

Analysis of the effects of cataract surgery on corneal sensation variation after SICS and phacoemulsification

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Abstract

Background: Cataract surgery results in diminished corneal sensitivity, as the procedure involves damage to the normal organization of corneal innervations. The objective of this study is to measure the corneal sensitivity after different types of cataract surgeries.

Methods: A hospital based cross-sectional study was done in patients who were phakic in one eye and pseudophakic in the other, above the age of 45 years. Only patients in whom a minimum of 3 months passed after surgery were taken. Corneal sensitivity was assessed by a Cochet- Bonnet esthesiometer.

Results: The corneal sensitivity following cataract surgery was decreased 9(50%) in SICS superior incision, 12(57.1%) in SICS temporal and 18(85.7%) in corneal incision phacoemulsification by comparing it to the phakic eye of the same group, which has normal corneal sensitivity.

Conclusion: This study suggests that a thorough ocular evaluation of all pre and post-operative patients of cataract surgery should include evaluation for corneal sensitivity.

Keywords: Corneal Sensation, Corneal Surgery, Phacoemulsification, SCIS

Introduction

Cornea is the most densely innervated tissue contains about 7000 nociceptors/ square mm. Corneal nerves carries not only sensation, it also protects cornea by regulating epithelial cell integrity and plays important role in wound healing.^(1,2)

Normal corneal sensitivity (CS) is important for maintaining the normal structure and function of the cornea. There are a number of pathological conditions where corneal sensation is diminished like leprosy, herpes and cerebellopontine angle tumors.⁽³⁾ Anterior segment surgeries and diabetes mellitus disrupt corneal innervations and causes diminished corneal sensation.^(4,5)

Cataract is the leading cause of reversible blindness in our country and also worldwide.⁽⁶⁾ Cataract surgery is the most successful and rewarding surgery in the field of ophthalmology. Small Incision Cataract Surgery (SICS) and phacoemulsification are the major procedures used in cataract surgery.⁽⁷⁾ The main goal of a cataract surgery is to gain and maintain the pre cataract vision and to alleviate the other related symptoms of cataract. In giving the best to the patients with perfection, the techniques and approaches followed by cataract surgeons have constantly changed over the years.⁽⁸⁾

After cataract surgery many patients complain of foreign body sensation, irritation, redness, blurring of vision which are considered as unwanted effects of the surgery.⁽⁹⁾ They are worse in the elderly population and those with ocular surface disorder. These unwanted effects of the surgery persist in some patients until they are managed by subsequent effective treatment.⁽¹⁰⁾

Studies have reported that diminished corneal sensations are signs after cataract surgery.⁽¹¹⁾ The type of cataract surgery done has varying impact in the corneal sensations. SICS may result in a complete loss of sensitivity in the sector of the cornea enclosed by the arc of incision and not recoverable for years.⁽¹²⁾ Different rates of diminished sensation following phacoemulsification is also seen.^(13,14)

This study is focussed to find out whether corneal sensation is diminished following SICS superior, SICS temporal and phacoemulsification surgeries.

Materials and Methods

This study was undertaken from September 2014 to January 2015 in patients who attended the ophthalmology OPD of Sri Manakula Vinayagar Medical College and Hospital, Puducherry.

Inclusion Criteria: Patients who were phakic in one eye and pseudophakic in the other, above the age of 45 years were included. Only patients in whom a minimum of 3 months has elapsed after surgery were taken.

Exclusion Criteria: Patients with conditions like leprosy and other conditions known to affect corneal sensation, apart from diabetes mellitus. Patients with other ocular pathology like corneal ulcer, uveitis, and glaucoma. Patients having undergone any surgeries other than cataract surgery and contact lens wearers were excluded.

The procedure used in this study was approved by the ethics committee of Sri Manakula Vinayagar Medical College and hospital. Signed informed consent was obtained from all subjects after they were informed of the procedure.

Patients who were enrolled in this study were taken after obtaining a thorough history and details regarding the surgery underwent.

There were three groups categorized according to the type of cataract surgery.

Group 1-Small Incision Cataract Surgery with superior incision.

Group 2- Small Incision Cataract Surgery with temporal incision.

Group 3- Phacoemulsification with corneal incision.

Corneal sensitivity evaluation: Cornea Sensation was recorded with a Cochet-Bonnet esthesiometer and graded as normal (5mm to 6mm) or reduced (<5mm). The filament was extended to a full length of 6cm and retracted incrementally in 0.5 cm steps until the patient can feel its contact. Length was recorded in superior, temporal, inferior and nasal quadrants.

