



COMPARATIVE STUDY OF A SINGLE INTRA-OPERATIVE INJECTION OF TRIAMCINOLONE ACETONIDE (30MG) INTO THE SUB-TENON'S CAPSULE SPACE VERSUS 1% PREDNISOLONE ACETATE EYE DROPS IN CONTROLLING POST OPERATIVE INFLAMMATION FOLLOWING CATARACT SURGERY

Ophthalmology

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ABSTRACT

Background: To compare the therapeutic effect of a single intra-operative sub-Tendon's capsule injection of triamcinolone acetonide (30 mg.) as an alternative to topical 1% prednisolone acetate eye drops for the control of post-operative inflammation following cataract surgery.

Conclusion- sub tenons a triamcinolone is well tolerated by patients but a study with longer duration of follow up can be tried since a bigger difference may be noted in IOP.

KEYWORDS

Small Incision Cataract Surgery (SICS) with Posterior chamber Intraocular Lens (PCIOL) Implantation were enrolled in this study.

INTRODUCTION

Cataract is the leading cause of treatable blindness in India and also worldwide. Each year, cataract surgery enables millions of people to improve their vision. Although cataract surgery has been performed since ancient times the last half century has seen remarkable refinement of the procedure.

Jacques Daviel was the first modern European physician to successfully extract cataract in 1748. It took almost two centuries when in 1949; Sir Harold Ridley inserted the first intraocular lens after cataract extraction. Later Charles D. Kelman in the year 1967, introduced phacoemulsification. The Non-phaco Small incision cataract surgery emerged as a popular technique which offers all the benefits of phacoemulsification with added advantage of low cost, wider applicability, safety and machine independence.

Despite the advancement in the surgical techniques and refinement in the type of intraocular lenses, post-surgical inflammation is not uncommon after cataract surgery. Surgical trauma can induce iridocyclitis by several mechanisms, for e.g., the release of prostaglandins with recruitments of neutrophils and macrophages. This process subsequently produces oxygen free radicals, proteolytic enzymes and both cyclo-oxygenase and lipo-oxygenase metabolites of Arachidonic acid. These inflammatory mediators are known to amplify the inflammatory process, leading to clinically detectable perlimbal injection, flare, and cells in the anterior chamber.

The use of peri-operative anti-inflammatory medication for cataract surgery continues to be standard practice. The goal is to suppress and eliminate the variable amount of post-operative iridocyclitis and patient discomfort resulting from intra-ocular surgery. Options for drug administration at the time of surgery include topical drops, sub-conjunctival injection, collagen shield, and intracameral injection or infusion. However, all of these methods fail to provide a therapeutic drug level of more than several hours' duration. For this reason, topical anti-inflammatory medication is routinely prescribed for several weeks postoperatively until the blood-aqueous barrier is re-established.

Steroids interfere at several steps in the inflammatory response but the most important overall mechanism appears to be limitation of recruitment of pro-inflammatory cells at the local sites and production of pro-inflammatory mediators like PGs, LTs, PAF, through inhibition of phospholipase A2.

Topical steroids effectively control ocular inflammation but are associated with well recognised challenge of patient compliance, patient inconvenience and patient instruction. Patient compliance problems may result in improper dosing and frequency, improper cul-de-sac instillation, improper preparation (e.g. bottle nozzle contamination or failure to shake the suspension), and substitution of

wrong medication. Compliance problem is still bigger in illiterate patients. Also poor corneal penetration may limit the drug level attainable via topical route.

Sub-Tenon's capsular triamcinolone thus may offer enhanced patient compliance, eliminate topical steroid drops instillation and improve drug bio-availability after cataract surgery. It may also reduce instruction time of medical staff and reduce the dependency of patient on relatives for instillation of drug that may minimise the economic loss of working relatives.

AIMS & OBJECTIVE

To compare the therapeutic effect of a single intra-operative sub-Tendon's capsule injection of triamcinolone acetonide (30 mg.) as an alternative to topical 1% prednisolone acetate eye drops for the control of post-operative inflammation following cataract surgery.

PATIENTS AND METHODS

A total of 120 eyes of 120 patients undergoing elective Small Incision Cataract Surgery (SICS) with Posterior chamber Intraocular Lens (PCIOL) Implantation were enrolled in this study. The therapeutic response and ocular tolerance of a single sub-Tenon's capsule Triamcinolone acetonide injection in the treatment of post-operative ocular inflammation was evaluated in a 3 weeks prospective randomised double masked study. This investigation was conducted from Indira Gandhi Institute of Medical Science, Patna. Written informed consent was obtained from all the participants before enrolment in the study. Patients with un-complicated senile cataract were scheduled for SICS and PCIOL implantation using peribulbar anaesthesia.

