



Department of Ophthalmology and Visual Science

Comparison of Astigmatic Outcome of Inferior Incision Versus Superior Clear Corneal Incision in Phacoemulsification

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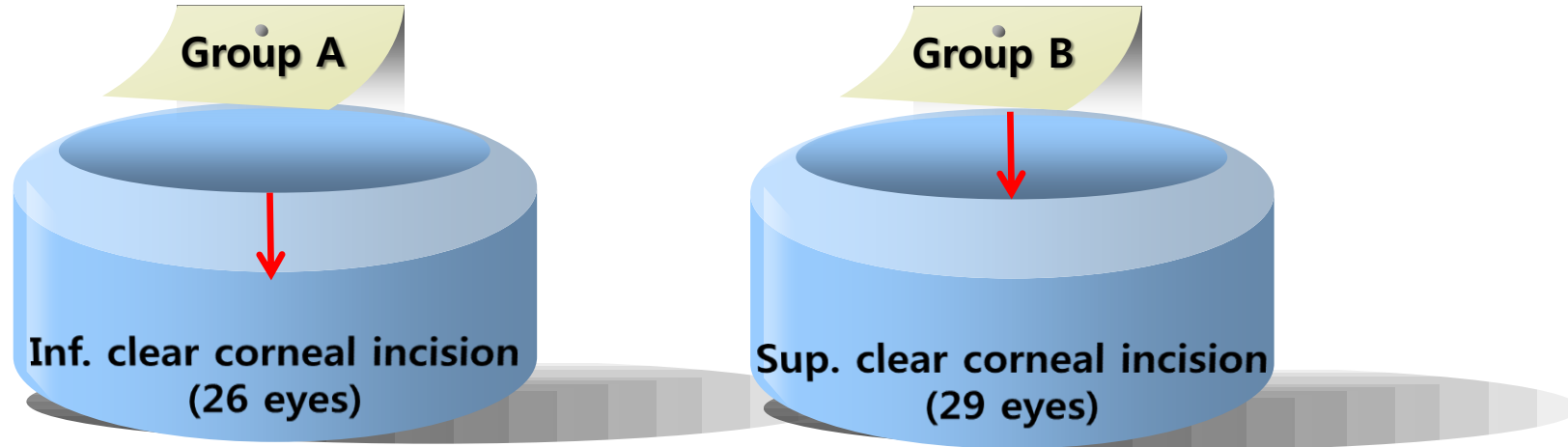
Introduction

- **Temporal clear corneal incision is much used recently in cataract surgery because surgeon's view on operation field is good and it is easy to approach in patients with conjunctival bleb after trabeculectomy or in sunken eyes. In addition, occurrence rate of astigmatism is lower as the distance between the visual axis and the limbus is longer from the temporal site.**
- **However, the report has been made that the amount of astigmatism can be increased after cataract surgery using temporal clear corneal incision when patient's original astigmatism follows with-the-rule.**
- **Cataract surgery using superior clear corneal incision instead might help correcting the preoperative astigmatism in those patients.**
- **But, not many researches are done concerning the effectiveness of inferior clear corneal incision in correcting astigmatism in cataract surgery which is considered to be not much different from superior clear corneal incision in patients with astigmatism with-the-rule.**

Purpose

To analyze the differences in amount of surgically induced astigmatism and mean change in total astigmatism between inferior clear corneal incision and superior clear corneal incision following cataract surgery.

methods



- The total 55 eyes of 55 patients with astigmatism with-the-rule were divided into two groups of inferior incision in 26 eyes; Group 1 and superior incision in 29 eyes; Group 2. Clear corneal incision at 270° was made in group 1 and clear corneal incision at 90° was made in group 2.
- The postoperative astigmatism was measured by using automatic refractometer and topography after two months of surgery when the astigmatism comes into stable state.
- The clear corneal incision site's influence on minimizing the astigmatism was investigated in two groups by examining the surgically induced astigmatism and the absolute amount of change in astigmatism.

