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ORIGINAL ARTICLE

COMPARATIVE STUDY OF MSICS TECHNIQUE BY SUPERIOR STRAIGHT AND OBLIQUE STRAIGHT (9-12 0'CLOCK) INCISION IN TERMS OF VISUAL OUTCOME, SURGICAL DURATION, SURGEON AND PATIENT COMFORT AND BCVA UPTO 6 WEEKS

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ABSTRACT: AIMS: Comparative study of manual SICS technique by superior straight incision and oblique (9-12 O'clock) straight incision in terms of surgical duration, surgeon and patient's comfort, intraoperative and postoperative complications and visual outcome up to 6 weeks. **MATERIALS AND METHODS:** 200 eyes of cataract were randomly subjected to cataract surgery by manual SICS technique using superior and oblique incision approach in 100 eyes each. Further grouping was done as Group A: RSS-Right superior straight incision, Group B: RSUT-Right superior upper temporal: Group C: LSS-Left superior straight, Group D: LSUN-Left superior upper nasal: 50 case each. Surgeon comfort was accessed in 5 steps namely tunnel making, capsulorrhexis, nucleus delivery, cortical wash and IOL implantation in both groups and graded as comfortable, convenient and difficult. Patient comfort was accessed as pain felt at 1st postoperative day, taken as P1, P2 and P3 according to increasing pain intensity. Surgical duration in both approaches was studied and compared. Visual outcome and complications were accessed at 2, 4 and 6 weeks. **STATISTICAL ANALYSIS:** Commercial SPSS 17 was used for statistical analysis. Chi square test and independent t test was used for calculating p value. **RESULTS:** Visual outcome was comparable in both the groups at 2, 4 and 6 weeks ($p>0.05$).Mean SIA in superior incision was +0.88D and +0.63D in oblique group (p value=0.00).Mean surgical duration in oblique group was 455.88+14.559 seconds and 541.63+31.699 seconds in superior group. Surgeon was comfortable in all 5 steps in both approaches except tunnel making, being difficult in oblique incision. Patient comfort at 1st postoperative day was insignificant between two groups. Postoperative hyphaema was found in 6 % in superior as compared to 14% in oblique incision group. **CONCLUSION:** Oblique (9-12 O'clock) incision was associated with less surgically induced astigmatism and surgical duration as compared to Superior incisional approach. Difference in visual outcome, Intra and postoperative complications, surgeon and patient comfort was insignificant between two groups.

KEYWORDS: SICS, Superior and Oblique incision.

ABREVIATIONS: SICS small incision cataract surgery, SIA- surgically induced astigmatism, IOL- intraocular lens.

INTRODUCTION: WHO has estimated that there are 45 million blind people worldwide with visual acuity less than 3/60. Out of this 19 million are estimated to have cataract.[1] Of the estimated 45 million, India alone has 8.9 million blind people.[2] The prevalence of blindness in India is 1.1%.[2] In India, cataract still continues to be a major cause of blindness, which accounts for 62.6%.[2] Surgical treatment is the only proven remedy to restore visual loss occurring due to cataract.

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Manual small incision cataract surgery is a technique of extra capsular cataract extraction surgery (ECCE) in which cataract extraction and intraocular lens (IOL) implantation is performed through a suture less, self-sealing valvular sclera corneal tunnel incision. It retains most of the advantages of Phacoemulsification but can be delivered at a lower cost and lesser training. It has come as a boon to fill the yawning gap between high cost, high tech phaco machine and conventional large incision ECCE.[3]

The trend in the cataract surgery has been towards smaller incision, moving from superior scleral incision to temporal approach, in an attempt to reduce post-operative astigmatism.[4] The temporal approach provides the surgeon easiest access to the surgical zone because it is not obstructed by the orbital edge of frontal bone and minimizes the effect of Bell's phenomenon. The horizontal meridian of cornea is more than the vertical meridian.

So, the distance from periphery to visual axis is longer in this position and it is also less flattening. There is no role of bridle sutures in such cases. There is also marked increase in the red reflex because the iris is perpendicular to the light of the microscope. It also facilitates the drainage of the fluid through lateral canthus. It also produces excellent results in terms of astigmatism, both immediate and long term.[4]

As cataract surgery accounts for the bulk of the surgeries performed in our institute, this study protocol is designed to assess the complications, visual outcome, patient and surgeon comfort and comparison of surgical duration in superior and oblique approaches of MSICS.

