Original Article

Comparison of visual outcome in senile cataract after phacoemulsification and manual small incision cataract surgery.

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Abstract

Background: Different surgical treatment options are used to treat cataracts, such as Manual Small Incision Cataract surgery (MSICS) and Phacoemulsification. The present study compares the visual outcomes of phacoemulsification and MSICS in senile cataract patients.

Methodology: A quasi-experimental study was conducted with 270 patients aged between 50 and 70. Patients diagnosed with senile cataract were included in the study and divided equally into two groups, Group A patients underwent MSICS, and Group B patients underwent Phacoemulsification. Pre-operative visual acuity and Postoperative visual acuity were assessed between the two groups on the 1st day, 1st week, and 1st month.

Results: Significant difference (p=0.001) was observed on 1st day of assessing uncorrected visual acuity among both interventional groups. However, no significant difference was observed in uncorrected visual acuity postoperatively on the 1st week (p=0.093) and 1st month (p=0.266).

Conclusion: Both Phacoemulsification and MSICS are beneficial surgical options to treat senile cataract, with both showing similar efficacy to one another.

Keywords

Vision, Cataract, Phacoemulsification.
Introduction
Cataract can be defined as any type of opacity of the crystalline lens in the eye that affects clear vision, and it might occur due to the development of opaque lens fibres. As per the global burden of disease, a cataract is the leading cause of blindness and is the second cause of moderate and severe vision impairment. According to the World Health Organization (WHO) report, approximately 1 billion individuals have a near or distant vision impairment. The primary causes of vision impairment and blindness are uncorrected refractive errors and cataracts. Moreover, the prevalence of distance vision impairment in low and middle-income countries is estimated to be four times higher than in high-income countries. At the same time, rates of unaddressed near vision impairment are estimated to be greater than 80%.

Age-related Cataract or Senile Cataract is also very common in the population; it is a type of cataract in people more significant than 50 years in the absence of mechanical, chemical, or radiation trauma. The prevalence of Senile Cataract is also too high due to risk factors such as environmental stress (UV light, diabetes, and drug ingestion), smoking, alcohol, and social-economic status.

Cataract surgery is easy, safe, and cost-effective. Cataract blindness is avoidable and surgical intervention can effectively restore any visual impairment. Moreover, various surgical treatment options are used to treat cataracts, such as Manual Small Incision Cataract surgery (MSICS) and Phacoemulsification. However, Phacoemulsification is more expensive, and hence many developing nations have replaced it with a more cost-effective surgical method that is MSICS.

Pakistan, a developing country, also has a very high prevalence of cataracts. Jadoon et al. stating that approximately 570,000 adults are blind, and 3,560,000 eyes have a visual acuity of less than 6/60 in Pakistan. Furthermore, the lack of knowledge and poor social background prevent Pakistan from seeking proper surgical treatment. In light of the prevalence of cataracts in the country, it is essential to assess if MSICS is a much cheaper alternative to Phacoemulsification that can deliver the same results. The present study is designed to compare the visual outcomes of small incision cataract surgery and Phacoemulsification in patients with senile cataract.

Methodology
A 24-weeks, quasi-experimental study was conducted at Al- Ibrahim Eye Hospital, Malir, situated in Karachi-Pakistan. This experiment was designed following Helsinki’s declaration, and the study was approved by the hospital’s Ethics and Research Committee, and all patients signed an informed consent form.

Confirmed diagnosed patients with senile cataract aged between 50-70 years were included in this quasi-experimental study. A total of 270 patients consented to participate in this study. The patients were divided equally into two groups by the use of the non-probability convenient sampling method. Group A patients underwent manual small incision cataract surgery, while Group B patients underwent Phacoemulsification. At Baseline, best-corrected visual acuity was assessed using the Snellen eye chart. Postoperative uncorrected visual acuity (UCVA) was assessed using the Snellen eye chart on the 1st day, 1st week, and 1st month after surgery.

Data were analyzed using the statistical package of social science (SPSS) Version 24.0. Difference between the Mean ages among the different groups analyzed by paired “t” test. To evaluate the difference between the two groups at the different periods of follow-up was analyzed through the Chi-square test, and the level of significance was considered p<0.05.