Results

Table 1. Demographics and preoperative data in each group

	(1) Inferior incision	(2) Superior incision	*p value
Number of eyes	26	29	
Gender (Male/Female)	10/16	16/13	
Age (years)	55.31 ± 11.60	53.38 ± 11.48	0.224
UCVA (logMAR)	0.75 ± 0.50	0.68 ± 0.36	0.933
BCVA (logMAR)	0.46 ± 0.37	0.40 ± 0.28	0.664
Autorefractometer cylinder	1.18 ± 0.59	1.14 ± 0.54	0.687
Topographic cylinder	1.12 ± 0.65	1.09 ± 0.52	0.906

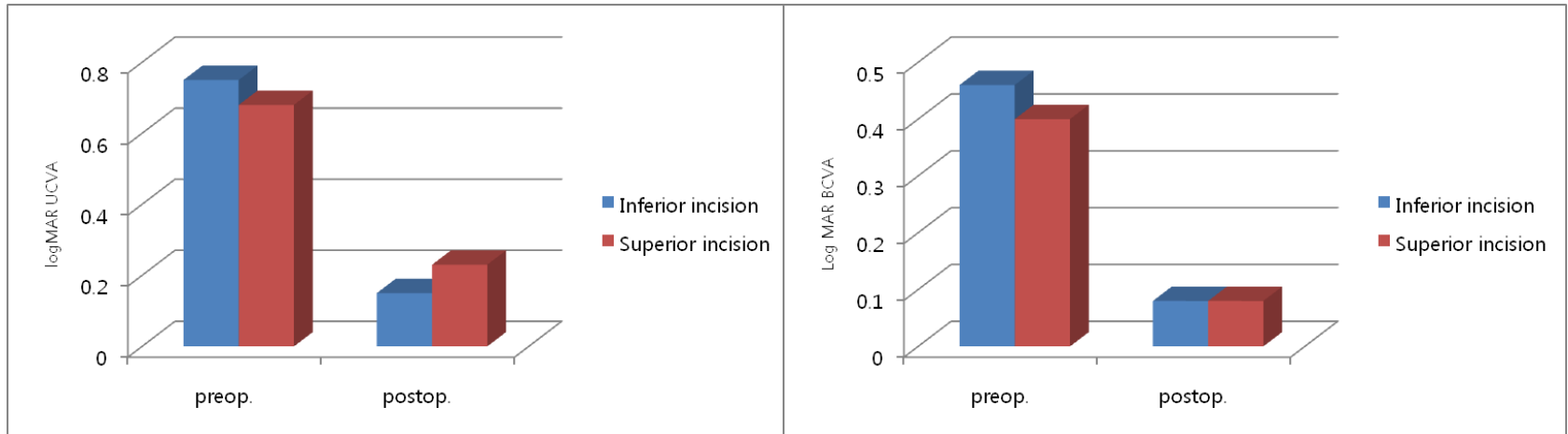
UCVA = uncorrected visual acuity, BCVA = best corrected visual acuity.

*Mann-Whitney U test.

- **Of the total 55 patients(55 eyes), the average age in group 1 was 55.31±11.60 years old(24~76 years old) and in group 2 was 53.38±11.48 years old(26~84 years old) which showed no statistically significant difference in two groups. (p=0.224)**
- **The corneal astigmatism checked by preoperative automatic refractometer and topography was 1.18±0.59 diopter and 1.12±0.65 diopter respectively in group 1 and 1.14±0.54 diopter and 1.09±0.52 diopter respectively in group 2 which also showed no statistically significant difference.(p=0.687, p=0.906)**

Results

Figure 1. UCVA and BCVA in the 2 Groups



- In group 1, the average of preoperative UCVA(logMAR) was 0.75 ± 0.50 and BCVA(logMAR) was 0.46 ± 0.37 . In group 2, the average of preoperative UCVA(logMAR) was 0.68 ± 0.36 and BCVA(logMAR) was 0.40 ± 0.28 . No acknowledgeable difference was found among two groups. ($p=0.933$, $p=0.664$)

Results

Table 2. Postoperative UCVA (logMAR) and BCVA (logMAR) in both(1) inferior incision group and (2) superior incision group

	(1) Inferior incision	(2) Superior incision	*p value
UCVA (logMAR)	0.15 ± 0.17	0.23 ± 0.24	0.253
BCVA (logMAR)	0.08 ± 0.13	0.08 ± 0.12	0.926

UCVA = uncorrected visual acuity, BCVA = best corrected visual acuity.

*Mann-Whitney U test.