Inclusion Criteria:

- Patient's age: equal to or more than 40 years.
- Uncomplicated Small incision cataract surgery with PCIOL implantation
- Best corrected visual acuity in the un-operated eye better than 6/36 and had to be deemed likely to follow instructions and complete the entire course of the study.

Exclusion Criteria:

- Baseline IOP more than 21 mm of Hg
- Eye receiving other medication not mentioned in the study
- Eye having signs of chronic uveitis: Old pigmented KPs, ghost KPs, Pigments on lens, anterior chamber Flare and Cells, difficulty in achieving full mydriasis.
- Previous intraocular surgery
- Complicated cataract
- Corneal diseases including post-operative corneal oedema (Epithelial oedema and Descemet's folds)
- Patient who are using or had used (in past 2 weeks) oral or topical anti-inflammatory agents.

- One eyed patient

TREATMENT ASSIGNMENT AND STUDY MASKING

After uncomplicated SICS with PCIOL implantation qualified patients were assigned to one of the two masked post-operative treatment group using a table of computer generated random numbers.

Group A patients (60 in numbers): They received conventional 1% prednisolone eye drops instilled in the treated eye, according to the following schedule: 1 drops four times daily (week-1), 3 times daily (week-2), 2 times daily (week-3), once daily (week-4).

Group B patients (60 in numbers): They received a single intra-operative 30 mg TA sub-Tenon's capsule injection.

To mask the study, normal saline placebo eye drops were prescribed to group B patients in bottles and schedules similar to those given to the prednisolone group. The bottle containing the eye drops were coded and not labelled with the name of substance that they contained. A sub-tenon's capsule injection of an equal volume of balanced salt solution was used in group A. Ciprofloxacin, 0.3% topical drops were instilled 4 times daily (for 3 weeks) for both the groups. Clinical assessment of intraocular inflammation was performed by a masked investigator who was unaware of patient's group status and a masked statistician analysed the data. Unfortunately because of the milky appearance of the prednisolone, some barriers were faced to guarantee the masked fashion of the study. To overcome this potential problem, the observer was unaware of any details of the patient treatment and patients were asked not to provide any information regarding eye drops instillation. Also the patients were examined under a slit lamp only after complete antiseptic cleaning of the treating eye by a nurse so that the milky deposits of the prednisolone drops may not hinder the masking.

SURGICAL PROCEDURE

All eyes were dilated with 2 drops of 5% phenylephrine and 0.8% tropicamide combination 5 minutes apart. Antiseptic dressing was done with 10% Betadine for skin and 5% Betadine drops for conjunctiva. Surgery was performed under peribulbar anaesthesia using 2% lidocaine and 0.5% Bupivacaine. The surgical approach consisted of SICS with PCIOL. For injection into the posterior sub-Tenon's capsule space Tuberculin syringe was used. BSS (group A) or TA (group B) injected into the infero-temporal quadrant.

OUTCOME MEASURES

All efficacy variables were evaluated at baseline and during all follow up visits by slit lamp biomicroscopy without pupil dilation. *The primary efficacy variables were Anterior chamber Cells and Flare.* In addition, the percentage of patients dropped from study for lack of efficacy was considered a key indicator of treatment failure. Additional efficacy variable was conjunctival erythema. *Safety variables monitored included IOP and Visual acuity.* At the end of each visit, IOP was measured by Goldmann Applanation Tonometer. Visual acuity in the study eye was measured using the snellen's visual acuity chart. Patients were examined post operatively on day 1, 3, 7 and 21. Feedback was taken from the patients regarding any postoperative symptoms.

SLIT LAMP EXAMINATION

Slit lamp examination is a dynamic examination in which the eye is scanned antero-posteriorly and horizontally. Ocular problem can be identified by various methods of examination, which differ in the position of the illuminating arm and the angle between the illuminating arm and the observing arm.

Diffuse illumination allows an observer to obtain a direct and tangential view of the anterior segment of the eye.

Statistical Analysis

For the Qualitative data (Sex and Eye) **CHI Square test** is applied. For the semi quantitative data which is Non-Normally distributed (Grading of Aqueous cells, Aqueous flare, Conjunctival congestion and Post-op IOP) **Mann-Whitney U test** is applied. For the quantitative data (Age and pre-op IOP) **t-test** (for Equality of Means) is applied.

Asymptomatic significance (**P-value**) is calculated for all the variables through these statistical tests. If the P-value is ≤ 0.05 the difference between the two group would be considered statistically significant.

RESULTS AND OBSERVATION

A total of 120 eyes of 120 patients who had undergone SICS with PCIOL implantation were analysed. 60 eyes belonged to the prednisolone drops group, while 60 eyes belonged to the TA group. All patients completed a 3 weeks follow up period. No patients were discontinued because of improper entry or protocol violations. No patients from either treatment group were dropped from the study for lack of response.

