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Original Research Article

Astigmatism Correction Following VariousIncisions in Manual Small Incision in the Management of Cataract Surgery

Navin Chandra[1], Utkarsh Bhardwaj[2], Rajesh Tiwary[3]

[1]Senior Resident, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India

[2]Senior Resident, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India

[3]Professor, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India

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Corresponding author: Dr. Utkarsh Bhardwaj
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Abstract

Aim: The aim of this study to compare the laparoscopic cholecystectomy with and without drains. **Methods:** This randomized controlled trial single-blind study was done the Department of General Surgery, VMMC and Safdarjung Hospital, New Delhi from January 2019 to December 2019. 200 patients were included in this study. Patients were divided into 2 groups; A with drain and B without drain. A complete history, physical evaluation, the relevant investigations were done, and the post-operative period and complications were assessed. Patients were grouped by simple random sampling. **Results:** Amongst cholelithiasis patients 42% had drain and 42% without drain. Amongst acute cholecystitis patients, 27% had drain and 11% without drain and amongst chronic cholecystitis patients, 31% had drain and 47% without drain. The difference was not statistically significant. VAS (Visual analogue scale) grade in patients with drain was G4 (49%), G3 (47%) then G2 (5%). VAS grade in patients without drain was G2 (49%) followed by G3 (30%) then G1 (15%). P<0.05, there was statistically significant difference observed between the two groups. Wound infection is noted in 12(12%) with drain and 1 (1%) without drain group, hence p value was 0.006. So, there was statistically significant difference noted between the two study groups. Mean hospital stay in patients with drain was 9.15±2.03 days and a patient without drain was 4.11±1.36 days. P<0.05, there was statistically significant difference noted between two study groups. Nausea and vomiting were noted in 45 (45%) with drain and 3 (3%) without drain group, hence p value was less than 0.05. **Conclusions:** An uncomplicated gall stone disease can be treated by laparoscopic cholecystectomy without need for drain with reasonable safety by an experienced surgeon. With no usage of drain, it is significantly advantageous in terms of post-operative pain, use of analgesics and hospital stay.

Keywords: laparoscopic cholecystectomy, drain

Introduction

Astigmatism is that condition of refraction wherein a point focus of light, cannot be formed upon the retina owing to unequal refraction of incident light by dioptric system of eye in different meridians, but form focal lines.[1] Prevalence of astigmatism and changes with age

In the first months of life, infants show a high prevalence of high (6D average) ATR astigmatism (corneal). The steepest most astigmatic corneas occur in newborns with the lowest birth weight and lowest post conceptual age. As infants grow, emmetropisation of astigmatism occurs. Astigmatism shifts to low levels of WTR after four years of age and pressure from eyelids on the cornea over time has been suggested as a cause. Children typically display WTR astigmatism. Young adults typically display small degrees of WTR astigmatism and in older adult's shift occurs and ATR astigmatism becomes more prevalent.

Research has estimated that 15-29% of patients with cataract have more than 1.5 D of pre-existing astigmatism.[2] In a general cataract population, approximately 10% of patients have astigmatism with greater than 2 D of cylinder, 20% have between 1 and 2 D, and 70% have less than 1D.[3-6] Astigmatism induces distortion of image. The retinal image is distorted because of a differential magnification in the two principal meridians. There is 0.3% image distortion per diopter of astigmatism.[7] In WTR astigmatism, the power of weaker principal meridian produces a vertical line focus. In printed matter the vertical strokes of the letter are more important for recognition for example b,d,h, also there is less space between letters than between lines. Hence it is useful to have a better focus in vertical meridian as is there in myopic WTR astigmatism, resulting in better Snellen visual acuity. Another benefit of WTR astigmatism is that less cylinder is required in spectacle correction than ATR astigmatism of same magnitude. In corrected, astigmatic eye, retinal image distortion arises due to unequal spectacle magnification in the two principal meridian, representing 1.6% distortion per dioptre cylinder correction.