Results

The distribution of the type of surgery undertaken by the study population (60) were 18 in SCIS superior, 21 in SCIS temporal and 21 in phacoemulsification (Fig. 1).

Among the 60 patients, 39 had diminished corneal sensation and 21 had normal corneal sensation. 9 patients had diminished corneal sensation and 9 patients were normal, leading to equal distribution in case of SICS with superior incision. There were 12 (57.14%) with diminished corneal sensation and 9 (42.85%) had normal sensation in patients who underwent SICS with temporal incision. Among the 21 patients who underwent phacoemulsification with corneal incision, 18 (85.71%) had diminished corneal sensation and 3 (14.28%) had normal sensation (Table 1).

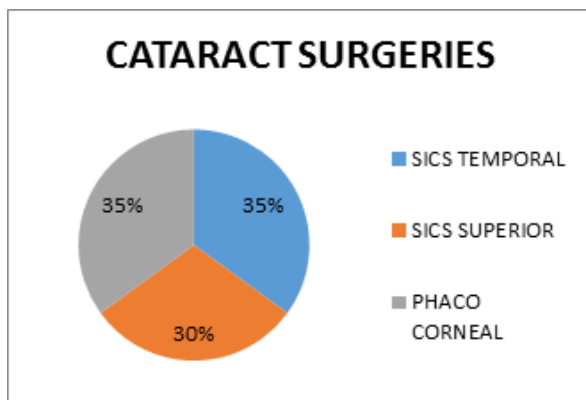


Fig. 1: Cataract surgeries

Distribution of type of surgery done among 60 patients.

Table 1: Representation of the percentage of CS within the three groups

Groups	CS diminished	CS normal
1-SICS Superior	9 50.0%	9 50.0%
2-SICS Temporal	12 57.1%	9 42.9%
3-PHACO Corneal	18 85.7%	3 14.3%
Total	39 65.0%	21 35.0%

CS (Corneal Sensation) is diminished in a higher rate in patients treated by phacoemulsification corneal incision

Discussion

On studying the parameters of the three types of surgeries done, there was a significant decrease in the corneal sensation following phacoemulsification surgery. There are many studies which have indicated some varying degrees of diminution of corneal sensation following cataract surgery.^(5,12) In our study also it was seen that among 60 patients, 39 patients had diminished corneal sensation following cataract surgery. This study showed a decreased corneal sensation following phacoemulsification along the width of tunnel at limbus on comparing with the other two groups (SICS with temporal and superior).

A study by Schirmer et al 1961, found that after the SICS there was a complete loss of sensitivity in the sector of the cornea enclosed by the arc of incision and did not recover in most people even after two years following the surgery.⁽¹²⁾

Decreased corneal sensitivity following cataract surgery using limbal incision or corneal incision was reported by John et al in 1995, which is similar in trend with our study. There were no significant differences in either the rate of decrease or recovery of corneal sensitivity according to the incision sites.⁽¹³⁾

There was a significant decrease in corneal sensation up to 3 months following superior as well as temporal clear corneal and phacoemulsification in a study conducted by Lyne et al 1982, which did not recover even 3 months following surgery.⁽¹⁵⁾

John et al 1988, studied corneal sensitivity after phacoemulsification, using a horizontal scleral incision at 12 o'clock position. Diminished sensation was noted in 90% along the width of the tunnel at the limbus. But sensation never recovered to normal levels.⁽¹⁶⁾ In the present study it showed 85.17% of phacoemulsification along the width of tunnel at limbus. A study in Korean population by Woo et al 2006, found that the corneal sensitivity was significantly lower at the superior and temporal limbal incision sites after surgery than at the other sites. The percentage of SICS superior was 50% and SICS temporal was 57.1% in our study.⁽¹⁷⁾

Conclusion

Cataract surgery is one of the most cost-effective interventions in the field of medicine, resulting in almost immediate visual rehabilitation. Particularly, phacoemulsification is increasingly applied in the management of cataract patients because of its earlier refractive stabilization, and milder postoperative inflammation, all resulting in faster visual rehabilitation. Corneal sensation was found to be reduced because most of the surgical procedures involving the anterior segment of the eye disrupt the normal organization of corneal innervation. It is important to identify the factors that determine the extent of neural regeneration after cataract surgery which may help to enhance the restoration of corneal sensitivity.

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