

Pattern of intraocular pressure changes following manual small incision cataract surgery

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Abstract

Objectives:

To find out the pattern of changes in intraocular pressure after manual small incision cataract surgery.

Methods: Consecutive patients (291 eyes of 291 patients) undergoing manual small incision cataract surgery were prospectively evaluated for change in IOP. Patients were further divided into two groups based on whether or not sutures were used to close the scleral tunnel. IOP was serially measured at day 1, 1st, 2nd, 4th, 6th, 8th and 12th week.

Results: The mean post operative IOP in eyes where sutures were not applied (12.59 ± 3.02 mmHg, 12.59 ± 2.34 mmHg, 12.54 ± 2.19 mmHg and 12.40 ± 2.99 mm Hg at day 1, 2 week and 4 weeks respectively) was lower than that where sutures were used to close the wound (15.57 ± 3.86 mmHg, 14.05 ± 2.52 mmHg, 14.43 ± 3.39 mmHg at day 1, 2 weeks and 4 weeks respectively). There was a drop of IOP from the preoperative IOP in both suture (1.15 ± 3.29 mm Hg) and non suture (3.29 ± 3.07 mm Hg) group at 3 months of follow up. **Conclusion:** There is a small drop of IOP following sutureless MSICS during long term follow up. Eyes where sutures are applied are more likely to have higher IOP than those without sutures at the initial post operative period.

Key Words:

Small incision cataract surgery, suture less cataract surgery, intraocular pressure.

On the basis of its cost effectiveness, early rehabilitation, less learning curve, feasibility for almost all types of cataract and minimal complications manual small incision cataract surgery (MSICS) is gaining its popularity^{1,2}. Emphasis has been given on induced astigmatism following MSICS³. However, there is no report on changes of intraocular pressure (IOP) following MSICS. The aim of the present study was to analyse the pattern of IOP that occurred from first day to 12 weeks. Further emphasis was given if there was any difference in the IOP pattern distribution in eyes, which had one cross suture and those without any sutures.

Patients and Methods

A total of 291 eyes of 291 patients subjected to MSICS were evaluated prospectively to observe the IOP changes from 1st postoperative day onwards for 3months. In addition to routine examination, IOP was measured in all the subjects. The surgery was performed by three surgeons having more than 5 years of experience. A standard surgical technique was followed by all the surgeons. All the surgeries were performed under peribulbar anaesthesia. Only the eyes with mature and hypermature senile cataract were included. Eyes with immature senile cataract, complicated cataract, congenital or juvenile cataract,

glaucoma, scleral thinning, improper wound construction, premature anterior chamber entry, hyphaema, posterior capsular tear with vitreous loss, and extensive central corneal oedema preventing IOP measurement were excluded from the study.

After cleaning and draping a fornix based conjunctival flap was made at 11-1 O'clock position and light cautery was applied. A frown incision was given on the sclera the centre of which was 1.5 mm away from the limbus. The length of the external scleral incision varied from 6.5 -8.5 mm and that of internal incision was 7.5 -9.5 mm. Either an envelope or capsulorhexis was performed. It was followed by hydrodissection, complete nucleus rotation and prolapse of nucleus into the anterior chamber. Nucleus delivery was achieved by an irrigating vectis. Cortical aspiration was completed and 6 mm all PMMA PC IOL was implanted into the bag.

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The anterior capsulorhexis was completed in eyes that had envelope capsulotomy. No scleral sutures were applied if the external incision size was 7mm or less and one crossed scleral suture was applied when the external wound was more than 7mm. (Table 1) All the eyes received subconjunctival gentamycin and dexamethasone at the end of the surgery. Conjunctiva was closed by cautery in all. Post operative therapy included 0.3% ciprofloxacin drop QID, 1% prednisolone acetate drops 2 hrly and 1% tropicamide drops OD. All the patients were subjected to slit lamp examination and Goldmann applanation tonometry on 1st day, 1st, 2nd, 4th, 6th, 8th and 12th week.

Results

Of 291 eyes 143 were without sutures and 148 had one cross suture (shoelace pattern). The mean age in no suture group was 55.74 ± 16.65 years (Range =51-61 years) and that of suture group was 61.61 ± 14.47 years (Range =59-64 years). Male: Female ratio in both the groups was almost 1:1, right eye: left eye ratio was 1:1 in no sutures and 1.5:1 in sutured group. The mean size of external wound was 7.02 ± 0.6 , 7.51 ± 0.74 and that of internal wound was 7.76 ± 0.66 , 8.14 ± 0.66 in suture and non-sutured group respectively (Table 1). The mean pre operative IOP in both the groups was almost equal (15.52 ± 2.37 mm Hg Vs 15.61 ± 1.62 mm Hg in sutured and non-sutured group respectively) ($p=0.911$) (Table 2)

The changes in IOP during the follow up in each group; as compared to the pre operative IOP was not

statistically significant. (ANOVA; $p=0.366$, 0.361 , 0.686 , 0.876 , 0.405 , 0.689 , 0.832 at day1, 1st, 2nd, 4th, 6th, 8th and 12th week respectively compared to preoperative IOP in the non suture group and $p=0.616$, 0.843 , 0.377 , 0.686 , 0.976 , 0.846 , 0.853 at day1, 1st, 2nd, 4th, 6th, 8th and 12th week respectively compared to preoperative IOP in suture group).