Results
In Group A, the male participants were 72(53.3%), and the female was 63(46.7%). While in Group B, the male participants were 74(54.8%), and the female was 61(45.2%). The mean age of Group A was 54.95 ± 11.0, and Group B was 57.09 ± 10.59. A significant difference was noticed between the two groups in uncorrected visual acuity according to the Snellen Eye chart at 1st post-op day (Table 2).
Table 1: Pre-operative best-corrected visual acuity according to the Snellen Eye chart.

| Variables Pre-operative Best-Corrected Visual Acuity (BCVA) | Group A | Group B | p-value |
|-------------------------------------------------------------|---------|---------|---------|
| Perception of light                                         | 9       | 6.7     | -       |
| Hand Movement                                               | 19      | 14.1    | 5       | 3.7     |
| Counting fingers                                            | 12      | 8.9     | 7       | 5.2     |
| 1/60                                                        | 23      | 17.0    | 15      | 11.1    | <0.001  |
| 2/60                                                        | 18      | 13.3    | 16      | 11.9    |
| 3/60                                                        | 8       | 5.9     | 15      | 11.1    |
| 4/60                                                        | 1       | 0.7     | -       | -       |
| 5/60                                                        | 2       | 1.5     | -       | -       |
| 6/60                                                        | 14      | 10.4    | 15      | 11.1    |
| 6/36                                                        | 18      | 13.3    | 25      | 18.5    |
| 6/24                                                        | 3       | 2.2     | 13      | 9.6     |
| 6/18                                                        | 6       | 4.4     | 14      | 10.4    |
| 6/12                                                        | 1       | 0.7     | 7       | 5.2     |
| 6/9                                                         | -       | -       | 3       | 2.2     |
| 6/6                                                         | 1       | 0.7     | -       | -       |

*p-value <0.05 is considered significant.

Table 2: Uncorrected visual acuity according to Snellen Eye chart at 1st postoperative follow-up.

| Variables Uncorrected Visual Acuity UCVA Operative Assessment 1st Day | Group A | Group B | p-value |
|-------------------------------------------------------------------|---------|---------|---------|
| Perception of light                                               | 1       | 0.7     | -       |
| Hand Movement                                                     | 5       | 3.7     | 5       | 3.7     |
| Counting fingers                                                  | 2       | 1.5     | -       | -       |
| 1/60                                                              | 12      | 8.9     | 4       | 3.0     | <0.001  |
| 2/60                                                              | 5       | 3.7     | 2       | 1.5     |
| 3/60                                                              | 6       | 4.4     | 2       | 1.5     |
| 4/60                                                              | -       | -       | -       | -       |
| 5/60                                                              | -       | -       | -       | -       |
| 6/60                                                              | 19      | 14.1    | 8       | 5.9     |
| 6/36                                                              | 9       | 6.7     | 8       | 5.9     |
| 6/24                                                              | 11      | 8.1     | 7       | 5.2     |
| 6/18                                                              | 16      | 11.9    | 12      | 8.9     |
| 6/12                                                              | 17      | 12.6    | 15      | 11.1    |
| 6/9                                                               | 21      | 15.6    | 50      | 37.0    |
| 6/6                                                               | 11      | 8.1     | 22      | 16.3    |

*p-value <0.05 is considered significant.

In contrast, no significant difference was observed in uncorrected visual acuity according to the Snellen Eye chart at 1st week & 1st-month post-op (Table 3 & 4).
Table 3: Uncorrected visual acuity according to Snellen Eye chart at 1st week of postoperative follow-up

| Variables                      | Group A | Group B | p-value |
|--------------------------------|---------|---------|---------|
|                                | n       | %       | n       | %       |
| Perception of light            | -       | -       | -       | -       |
| Hand Movement                  | -       | -       | -       | -       |
| Counting fingers               | -       | -       | -       | -       |
| 1/60                           | -       | -       | 1       | 0.7     |
| 2/60                           | 1       | 0.7     | -       | -       |
| 3/60                           | -       | -       | -       | -       |
| 4/60                           | -       | -       | -       | -       |
| 5/60                           | -       | -       | 1       | 0.7     |
| 6/60                           | 5       | 3.7     | 1       | 0.7     |
| 6/36                           | 3       | 2.2     | 1       | 0.7     |
| 6/24                           | 5       | 3.7     | 2       | 1.5     |
| 6/18                           | 8       | 5.9     | 5       | 3.7     |
| 6/12                           | 17      | 12.6    | 12      | 8.9     |
| 6/9                            | 48      | 35.6    | 43      | 31.9    |
| 6/6                            | 48      | 35.6    | 71      | 52.6    |

*p-value <0.05 is considered significant.