MATERIALS AND METHODS: In this study, 200 eyes of cataract were taken.100 eyes each were taken for surgery through superior and oblique approach by manual small incision cataract surgery. Further division of two groups was done according to the eye to be operated and divided into 4 groups. (Group A: RSS-Right superior straight incision, Group B: RSUT-Right superior upper temporal: Group C: LSS-Left superior straight, Group D: LSUN-Left superior upper nasal:50 cases each were taken. Surgical steps were divided into 3 stages i.e., stage 1-from application of wire's speculum to entry into anterior chamber, stage 2-from entry into anterior chamber to nucleus delivery, stage 3-from nucleus delivery to sub conjunctival application of steroid and antibiotic injection.

Surgeon comfort was graded as comfortable (C1), convenient (C2) and difficult (C3) according to the comfort level faced by the surgeon during surgery. Patient comfort was graded through pain observed by the patient on first postoperative day. It was graded as P1: no pain, P2: mild to moderate pain, P3: severe pain.

RESULTS: Most common intraoperative complication among 2 groups was sub conjunctival hemorrhage being 10% in oblique group and 15% in superior group. PCR was observed in 3% of cases in oblique group compared to 4% cases in superior group. Vitreous loss was seen in 2% cases in oblique and 1% case in superior group.

The Best Corrected Visual Acuity (BCVA) was documented in the operated eye at day of discharge, 2 weeks and at 6 weeks after surgery. Postoperative visual acuity at day 1/at discharge was between 6/6-6/18 in 67% of patients in oblique group and 66% in superior group.

100% patients in superior group and 94% patients in case of oblique group had Postoperative VA between 6/6-6/18 at 2 week. At 6 weeks, 99% patients in case of oblique group and 97% in superior group had VA between 6/6-6/18.(P value 0.06).At 6 weeks 3% in superior and 1% patient in

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oblique group had VA less than 6/24.During whole course postoperative VA remained statistically insignificant between two groups.(P value>0.05).

Mean postoperative astigmatism at 6 weeks using refraction in case of superior group was 1.35±0.62 D and 0.97±0.51D in oblique group.

50% of the patients in oblique group and 71% patients in superior group had against the rule axis at 6 weeks postoperative period, showing superior incision causing more of 12'0 clock meridian flattening as compared with the oblique group.

Mean surgically induced astigmatism in oblique group was 0.63±0.27D and 0.88±0.44D in superior group which was statistically significant. (P value 0.00).

Most common postoperative complication among 2 groups was striate keratopathy which was 19% in oblique and 14 % in superior group. Postoperative hyphaema was seen in 14 % in oblique incision and 6 % in superior incision group.

Posterior Capsular Opacification was observed in 6% in superior and 5% cases in oblique group at 6- 8 weeks postoperative period. Flat AC was observed in only 2% cases in oblique incision group. 4% cases in superior and 2% cases in oblique group had residual lens matter in AC.

Most of the patients observed no pain in 1st postoperative day, percentage being 98% in oblique and 96% in superior group.

Surgeon was comfortable (C1) in all the steps in both the approaches except tunnel making in case of oblique incision group, which was convenient (C2).

Mean surgical duration in case of oblique group was 455.88+14.559 seconds and 541.63+31.699 seconds in case of superior group.

DISCUSSION: Non phaco manual small incision cataract surgery (MSICS) has evolved in recent years as a very cost-effective, highly reproducible technique with minimum learning curve and excellent postoperative visual outcome. The conventional approach of SICS is through a superior incision. SICS through a temporal approach allows better exposure of the operative field, produce less surgically induced astigmatism & results in earlier stabilization of refraction and of visual acuity.[5]

Maximum no. of patients in this study belong to the rural area, due to the fact that minority of the population (9.9%)[6] of Himachal Pradesh reside in urban area. Thus it is obvious that our hospital caters to the needs of large section of rural population and large rural population will have more people with cataract.

In both groups, right and left eyes were taken in equal proportion i.e. 50% each. It was taken to find out the difficulty level of surgery in right and left eye particularly in oblique group.

None of the patient was taken up for study whose preoperative corneal cylinder power was >1.50 D.[7]This was done to eliminate patients with high preoperative astigmatism, so that comparison of surgically induced astigmatism could be done postoperatively.

