



Anti-Inflammatory Efficacy of Topical Diclofenac Sodium After Uneventful Cataract Surgery.

KEYWORDS

Cataract surgery, Comparative Study, Dexamethasone, Diclofenac sodium, iritis

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ABSTRACT

To compare the effectiveness of topical diclofenac sodium as an alternative to topical steroids in controlling inflammation after cataract surgery. **Methods:** The anti-inflammatory effect of topical diclofenac sodium 0.1% following cataract surgery was evaluated and compared to routine corticosteroid, dexamethasone sodium 0.1% in a prospective, double-blind randomized study. Both groups were comparable in baseline parameters. Post-operative inflammatory response following standard extracapsular cataract extraction (ECCE) was assessed in both groups by following up the patients post-operatively for one month. The severity of post-operative inflammatory response for the two drugs with respect to ciliary congestion, corneal edema and iritis was graded at post-operative days 1, 3, 7 and 30. **Results:** The two groups did not show statistically significant difference in improvement for any of the variables. There were no side effects for topical diclofenac, and it was well tolerated. **Conclusion:** Diclofenac sodium is as effective as topical steroid in controlling inflammation after uneventful cataract surgery.

Introduction:

Visual prognosis after cataract surgery depends on various intra-operative and post-operative factors. Of these, post-operative intraocular inflammation is a very important factor. Handling of intraocular tissues during cataract surgery induces prostaglandin (PG) synthesis from arachidonic acid. These prostaglandins induce inflammatory response manifested as ciliary congestion, aqueous cells, flare and cystoid macular edema (CME)¹. If not controlled in time, this inflammatory reaction can adversely affect the post-operative visual outcome and can also lead to substantial visual impairment.

Topical steroids have been considered as the gold standard for the treatment of post-operative ocular inflammation. They reduce the inflammation by preventing PG synthesis. However, adverse effects of topical steroids are well known and include elevation of intra-ocular pressure, delayed wound healing and facilitation of infection.² Topical Non-steroidal anti-inflammatory drugs (NSAIDs) have been used less frequently to control intraocular inflammation. They have been shown to be as effective as topical corticosteroids in controlling ocular inflammation without the side-effects associated with topical steroids with additional advantages of better post-operative analgesia. Cystoid macular edema that may be seen in the post-operative period occurs less frequently with use of topical and oral NSAIDs.^{3,4} These drugs have been used to treat intraocular as well as extraocular inflammation. Animal studies have shown that NSAIDs are inhibitors of arachidonic acid pathway. They limit fibroblastic activity and reduce inflammation.⁵ Topical NSAIDs offer an alternative to topical corticosteroids for treatment of ocular inflammation following cataract surgery.

A prospective, randomized, double-blind study of efficacy of diclofenac sodium (0.1%) versus dexamethasone sodium (0.1%) in treatment of post-operative inflammation following uneventful cataract surgery was undertaken in a rural hospital. Approval for the study was obtained from the hospital ethics committee.

Materials and methods:

Total of hundred patients with senile cataracts who un-

derwent uncomplicated Extracapsular Cataract Extraction (ECCE) with posterior chamber intraocular lens (PCIOL) implantation were enrolled in the study after obtaining informed consent.

Inclusion criteria:

Patients > 50 years age
Uneventful ECCE-PCIOL surgery

Exclusion criteria:

Intraocular pressure (IOP) > 21 mmHg
Eyes receiving other medications
Previous intraocular surgery or ocular inflammation like iridocyclitis
Pseudoexfoliation
Diabetic retinopathy
Insulin - dependent diabetes, connective tissue disorder, immunological disorder
Patients allergic to NSAIDs
One-eyed individuals

Patients who fulfilled the study selection criteria underwent a detailed slitlamp examination, measurement of intraocular pressure (by Schiott tonometry) and assessment of visual acuity on Snellen's chart.

The intraocular surgery was a standard ECCE with PCIOL implantation done under peribulbar anaesthesia using a combination of 2% lignocaine with adrenaline and 0.5% bupivacaine. The surgery consisted of fornix based conjunctival flap, limbal incision, anterior capsulotomy, nucleus delivery, aspiration of cortical matter, insertion of a polymethylmethacrylate (PMMA) IOL in the capsular bag and wound closure using 10-0 monofilament nylon. 2% Methylcellulose was used as the viscoelastic substance during the surgery and was removed at the end of surgery. The Patients with operative complications like posterior capsular tear, vitreous loss, hyphema were excluded from the study.

The post-operative medications, topical diclofenac sodium (0.1%) or dexamethasone sodium (0.1%) were administered in a randomized double-blind fashion. Randomization was done using computer generated schedule and patients were allotted to one of the treatment schedules.

All the patients also received topical antibiotic (Ofloxacin) and cycloplegic (2% Homatropine) along with the study medication. Patients, nursing staff and surgeons were masked to the topical medications. Enough care was taken to supply the topical medications (trial drug and control drug) to the patients in identically sealed bottles.

The study medication was instilled six times a day for one month post-operatively. Patients were examined on post-operative days 1, 3, 7 and 30. During each follow up examination, the patients were evaluated and graded on the following aspects: ciliary congestion, corneal edema and iritis by presence of aqueous flare and cells in anterior chamber.