While comparing both the groups we found that the eyes where sutures were applied had a significantly higher IOP as compared to that where sutures were not applied in the first month of follow up. (Table 2, Fig 1)

The intraocular pressure drop in the nonsuture group was 2.44 ± 3.85 mm Hg in the first postoperative day. There was further decrease in the IOP during the follow up period. There was a mean drop of 3.29 ± 3.07 mm Hg at the end of 3 months in the same group. (Table 3)

In eyes with suture, we found that there was actually an increase in IOP in the first post operative day (mean increase of 0.1 ± 3.48 mm Hg from the preoperative IOP). During follow up there was a fall of IOP by 1.15 ± 3.29 mmHg at the end of 3 months (Table 3). The common postoperative complications encountered was decentments detachment (12 eyes), superior corneal oedema (23 eyes), iridocyclitis (anterior chamber cells < +3) (2 eyes), irregular pupil (9 eyes), 6 O'clock zonular dialysis (4 eyes) and iridodialysis (2 eyes). During the study nineteen eyes were found to have post operative hyphaema and were excluded.

Table 1 MSICS – Composite Data

	NO SUTURE (143)	WITH SUTURE (148)
AGE		
Mean (95% CI)	61.62(59.22-64.01)	55.75(50.86-60.63)
SD	14.47	16.65
Median	64	60
Sex		
Males	77	75
Females	66	73
LATERALITY		
Right eye	85	72
Left eye	58	76
DIAGNOSIS		
Hypermature senile cataract	42	78
Mature senile cataract	87	35
Advanced Immature cataract	14	35
WOUND LENGTH		
External		
Mean (95%CI)	7.02(6.93-7.125)	7.51(7.29-7.73)
SD	0.57	0.74
Median	7	7.5
Internal		
Mean (95%CI)	7.77(7.66-7.88)	8.15(7.95-8.35)
SD	0.67	0.67
Median	8	8

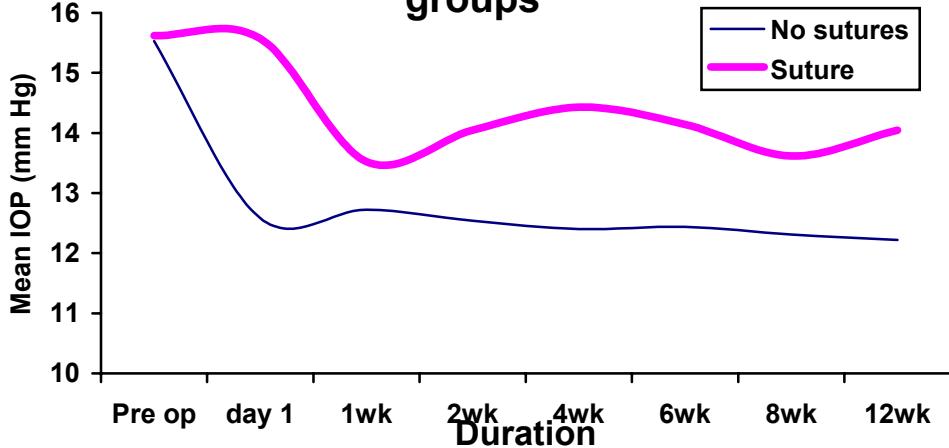
Table 2: Intraocular pressure at different point of follow up

	Pre op	1day	1 week	2weeks	4weeks	6weeks	8weeks	12weeks
WITH OUT SUTURE								
No of eyes								
No of eyes	143	143	116	118	128	107	110	110
Mean	15.53	12.59	12.72	12.54	12.40	12.44	12.31	12.22
Median	16	12	12	12	12	12	12	12
SD	2.38	3.02	2.34	2.19	2.99	2.39	2.15	2.04
95% CI	15.02-16.04	11.94-13.23	12.23-13.22	12.07-13.01	11.77-13.04	11.93-12.95	11.85-12.77	11.78-12.65
WITH SUTURES								
No of eyes	148	141	136	137	133	131	133	133
Mean	15.62	15.57	13.52	14.05	14.43	14.14	13.62	14.05
Median	16	14	14	14	12	14	14	14
SD	1.63	3.86	3.20	2.52	3.39	3.78	3.44	3.44
95% CI	14.88-16.36	12.45-18.69	12.07-14.98	12.90-15.19	12.43-16.43	11.97-16.32	12.05-15.19	12.48-15.61
P value	0.911	0.004	0.629	0.019	0.037	0.117	0.495	0.207