In our study complications occurred in 38 (19%) cases, out of which 23 complications occurred in superior group and 15 complications occurred in oblique group. Most common intraoperative complication among 2 groups was sub conjunctival haemorrhage.

The cause of high percentage of sub conjunctival haemorrhage was partially due to peribulbar anaesthesia and mainly due to handling of conjunctiva during operation. Iridodialysis was seen in 1% in case of superior approach compared to Muhammad akmal khan et al in his MSICS study in 2009 reported in which (3.1%) had dialysis of the superior iris, operated through superior approach.[8]

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PCR was observed in 3% of cases in oblique group compared to 4% cases in superior group. Vitreous loss was seen in 2% cases in oblique and 1% case in superior group. In all the cases open sky vitrectomy was done and non-foldable IOL was put in the sulcus.

Rashid et al in 2002 in his comparative MSICS study reported that 3.15% patients had per operative posterior capsular tear of which 1.05% had vitreous loss in superior incision group whereas 1.05% patients had posterior capsular rent without vitreous loss in temporal incision group.[5] Kimura et al reported intraoperative complications included posterior capsule rupture in 3 eyes (5.9%).[9]

The Best Corrected Visual Acuity (BCVA) was seen at day of discharge, 2 weeks and at 6 weeks after surgery.VA at 6 weeks was done with the full correction for spherical and cylindrical error. Both approaches showed good visual outcome at day of discharge, at 2 weeks and at 6-8 weeks of discharge.

Rashid etal[5] in his MSICS study reported that at 8th week postoperatively best-corrected V/A was achieved as 6/9 or better in 81.05% patients and as 6/12 or better in 94.68% patients in Group-A (superior), whereas in Group-B (temporal) best-corrected V/A was achieved as 6/9 or better in 87.36% patients and as 6/12 or better in 96.83% patients. Ashwini K etal[10] in their Hyderabad study reported that 82% of the patients in temporal group had visual acuity of >6/9 compared to superior group in which only 78% of the patients had visual acuity of better than 6/9.Results are consistent with our study.

Mean postoperative astigmatism in our study in case of superior group was 1.35±0.62 D and 0.97±0.51 D in oblique group. (statistically significant, P value<0.05).It was comparable to the previous studies, for example Gokhle etal[7] reported the amplitude of postoperative astigmatism higher in superior group (1.45 + 0.94) than in temporal group (0.43 + 0.27) and in superotemporal group (0.67 + 0.65) D.

Pipat Kongsap[11] documented that a superior scleral incision was associated with slight against-the-rule astigmatism (flatter vertical axis), while a temporal scleral incision was associated with slight with-the-rule astigmatism (flatter horizontal axis). This study differ from the previous studies with respect to against the rule as major postoperative axis, possibly due to the temporal incision taken in previous studies as compared to oblique incision taken in this study.

Surgically induced astigmatism was calculated at 6 weeks postoperatively by subtraction method between postoperative and preoperative astigmatic value. Gokhle etal[7] reported mean astigmatism induced by surgery was 1.28 D x 2.9 degrees for superior incision, 0.20 D x 23.7 degrees for supero-temporal incision and 0.37 D x 90 degrees for temporal incision. As compared to the Mumbai study by Gokhle etal[7] done in 2005, the Surgically induced astigmatism in oblique incision in this study is slightly more, might be due to larger incision size i.e. 6.5 mm as compared to 6 mm in Gokhle study and timing of calculation of surgically induced astigmatism which was 3 months in most of the studies as compared to six weeks taken in this study.

Most common postoperative complication among 2 groups was striate keratopathy. It was observed in the immediate postoperative period and disappeared at follow up at 2 weeks. The striate keratopathy that occurred in this study was of mild degree. The difference between two groups was statistically insignificant. According to Rashid etal[5] in their Bangladesh study, post-operative transient corneal oedema was 16.84% in superior and 9.47% in temporal approach in MSICS.

Postoperative hyphaema was seen in 14% cases in oblique incision and 6% in superior incision group. Hyphaema was seen on first postoperative day and resolved during the 1st week postoperatively without any intervention. Although, the no. of hyphaema cases were more in oblique group but the difference between two groups was not statistically significant.

PCO was observed in 6% cases in superior and 5% cases in oblique group at 6- 8 weeks postoperative period. All cases observed were having mild PCO and were left as such. Patients were observed till 6 months duration and YAG laser capsulotomy was done in 4% cases in superior and 3% in oblique group. Sudhaker etal[12] reported a higher incidence of 11.5% of PCO in his ECCE study.