Post-operative corneal edema was graded in two categories-

- a) Minimal corneal edema without Striate Keratitis (SK)
- b) Moderate corneal edema with Striate Keratitis (SK)

Post-operative iritis was graded in three categories-

- a) Mild- Just detectable aqueous flare or 5-10 aqueous cells.
- b) Moderate- Moderate aqueous flare, clear iris details or 11-20 aqueous cells.
- c) Severe- Marked aqueous flare, hazy iris details or 21-50 aqueous cells.

Post-operative miosis could not be studied as homatropine was used as a cycloplegic drug in the post-operative period for all patients.

Statistical analysis :

The following tests were used to test for statistical significance:

- 1. Chi-square test for qualitative data.
- 2. Baseline comparisons of quantitative data between groups were made using the independent sample t-test after confirming homogeneity of variances.

Alpha for significance was set at $p < 0.05$.

Results:

The mean age in the diclofenac group was 66.42 years and in the corticosteroid group was 66.04 years. The two groups were comparable in age.

The diclofenac group included 24 males (48%) and 26 females (52%), while the dexamethasone group consisted of 22 males (44%) and 28 females (56%). The two groups were similar in gender distribution.

All the patients on the trial showed good compliance to the drug. Though analgesia could not be adequately documented among all patients, most of them expressed no discomfort on instillation of either drug. There were no secondary infections encountered during the study period in the selected group.

There were no adverse reactions observed with topical diclofenac sodium which might have necessitated withdrawal of the drug from use. All the patients on the trial showed good compliance to the drug.

Data were analyzed on days 1,3, 7 and 30 post-operatively for presence of ciliary congestion

Table 1
Post-operative Ciliary congestion

	Post-operative days			
	D1	D3	D7	D30
Dexamethasone	50 (100%)	50 (100%)	20 (40%)	2 (4%)
Diclofenac	50 (100%)	50 (100%)	22 (44%)	3 (6%)

Corneal edema

Table 2
Post-operative corneal edema
A) Dexamethasone group

Grades of corneal edema	Post-operative days			
	D1	D3	D7	D30
Minimal	29	29	12	0
Moderate with SK	5	5	3	0
Total	34 (68%)	34 (68%)	15 (30%)	0

B) Diclofenac group

Grades of corneal edema	Post-operative days			
	D1	D3	D7	D30
Minimal	24	24	8	0
Moderate with SK	7	7	4	0
Total	31 (62%)	31 (62%)	12 (24%)	0

And iritis (in the form of aqueous cells or flare).

Table 3
Post-operative iritis (Presence of aqueous flare or cells)
A) Dexamethasone group

Grades of iritis	Post-operative days			
	D1	D3	D7	D30
Mild	15	15	7	0
Moderate	3	3	0	0
Severe	0	0	0	0
Total	18 (36%)	18 (36%)	7 (14%)	0

B) Diclofenac group

Grades of iritis	Post-operative days			
	D1	D3	D7	D30
Mild	16	16	6	0
Moderate	4	4	3	0
Severe	0	0	0	0
Total	20 (40%)	20 (40%)	9 (18%)	0

None of these parameters showed any statistically significant difference in anti-inflammatory activity between the two topical medications used. ($p > 0.05$)

Discussion:

Inflammation after cataract surgery is due to disruption of Blood- Aqueous Barrier (BAB) and cellular infiltration of aqueous humor. PG's released from the ocular tissue in response to surgical trauma are the main chemical mediators responsible for intra-ocular inflammation.¹

Steroidal agents prevent formation of PG's through in-

hibition of enzyme phospholipase A₂ and release of arachidonic acid while non-steroidal anti-inflammatory drugs (NSAID's) prevent PG synthesis by inhibition of enzyme cyclo-oxygenase⁶. However, unlike other NSAIDs, diclofenac also indirectly modulates the lipoxygenase pathway in the arachidonic acid cascade.⁷This dual mechanism of action of diclofenac may make it comparable in anti-inflammatory activity to the corticosteroids. The results of the present study are in agreement with this presumption, since no significant difference in inflammatory reaction was found between dexamethasone and diclofenac at any observation time. The slit lamp has been used in this study for evaluation. The primary criteria to indicate reduction of inflammatory response was reduction in ciliary congestion, corneal edema and aqueous flare and cells in the post-operative period. Based on all these parameters used in this study, patients in both the groups showed comparable improvement. Patients in the corticosteroid group, however, showed greater magnitude of improvement in ciliary congestion and iritis while improvement in corneal edema was clinically better in the diclofenac group. However, these differences were not statistically significant. Quantitative evaluation of intra-ocular inflammation using anterior chamber fluorophotometry could provide objective information but unfortunately, is not readily available in a rural set up.

Most of the published studies so far have been done on Caucasian patients. Our study has been done on Indian patients with brown irises similar to Reddy et al⁸. Most of these studies like Laurellet al⁹, Othenin-Girard et al¹⁰, Ital-

ian diclofenac study Group⁵ and Reddy et al found diclofenac to be equally effective to dexamethasone in controlling inflammation after cataract surgery. The present study also demonstrates comparable anti-inflammatory effect of both diclofenac sodium (0.1%) and dexamethasone sodium (0.1%).

In conclusion, considering the adverse effects of topical corticosteroids like rise of IOP, delayed wound healing, secondary infection and equal effectiveness of topical NSAID's like diclofenac, this study recommends the use of topical 0.1% diclofenac sodium to control inflammation after uneventful cataract surgery.

The drawback of this study is that the trial has been conducted in patients with uncomplicated cataract surgery. It is not known whether diclofenac sodium is equally effective in treating inflammation associated with complications of cataract surgery.

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