSICS is comparable or almost equal to PHACO. in terms of***

(a) Intraoperative complications
(b) Total surgical duration
(c) Patient comfort
(d) Visual outcome at 6 weeks

It can be concluded that Manual SICS has been advocated for poor populations in the developing world because of advantages in cost, reduced technology and maintenance, shorter learning curve, and suitability for mature and

brunescent cataracts. Various modifications and innovations has made MSICS (for example M-MSICS in our study) comparable to PHACO. That is true but still there is a need to train large numbers of new cataract surgeons in both MSICS and PHACO. And also to increase the infrastructure in hospitals serving the underserved societies so that these underserved societies can also have access to the better medical technology like phacoemulsification.

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