Table 3: Change in intraocular pressure during follow up

	DAY 1	3 MONTHS
NO SUTURE GROUP		
Eye with decreased IOP	78(54.54%)	91(82.72%)
Eyes with no change	19(13.29%)	9(8.19%)
Eyes with increased IOP	46(32.17%)	10(9.09%)
Total	143	110
Mean change IOP from pre operative IOP in mmHg (95%CI)	2.44(1.431-3.45)	3.29(2.65-3.92)
Median	3	4
SD	3.84	3.07
Max and Min change	-18 to 9	-4 to 13
SUTURE GROUP		
Eye with decreased IOP	70(47.29%)	73(54.88%)
Eyes with no change	18(12.16%)	16(12.04%)
Eyes with increased IOP	60(40.55%)	44(33.08%)
Total	148	133
Mean change IOP from pre operative IOP in mm Hg (95%CI)	-0.1(-3.60-3.40)	1.15(-0.39-2.69)
Median	1.5	2
SD	3.48	3.29
Max and Min change	-19to 11	-7to 6

Fig 1. Mean IOP variation in the two groups



Discussion

Ever since the procedure was introduced by Blumenthol in 1991, a number of modifications have been made on the technique¹. One of the main concerns of MSICS is less astigmatism thus early rehabilitation. Though intraocular pressure variation has been widely studied following ECCE and phacoemulsification, to the best of our knowledge no such reported study exists after MSICS.⁴⁻¹⁴

Both decrease⁴ and increase in IOP following cataract surgery have been reported^{4,15}. In both the situations the operated eye runs risk of danger. While persistent raised IOP has a deleterious effect on optic nerve and cornea, prolonged hypotony may lead to choroidal detachment, suprachoroidal haemorrhage, macular oedema and inflammation (which in turn causes damage to blood aqueous barrier). Though a number of investigators have well projected the issue of raised IOP, there is scarcity of reports in the literature highlighting the decreased in IOP^{4,15}. It has been speculated in the literature that there may be alteration in IOP caused by peribulbar anaesthesia during the initial postoperative period. Direct effect of the local anaesthetic agent on the ciliary body is thought to reduce the production of aqueous. Epinephrine also has the same effect on non-pigmented epithelium of ciliary body. Both the factors may be responsible for lower IOP (hypotony) during early postoperative period. Peribulbar anaesthesia using 2% xylocaine and adrenaline (1:200,000) used during the surgery could reduce the IOP during early hours following surgery. However,

we cannot comment on this aspect as the first IOP measurement was only after 24 hrs of surgery.

Reduction of IOP by 2-4 mm Hg has been reported after extracapsular cataract extraction and phacoemulcification which may be due to an improvement in the outflow facility at the trabecular meshwork or production of new outflow pathways¹⁶⁻¹⁹. This may be a reason why we found decrease IOP in the post operative period.

Our main concern was to evaluate IOP maintenance with an anterior chamber (AC) entry of $\geq 6.5\text{mm}$ without any suture. It has been observed in the present study that the mean IOP varied from 12.58 ± 3.01 to 12.21 ± 2.04 mm Hg from 1st day to 12th weeks in no suture group. This change in IOP from pre operative IOP; during the follow up was however not statistically significant.

Those eyes with a cross scleral suture had pressure variation from 15.57 ± 6.85 to 14.04 ± 3.44 mmHg from 1st day to 12th weeks. Similarly the change in IOP in this group was also not statistically significant while compared to preoperative IOP.

However, the pressure variation between the two groups was statistically significant during the first month; no such changes were observed from 1st month on wards ($p=0.004, 0.019, 0.037$ at 1, 2 and 4 weeks). The initial high IOP in the group with suture is perhaps due to the compression effect of the suture on the wound. Another possible reason for this finding could be more secured wound closure due to

application of the suture. It is also likely that larger incision size and more manipulation in these eyes may be responsible for higher blood aqueous barrier breakdown, resulting in rise in IOP.^{20,21}

In conclusion, we found higher IOP in eyes where suture was used with MSICS in the early post operative period up to one month as compare to eyes without any suture. There is a small drop in IOP by 1.15 ± 3.29 mm Hg and 3.29 ± 3.07 mm Hg in MSICS with and without suture respectively at 3 months.

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