Moreover spectacle cylinder will be less than the ocular astigmatism when the spherical equivalent is positive and greater than the ocular astigmatism when spherical equivalent is negative. So in general myopic ATR astigmatism will result in proportionally larger spectacle correction, which will produce more distortion. A certain degree of myopic astigmatism is useful as it may produce a situation of pseudo-accommodation in a pseudophakic patient.[8] Uncorrected astigmatism causes blurred image, glare, monocular diplopia. Even with appropriate spectacle correction the meridional magnification may create distortion. The patients having preoperative astigmatism may experience difficulty adapting to axis shift induced by surgery. Any of these effects may create not only dissatisfaction with visual outcome, but also discomfort with an otherwise uneventful surgery. Manual SICS is a self-sealing cataract surgery due to the sclera-corneal tunnel construction. Lower cost of instrumentation and disposables in manual SICS is an added advantage.[9-11] It is also better suited for advanced and mature cataracts seen in developing countries.[12] In this incision the internal incision in the anterior chamber is remote from the external scleral incision and the two are connected together by a sclera corneal tunnel. When the internal pressure of the eye is re-established, the high intraocular pressure (IOP), compared to the lower atmospheric pressure causes the tunnel to collapse and self seal. The various incisions which are used in manual SICS vary according to their site, dimensions, design and architecture. The site of incision can be superior or super temporal or temporal. The dimensions of the incision can vary from a 3.5mm to a 6mm or longer in case of rigid IOLs. Other factors which affect incision

size are; Type of intraocular lens – incision size is small for foldable IOLs and large for rigid IOLs.

Material and Methods

The randomized control trial study was conducted in the Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India from July 2016 to July 2017, after taking the approval of the protocol review committee and institutional ethics committee.

All patients of both genders above 40 years of age with uncomplicated senile cataract till grade 3 nuclear sclerosis were included.

Hard cataract and nuclear cataract grade 4 was excluded in the study. Cataract with complications like subluxated lens, pseudoexfoliation, preexisting retinal and corneal diseases were also excluded.

Methodology

These 100 patients were divided into 4 groupsnamed group S (straight), Group B (Boat shaped), Group F (Frown) and Group C (Chevron) randomly. Detailed evaluation of the cases wascarried out like slit lamp biomicroscopy, tonometry, lacrimal sac syringing, fundus examination, keratometry and A-scan biometry. Pre operative emphasis was laid on keratometry and A-scan which was done for both eyes. Patients were posted for surgery on the next day and operated. Intraocular lens (IOL) power was calculated using SRK II formula.

During the surgery it was made sure all the other steps of manual small incision cataract surgerywill be the same except for the incision made at the sclera. Incisions were 6mm in cord length. The incisions were taken 2.5-3mm posterior to limbus. Sclerocorneal tunnel with formation of corneal valve was made. Continuous curvilinear capsulorrhexis was done in all cases. Viscoelastics.were used generously. Minimal iris handling was ensured. In-the-bag placement of IOL was done. Patient vision were analysed at the 6th week post operative period. The results obtained were tabulated and analyzed statistically by our statistician using paired and unpaired t test and chisquare test using SPSS version 21.0 software.

Results

100 eyes of 100 patients were included in this study. Here patients were of different age group as below.

Table 1 age distribution of patients

AGE	No of patients	Percentage
Below 60	24	24
60-70	48	48
70-80	28	28

The chi-square statistic is 0.044. The p-value is .88. The result is not significant at $p < .05$.

Table 2: gender distribution of patients

Gender	Number	%
Male	65	65
Female	35	35

In this study 65% of patients were male and 35% were female. It's due to lack of awareness of cataract surgery in female population compared to male population in bihar. After 6 weeks of surgery, a detailed examination was done to check visual acuity uncorrected and best corrected.