Table 4: Uncorrected visual acuity according to Snellen Eye chart at 1st month postoperative follow-up

| Variables                      | Group A | Group B | p-value |
|--------------------------------|---------|---------|---------|
|                                | n       | %       | n       | %       |
| Perception of light            | -       | -       | -       | -       |
| Hand Movements                 | -       | -       | -       | -       |
| Counting fingers               | -       | -       | -       | -       |
| 1/60                           | -       | -       | -       | -       |
| 2/60                           | -       | -       | -       | -       |
| 3/60                           | -       | -       | -       | -       |
| 4/60                           | -       | -       | -       | -       |
| 5/60                           | -       | -       | -       | -       |
| 6/60                           | 3       | 2.2     | -       | -       |
| 6/36                           | 1       | 0.7     | -       | -       |
| 6/24                           | 2       | 1.5     | 1       | 0.7     |
| 6/18                           | 11      | 8.1     | 4       | 3.0     |
| 6/12                           | 13      | 9.6     | 10      | 7.4     |
| 6/9                            | 17      | 12.6    | 22      | 16.29   |
| 6/6                            | 88      | 65.18   | 98      | 72.59   |

*p-value <0.05 is considered significant.
Discussion

Our study aimed to see if there will be an improvement in people’s visual acuity with cataracts once manual small incision cataract surgery or Phacoemulsification was performed and see which one of these surgical treatment options was the better. Both of the groups showed improvement in uncorrected visual acuity postoperatively. However, a significant difference (p=0.001) between both the groups was experienced only on 1st day postoperatively. In contrast, no significant difference was observed on 1st week (p=0.093) and 1st month postoperatively (p=0.266) between the two groups. Singh et al. conducted a similar study to ours in patients with immature cataracts. The visual outcome on 1st postoperative day was reported with a good visual acuity (6/6-6/18) in 68% of patients who went Phacoemulsification. Good visual acuity of 77% in patients with MSICS leads to an insignificant difference between the groups (p=0.07). The study also showed that poor visual acuity (6/60) was observed in 6% in the Phacoemulsification group and 1% in the SICS group. Alternatively, our study showed only 11 (8.1%) patients with a visual acuity of 6/6 in the MSICS after the 1st day and 48 (45.6%) after 1st week. There is a difference in the study results conducted by Singh et al., probably since only patients with immature cataracts were selected. However, his study did confirm that SICS was a faster and cheaper method of Phacoemulsification. Gogate et al. also conducted a study in which he followed 400 patients to compare small incision cataract surgery efficacy. The study showed 192 (68.2%) patients in the Phacoemulsification group, and 117 (61.25%) patients in the manual small incision group had an uncorrected visual acuity of better than or equal to 6/18 at 1st week (p=0.153). Whereas in our study, 121 out of 135 patients in the MSICS and 131 out of 135 in the Phacoemulsification had visual acuity of greater than or equal to 6/18. Gogate et al. study coincides with our findings and results, indicating that both surgical methods are excellent; however, Phacoemulsification delivers better visual acuity in both the studies. Both treatment options are highly beneficial to cataract patients, and that both can be used to improve the patients’ visual acuity. This was also in-line with a study conducted by Bhargava et al., which showed substantial improvement (p<0.001) in vision after patients underwent both the processes. However, Phacoemulsification delivered better overall results when it came to visual acuity than MSICS, but it was insignificant. Ruit et al. also reported that both treatment options showed excellent visual outcomes, but MSICS was substantially faster, less expensive, and required less technology than Phacoemulsification. It was regarded as a more appropriate treatment option to treat cataracts, especially in the developing world. A recent study by Rathi et al. concluded that Phacoemulsification gives better uncorrected visual acuity (UCVA) at postoperative day. Our study shows that MSICS is as effective as Phacoemulsification and can be used in low social, economic areas to treat age-related cataracts. Further studies can be done to assess and evaluate other different surgical options to see if they are as effective as those in this study. Additionally, the studies must be done in other private and public hospitals led by surgeons to see if the results overlap with our findings.