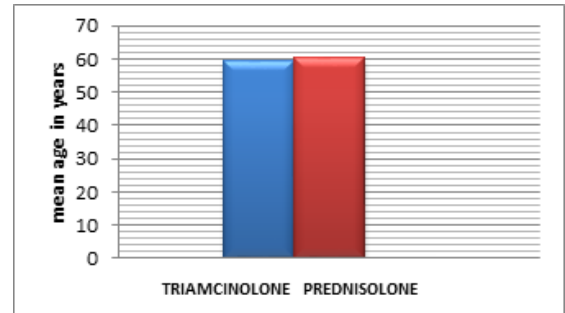
Patient Population Characteristics:-

The demographic characteristics of the patient population are listed in following tables. Patient age ranged from 40 years to 84 years, with mean age in TA group 59.72 years and mean age in prednisolone group 60.37 years. 71.7% (86/120) were male and 28.3% (34/120) were female. TA group comprises 73.3% (44/60) male and 26.7% (16/60) female while in prednisolone group 70% (42/60) were male and 30% (18/60) were female. There were no significant differences between the treatment groups with respect to age, gender, eye and pre-op IOP.

GROUP

		Frequency	Percent
Valid	Triamcinolone acetamid	60	50.0
	Prednisolone acetate	60	50.0
	Total	120	100.0

AGE



Group Statistics

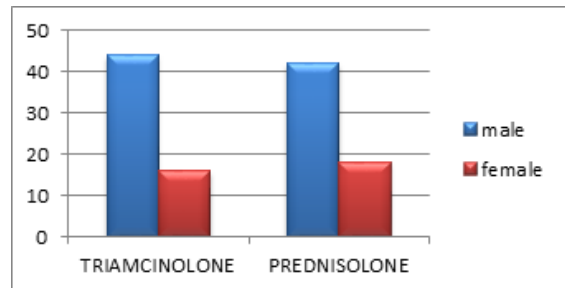
Group		N	Mean	Std. Deviation
ACE	Triamcinolone acetamid	60	59.72	9.81
	Prednisolone acetate	60	60.37	8.87

Independent Sample Test

	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
AGE	-.381	118	.704

P value is .704 (i.e. $> .05$), hence age distribution between the treatment groups are comparable.

SEX



Crosstab

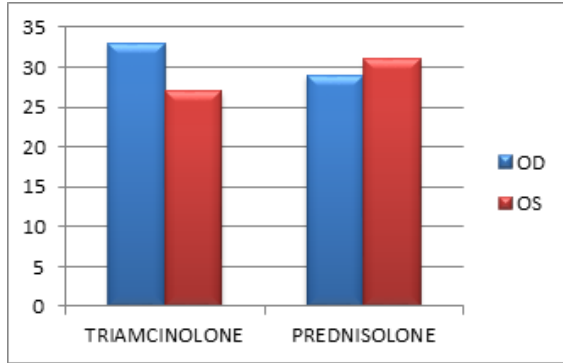
	SEX		Total
	Male	Female	
GROU triamcinolone ac Count	44	16	60
% within GR	73.3%	26.7%	100.0%
prednisolone ac Count	42	18	60
% within GR	70.0%	30.0%	100.0%
Total Count	86	34	120
% within GR	71.7%	28.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.164	1	.685

Asymptomatic significance (p value) is .685(i.e. > .05), hence SEX is comparable between the treatment groups.

EYE



Crosstab

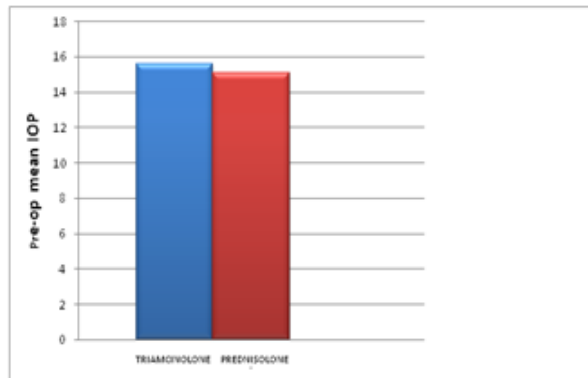
	EYE		Total
	OD	OS	
GROUP triamcinolone acet: Count	33	27	60
% within GRO	55.0%	45.0%	100.0%
prednisolone acet: Count	29	31	60
% within GRO	48.3%	51.7%	100.0%
Total Count	62	58	120
% within GRO	51.7%	48.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.534	1	.465

Asymptomatic Significance (p value) is .465(i.e. > .05), hence EYE (OD or OS getting operated) is comparable between the treatment groups.

