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Comparative Analysis of Surgically Induced Astigmatism and Visual Outcomes: Manual SICS vs Phacoemulsification in Hard Nuclear Cataracts.

Abstract

Background: Hard nuclear cataracts pose surgical challenges, especially in developing countries.

Purpose: To compare surgically induced astigmatism (SIA) and visual outcomes between Manual Small Incision Cataract Surgery (SICS) and phacoemulsification.

Methods: A prospective comparative study was conducted on 100 patients with grade III–V nuclear cataracts. Patients were divided into two groups: SICS (n=50) and phacoemulsification (n=50). Postoperative visual acuity and SIA were assessed at 1 week and 6 weeks.

Results: Early postoperative visual acuity was significantly better in the phacoemulsification group. Mean SIA was higher in SICS (1.3 ± 0.3 D) compared to phacoemulsification (0.6 ± 0.2 D) ($p < 0.05$). At 6 weeks, final visual outcomes were comparable between both groups.

Conclusion: Phacoemulsification provides faster visual recovery with lower SIA; however, SICS remains a safe and cost-effective alternative with comparable final outcomes.

Keywords: SICS, Phacoemulsification, Surgically Induced Astigmatism, Hard Cataract, Visual Outcome

Introduction

Cataract is the leading cause of avoidable blindness globally. Management of hard nuclear cataracts remains challenging due to increased nucleus density and associated surgical risks. Phacoemulsification, with its small incision size, offers rapid recovery and minimal astigmatism, whereas Manual Small Incision Cataract Surgery (SICS) is cost-effective and widely practiced in resource-limited settings.

Surgically induced astigmatism (SIA) plays a crucial role in determining postoperative visual quality. The magnitude of SIA depends on incision size, site, and healing

characteristics. This study aims to compare SIA and visual outcomes between SICS and phacoemulsification in patients with hard nuclear cataracts.

Materials and Methods

Study Design

Prospective, comparative, interventional study.

Study Population

100 patients with grade III–V nuclear cataracts attending a tertiary care center.

Inclusion Criteria

- Age > 40 years
- Hard nuclear cataracts (Grade III–V)
- Willing for surgery and follow-up

Exclusion Criteria

- Corneal opacity or irregular astigmatism
- Previous ocular surgery
- Coexisting retinal pathology

Grouping

- Group A: SICS (n=50)
- Group B: Phacoemulsification (n=50)

Surgical Technique

- SICS: Superior scleral tunnel (6–7 mm incision)
- Phacoemulsification: Clear corneal incision (2.8–3.2 mm)

Outcome Measures

- Best Corrected Visual Acuity (BCVA)
- Surgically Induced Astigmatism (calculated using keratometry)

Follow-Up

Postoperative day 1, 1 week, and 6 weeks

Statistical Analysis

Data analyzed using appropriate statistical tests (independent t-test). A p-value < 0.05 was considered significant.

Results

□ Visual Outcomes:

Early postoperative BCVA was significantly better in the phacoemulsification group (p < 0.05). At 6 weeks, no statistically significant difference was observed.

□ Surgically Induced Astigmatism:

o SICS: 1.3 ± 0.3 D

o Phacoemulsification: 0.6 ± 0.2 D

The difference was statistically significant (p < 0.05).

□ Complications:

Minimal intraoperative complications in both groups. Phacoemulsification showed increased difficulty in very dense nuclei.

Discussion

This study highlights that phacoemulsification induces significantly less astigmatism due to smaller incision size, resulting in faster visual rehabilitation. However, SICS demonstrated comparable final visual acuity at 6 weeks.

In hard cataracts, phacoemulsification may require higher energy levels, increasing endothelial risk. SICS, on the other hand, provides a safer and more practical option, especially in high-volume settings.

These findings are consistent with previous literature indicating that while phacoemulsification is technologically superior, SICS remains indispensable in developing countries.

Conclusion

Phacoemulsification offers better early visual outcomes and lower SIA. However, Manual SICS provides comparable final visual acuity and remains a cost-effective and reliable technique for managing hard nuclear cataracts.

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