Conclusion

MSICS and Phacoemulsification showed no significant difference in postoperative uncorrected visual acuity. MSCIS should be considered for senile cataracts as it possesses the same efficacy as Phacoemulsification with less cost and equipment being used.

Conflicts of Interest

The authors have declared that no competing interests exist.

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References

1. Khurana AK, Khurana B. Comprehensive Ophthalmology: With Supplementary Book-Review of Ophthalmology.
2. Wang W, Yan W, Fotis K, Prasad NM, Lansingh VC, Taylor HR, Finger RP, Facciolo D, He M. Cataract surgical rate and socioeconomics: a global study. IOVS. 2016;57(14):5872-5881.
3. World Health Organization. Blindness and vision impairment. (Updated October 20, 2020). Available at: https://www.who.int/news-room/factsheets/detail/blindness-and-visual-impairment
4. Bourne RR, Flaxman SR, Braithwaite T, Cicinelli MV, Das A, Jonas JB, Keeffe J, Kempen JH, Leasher J, Limburg H, Naidoo K. Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. Lancet Glob Health. 2017;5(9):e888-97.
5. Fricke TR, Tahhan N, Resnikoff S, Papas E, Burnett A, Ho SM, Naduvilath T, Naidoo KS. Global prevalence of presbyopia and vision impairment from uncorrected presbyopia: systematic review, meta-analysis, and modelling. Ophthalmology. 2018;125(10):1492-1499.
6. Hashemi H, Pakzad R, Yekta A, Aghamirsalim M, Pakbin M, Ramin S, Khabazkhoob M. Global and regional prevalence of age-related cataract: a comprehensive systematic review and meta-analysis. Eye. 2020;34(8):1357-1370.
7. Liu YC, Wilkins M, Kim T, Malyugin B, Mehta JS. Cataracts. The Lancet. 2017;390(10094):600-612.
8. Jadoon Z, Shah SP, Bourne R, Dineen B, Khan MA, Gilbert CE, Foster A, Khan MD, Pakistan National Eye Survey Study Group. Cataract prevalence, cataract surgical coverage and barriers to uptake of cataract surgical services in Pakistan: the Pakistan National Blindness and Visual Impairment Survey. Br J Ophthalmol. 2007;91(10):1269-1273.
9. Singh SK, Winter I, Surin L. Phacoemulsification versus small incision cataract surgery (SICS): which one is a better surgical option for immature cataract in developing countries?. Nephrol Dial Transplant. 2009;12(95):95-100.
10. Gogate PM, Kulkarni SR, Krishnaiah S, Deshpande RD, Joshi SA, Palimkar A, Deshpande MD. Safety and efficacy of Phacoemulsification compared with manual small-incision cataract surgery by a randomized controlled clinical trial: six-week results. Ophthalmology. 2005;112(5):869-874.
11. Bhargava R, Kumar P, Sharma SK, Arora Y. Phacoemulsification versus manual small incision cataract surgery in patients with fuchs heterochromic iridocyclitis. Asia Pac J Ophthalmol. 2016;5(5):330-334.
12. Ruit S, Tabin G, Chang D, Bajracharya L, Kline DC, Richheimer W, et al. A prospective randomized clinical trial of Phacoemulsification vs manual sutureless small-incision extracapsular cataract surgery in Nepal. Am J Ophthalmol. 2007;143(1):32-38.
13. Rath A, Singh N, Chauhan RS, Chugh JP, Jain G. A Comparative Study to Evaluate Visual Outcome in Post-Operative Patients of Manual Small Incision Cataract Surgery and Phacoemulsification. Saudi J Med Pharm Sci. 2020; 6(4): 353-358.