The criteria of grading patient's comfort make it a unique feature of our study. Patient's comfort is related to anaesthesia during surgery and pain during postoperative period, which in turn is dependent on the tissue manipulation and extent of tissue damage caused by a procedure.

The criterion of surgeon comfort was taken to access the difficulty faced during surgery in oblique incision group in manipulation of tissues, delivery of nucleus and IOL implantation. Difficulty level was slightly more in case of oblique incision group, especially in tunnel making. It was due to oblique positioning of the sclera corneal portion of the eye encountered in oblique approach.

Surgical duration was less in case of oblique group. Duration of surgery is not only important for handling more patients but there is lesser tissue handling, coaxial light exposure and less disturbances to ocular physiology. It might be due to the fact as superior rectus application was not done in case of oblique group, as there is adequate space available for surgery at oblique incision site.

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SICS. Fig. 1 and Fig. 3 showing Superior straight incision.

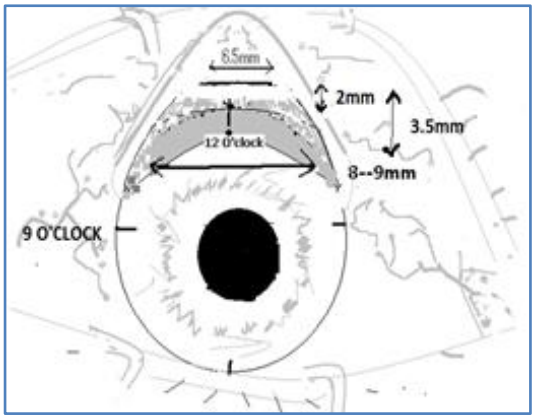

FIG. 1: GROUP A (RSS) RIGHT EYE

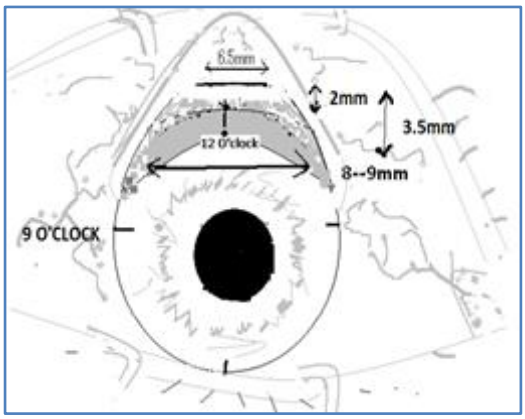

FIG. 3: GROUP C (LSS) LEFT EYE

SICS. Fig 2 and Fig 4: Showing oblique incision (9-12 O'CLOCK).

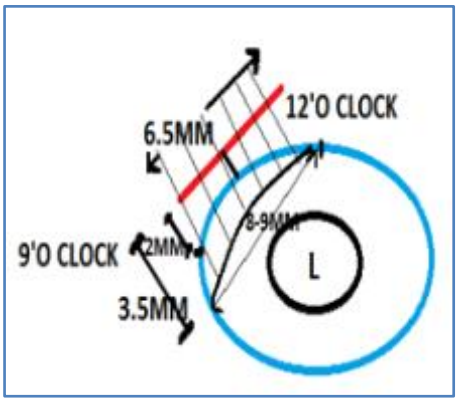

FIG. 2 GROUP D (LSUN) LEFT EYE

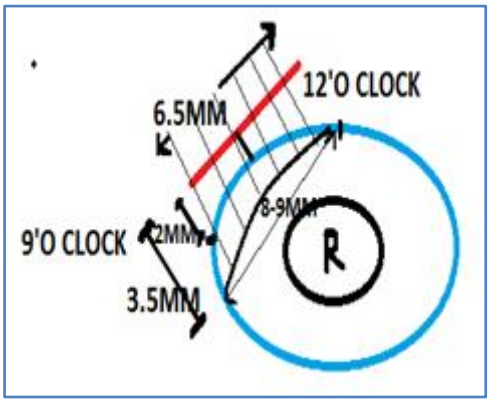

FIG. 4 GROUP B (RSUT) RIGHT EYE

FIGURE 5: Photograph showing sclerocorneal tunnel making in oblique incision in right eye (at 9-12'0clock)

FIG. 5

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Figure 6: Distribution of postoperative complications.