Table 3: Uncorrected Visual Acuity After 6 Weeks

Visual acuity	No. of patients	Percentage
6/9 – 6/12	23	23
6/12 – 6/18	49	49
>6/18	28	28

Visual acuity	Chevron Group=26	Frown group=25	Boat group=24	Straight Group=26
6/9-6/12	7 (7%)	5(5%)	5(5%)	6(6%)
6/12-6/18	13 (13%)	15 (15%)	11 (11%)	10 (10%)
>6/18	6 (6%)	5 (5%)	8(8%)	10 (10%)

Table 4: Best Corrected Visual acuity after 6 Weeks

Visual acuity	No. of patients	percentage
6/6 – 6/9	86	86
6/9 – 6/12	7	7
6/12 - 6/18	4	4
>6/18	3	3

Visual acuity	Chevron group	Frown group	Boat group	Straight group
6/6-6/9	26 (26%)	22 (22%)	19 (19%)	20 (20%)
6/9-6/12	-	3 (3%)	3(3%)	1(1%)
6/12-6/18	-	-	2 (2%)	2 (2%)
>6/18	-	-	-	3 (3%)

On detailed examination there were astigmatism noted after 6 weeks of surgery. There were significant differences noted in different types of incisions.

Table 5: Astigmatism Found in Different Incisions

	0.0 – 0.5D	0.6-1.0D	1.1-1.5D	1.6-2.0D	>2.1D
Chevron	13 (50%)	10 (38.46%)	3 (11.54%)	-	-
Frown	5 (20%)	6 (24%)	12(48%)	2 (8%)	-
Boat	5 (20.83%)	6 (25%)	10 (41.67%)	2 (8.33%)	1 (4.17%)
Straight	1 (3.85%)	7 (26.92%)	10 (38.46%)	7 (26.92%)	1 (3.85%)

The chi-square statistic is 21.88. The p-value is .055. The result is not significant at $p < .05$

Discussion

In our study Chevron Group had minimal astigmatism. 50% of people had astigmatism <0.5D which are uncorrected Visual acuity after 6 weeks of surgery. It was corrected with spectacle correction completely. 38.46% people had 0.5 to 1D and only 11.54% patients had visual acuity >1D. Thisis correlated with some other studies. In Randeriet al[13] study astigmatism <1D was 57.14%. As perstudy Jauhari N et al[14] visual acuity of <1D was 47.6%. The reason for this is V shaped Chevron incision is geometrically more stable thereby causing minimal sliding of tip of incision.

In our study frown incision showed slightly higher astigmatism compared to chevron incision. 60% patients here showed <1D astigmatism where maximum were between 0.5-1 D. similar findings were seen in study conducted by Jha and vats[15] which report 85.5% of patients with astigmatism up to 1 D, with only 8.7%cases

having astigmatism more than 2 D. similarly another study conducted by jauhari N at al[14] 57.9% of patients showed induced astigmatism of <1D. Minimum surgically induced astigmatism with Chevron incision in our study is supported by previous studies of Rohatgi et al[16] and Randeri et al [13].

In our study Boat shaped incision showed almost similar to frown shaped incision. 45.83% patients had astigmatism of <1D followed by 50% patients with 1-2D. Maximum patients (41.67%) were seen in 1.1-1.5D. this was almost similar to frown incision even though frown was slightly better as per our studies.

Straight incision was also studied, and outcome is evaluated. It shows only 30.77% patients with astigmatism <1D. 38.46% patients show astigmatism 1.1-1.5D and 30.77% showed astigmatism 1.5-2D.These findings show straight incision causes maximum astigmatism among all the four incisions studied. This study compares 4 types of incisions for the manual small incision cataract surgery.

Conclusion

The present study concluded in manual small incision cataract surgery type of incision done significantly changes the outcome in terms of astigmatism and uncorrected visual acuity. Even though chevron incision causes significantly less astigmatism, its less accepted among surgeons due to its steep learning curve. It was seen frown incision or boat shaped incision was preferred over chevron incision among surgeons due to its ease of learning and performing with relatively low surgically induced astigmatism.

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