PRE-OPIOP



Independent Samples Test

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
IOP_0	Equal variances assumed	1.174	118	.243

Group Statistics

GROUP	N	Mean	Std. Deviation
IOP_0 triamcinolone acet	60	15.60	2.45
prednisolone acetate	60	15.07	2.52

P value is .243(i.e. > .05) hence the Pre-op IOP between the treatment groups are comparable.

DISCUSSION

The present study was focused to evaluate the efficacy and tolerability of a single intra operative sub-Tenon's capsule space injection of Triamcinolone acetonide as an anti-inflammatory agent after cataract surgery.

In the modern cataract surgery era, post surgical inflammation is minimal, and a more comprehensive medical management strategy to treat such inflammation is still to be determined. Historically, corticosteroids have been the drug of choice for the prevention or treatment of post-operative ocular inflammation and are commonly used for several weeks. However, intraocular levels of topically applied preparations are low and unreliable, with concentration fluctuating between instillations and reaching peak concentration approximately 1 hour after application. Patient compliance in an elderly cataract population can be highly variables, and in situation with limited community resources, relatives have to take time off work for drop administration. Sub-Tenon's triamcinolone, by providing sustained levels of corticosteroid, eliminates the risk associated with poor patient compliance. The sustained anti-inflammatory effects associated with the use of triamcinolone in the ophthalmic setting have prompted us to consider its therapeutic use for controlling post cataract surgery inflammation. A sub-Tenon's capsule depot corticosteroid injection may satisfy all the requirements for an ideal anti-inflammatory strategy and may have distinct advantages for reducing complications related to patient non-compliance with eye drop administration.

In the present study, the mean age of the Triamcinolone group is 59.72 years while it is 60.37 years for the prednisolone group. The two groups were comparable in age (P value = .074). Within this age group of population, effect of sub-Tenon's Triamcinolone did not show any variance with respect to age.

Among the patients who were treated with sub-Tenon's triamcinolone 44(73.3%) were male while 16(26.7%) were female. In the prednisolone group 42(70%) were male and 18(30%) were female. The two groups are comparable with respect to gender (p value = .685). Among the eyes getting operated in Triamcinolone group, 33(55%) were right eyes (OD) and 27(45%) were left eyes (OS). In prednisolone group 29(48.3%) were OD and 31(51.7%) were OS. The two groups are comparable with respect to eyes getting operated (viz. OD or OS, P value = .465).

The mean pre-op IOP in the Triamcinolone group is 15.60 mmHg while that of mean pre-op IOP in prednisolone group is 15.07mmHg. The two groups are comparable with respect to the pre-op IOP (P value = .243).

SUMMARY AND CONCLUSION

The standard practice to control postoperative intraocular inflammation after cataract surgery has been the use of corticosteroid drops. However, Patient compliance in an elderly cataract population can be highly variable, and in several cases relatives have to take time off work for the same. The situation becomes more problematic in our set-up where the patient is illiterate and poor. Also, intraocular level of topically applied preparations are low and unreliable, with concentrations fluctuating between instillations and reaching peak concentration approximately 1 hour after application.

Sub-Tenon's triamcinolone, by providing sustained levels of corticosteroid, eliminates the risk associated with poor patient compliance. Sub-Tenon's capsular triamcinolone thus may offer enhanced patient compliance, eliminate topical steroid drops instillation and improve drug bio-availability after cataract surgery. It may also reduce instruction time of medical staff and reduce the dependency of patient on relatives for instillation of drug that may minimize the economic loss of working relatives.

This randomised double masked study was conducted at the Department of Ophthalmology, Indira Gandhi Institute of Medical Science, Patna, to compare the efficacy and tolerability of sub-Tenon's capsular space inj. of triamcinolone acetonide as an alternative to 1% topical prednisolone eye drops for postoperative control of inflammation following cataract surgery. 120 eyes of 120 patients who had undergone uncomplicated small incision cataract surgery (SICS) with posterior chamber intraocular lens (PCIOL) implantation were enrolled in the study.

One group (60 patients) received a single intraoperative sub-Tenon's capsule space triamcinolone injection (30mg) while the second group (60 patients) received topical 1% prednisolone eye drops in tapering dose schedule.

CONCLUSION

- Our study showed comparable results to the other two studies done on similar objectives and outcome measure.
- The sub-Tenon's triamcinolone has an edge over prednisolone eye drops as far as reduction of Aqueous cell and Conjunctival congestion are concerned.
- Sub-Tenon's triamcinolone is well tolerated by patients but a study with longer duration of follow-up can be tried since a bigger difference may be noted in IOP.
- This is a novel and effective way to eliminate the role of corticosteroid eye drops in controlling postoperative inflammation in cataract patients and can be advised to the patients where compliance is an issue.

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