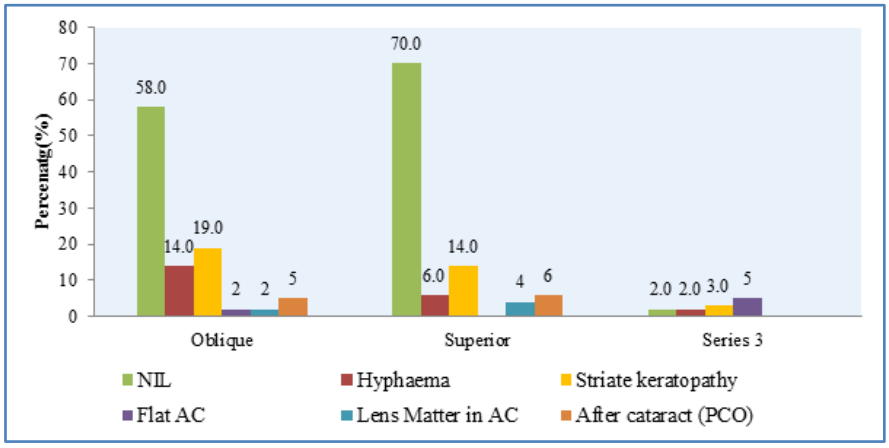

FIG. 6

STEPS	C1(comfortable)	C2(convenient)	C3(difficult)
1.Tunnel making			
2.Capsulorrhexis			
3.Nucleus delivery			
4.Cortical wash			
5.IOL implantation			

TABLE 1: Showing criteria taken for surgeon comfort

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

Table 2: Criteria for Patient's symptomatology patient at the first post-operative day

		6/6	6/9	6/12	6/18	6/24	6/36	Chi-Square	P value
VAPODIS	Oblique	0(0.0%)	5(5.0%)	20(20.0%)	42(42.0%)	30(30.0%)	3(3.0%)	3.9	0.4
	Superior	0(0.0%)	6(6.0%)	29(29.0%)	31(31.0%)	29(29.0%)	5(5.0%)		
VA2WKS	Oblique	2(2.0%)	66(66.0%)	29(29.0%)	3(3.0%)	0(0.0%)	0(0.0%)	9.4	0.08
	Superior	7(7.0%)	59(59.0%)	24(24.0%)	4(4.0%)	5(5.0%)	1(1.0%)		
VA6 T0 8 WKS	Oblique	65(65.0%)	32(32.0%)	2(2.0%)	0(0.0%)	0(0.0%)	1(1.0%)	10.7	0.06
	Superior	54(54.0%)	34(34.0%)	4(4.0%)	5(5.0%)	3(3.0%)	0(0.0%)		

Table 3:Visual recovery profile-distribution of postoperative visual acuity at discharge, visual acuity at 2 weeks, visual acuity at 6 to 8 weeks

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SIA	Oblique	Superior	Total
<.25 D	1(1.0%)	8(8.0%)	9(4.5%)
0.25-1 D	96(96.0%)	62(62.0%)	158(79.0%)
1-2 D	3(3.0%)	30(30.0%)	33(16.5%)
>2 D	0(0.0%)	0(0.0%)	0(0.0%)
Mean± SD	0.63±0.27	0.88±0.44	0.76±0.39
Total	**100**	**100**	**200**

TABLE 4: Distribution of surgically induced astigmatism at 6 weeks (SIA)

	Groups	Comfortable	Convenient	Chi-Square	P value
Tunnel Making	Oblique	17(17.0%)	83(83.0%)	104.1	0.00(SS)
	Superior	89(89.0%)	11(11.0%)		
Capsulotomy	Oblique	91(91.0%)	9(9.0%)	0.479	0.49
	Superior	88(88.0%)	12(12.0%)		
Nucleus Delivery	Oblique	87(87.0%)	13(13.0%)	0.17	0.68
	Superior	85(85.0%)	15(15.0%)		
Cortical Wash	Oblique	87(87.0%)	13(13.0%)	-	-
	Superior	87(87.0%)	13(13.0%)		
IOL Implantation	Oblique	93(93.0%)	7(2.0%)	0.08	0.8
	Superior	94(94.0%)	6(6.0%)		

Table 5: Distribution of surgeon comfort

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