- **Moreover, no statistical difference in postoperative 1 month UCVA (logMAR) and BCVA (logMAR) was found in two groups. The average of postoperative UCVA (logMAR) in group 1 was 0.15 ± 0.17 and that in group 2 was 0.23 ± 0.24 . ($p = 0.253$) The average of postoperative BCVA (logMAR) in group 1 was 0.08 ± 0.13 and that in group 2 was 0.08 ± 0.12 . ($p = 0.926$)**

Results

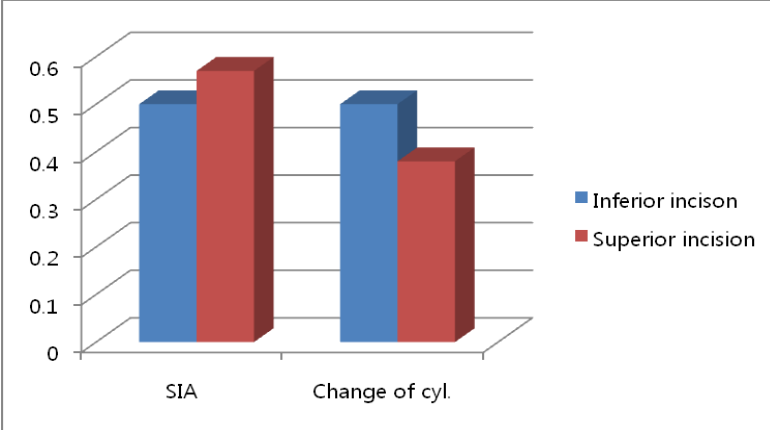


Figure 2. SIA(surgically induced astigmatism) and change in cylinder(absolute value of preoperative cylinder minus absolute value of postoperative cylinder) don't show statistically significant difference between two groups. *Mann-Whitney U test.

Table 3. Surgically induced astigmatism and change in cylinder according to preoperative astigmatism in (1) inferior incision group and (2) superior incision group. Positive result indicates decrease in astigmatism.

	(1) Inferior incision	(2) Superior incision	*p value
Surgically induced astigmatism	0.50 ± 0.33	0.57 ± 0.34	0.324
Change in autorefraction cylinder	0.50 ± 0.96	0.38 ± 0.86	0.426

*Mann-Whitney U test.

- In postoperative 1 month, we used Cravy calculation to find out SIA was 0.50 ± 0.33 diopter in group 1 and 0.57 ± 0.34 diopter in group 2 and that there is no statistically significant difference in two groups.
- The postoperative change in cylinder(absolute value of preoperative cylinder minus absolute value of postoperative cylinder) was 0.50 ± 0.96 in group 1 and 0.38 ± 0.86 in group 2 and this also showed no statistically significant difference.($p=0.426$)

Conclusions

- Astigmatism induced generally after cataract surgery can be affected by the number, location, and size of incision and its forms. Accordingly, many studies of correcting astigmatism have been made by carrying out research on the development of surgical instruments and surgical method to minimize the size of incision and looking for better incision sites.
- Lately, most cataract surgeries are done by using temporal clear corneal incision, but superior clear corneal incision is often used in cases of preoperative astigmatism with-the-rule.
- In this study, the amount of astigmatism was reduced in both groups and there was no statistically significant difference in its amount. ($P < 0.05$)
- This means that inferior clear corneal incision is not less effective than superior clear corneal incision in patients with preoperative astigmatism with-the-rule.

Conclusions

- **The choice of inferior clear corneal incision is thought to be helpful when superior conjunctiva and sclera need to be preserved in glaucoma patients and in patients having conjunctival bleb after trabeculectomy.**
- **The wider operation field is available to surgeon when superior deviation of eyeball due to Bell's phenomenon occurs after local anesthesia for the cataract surgery.**
- **If the remnant lens cortex material at superior is left after phacoemulsification through superior clear corneal incision, it can move down inferiorly by gravity and raise problem in visual acuity or visual field. On the other hand, remnant lens cortex at inferior after inferior clear corneal incision doesn't give much visual problems because it just stays at where it is.**

Conclusions

- There is **no statistically significant difference** between two groups of **inferior clear corneal incision** and **superior clear corneal incision** in minimizing the astigmatism in patients with preoperative astigmatism with-the-rule.
- Thus, cataract surgery through inferior clear corneal incision can be more useful in patients of glaucoma when preserving superior conjunctiva is necessary, those with hard upper eyelid tension, and in sunken eyes.