



Ophthalmology

COMPARISON BETWEEN TOPICAL NEPAFENAC AND FLURBIPROFEN IN MAINTAINING INTRAOPERATIVE MYDRIASIS DURING SMALL INCISION CATARACT SURGERY

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ABSTRACT **Background:** Preoperative dilation of pupil is one of the prerequisites to perform an uncomplicated cataract surgery. Intraoperative miosis is one of the many challenges which a cataract surgeon can encounter during cataract surgery. Preoperative use of NSAIDs like nepafenac, flurbiprofen, ketorolac have been used for maintaining intra operative mydriasis. **Aim:** To compare the efficacy of topical nepafenac and flurbiprofen in maintaining intraoperative mydriasis. **Settings and Design:** This was an institutional prospective comparative study done in Eye hospital, Ludhiana, Punjab. **Methods and Material:** This study was performed on 110 patients, 55 were allocated in each group and were given either of the topical NSAID's Nepafenac or Flurbiprofen prior to cataract surgery. Pupillary diameter was measured at the beginning and at the end of the surgery and the values were compared between the groups. **Results:** The mean pupillary diameter of the two groups were comparable at the beginning of surgery. The mean change in the pupillary diameter was more in flurbiprofen group when compared to nepafenac group. There was statistically significant difference among both the groups in maintenance of intraoperative mydriasis. **Conclusion:** Pre-operative Nepafenac was found to be better than flurbiprofen in maintaining intraoperative mydriasis.

KEYWORDS : Cataract surgery, Nepafenac, Flurbiprofen, Miosis, Mydriasis

INTRODUCTION

Senile cataract is the leading cause of avoidable blindness throughout the world. It is estimated that 39.1% of global blindness is caused by cataract.¹

The definitive treatment of cataract is the surgical removal of the cataractous lens and its replacement with an intraocular lens (IOL). Small incision cataract surgery with posterior chamber intraocular lens implantation (PCICL) is the most frequent surgical technique as it is cost effective compared to phacoemulsification.

Maintaining the pupil size is an essential prerequisite for uneventful cataract surgery. In Small Incision Cataract Surgery (SICS) all the manipulations are done in the posterior chamber (PC) of eye, the visibility of which can be increased by pupillary dilatation (mydriasis).

Preoperative dilatation is usually achieved by Cyclopentolate 1% eye drops or Tropicamide 0.8% with Phenylephrine 5% eye drops. However, in spite of adequate dilatation of pupil with mydriatics, intraoperative miosis is one of the challenges which a surgeon can encounter during cataract surgery leading to difficulty in performing precise anterior capsulorhexis and IOL implantation, with high risk of posterior capsular rent, vitreous loss, postoperative uveitis and cystoid macular edema.

Non-Steroidal Anti-Inflammatory drugs (NSAIDs) like Nepafenac, Flurbiprofen and Ketorolac are effective in maintaining intraoperative mydriasis and controlling postoperative inflammation.²

Surgical trauma triggers the inflammatory cascade with release of Cyclooxygenase enzymes (COX-1 and COX-2) producing excessive quantities of prostaglandins in the anterior chamber, leading to miosis, inflammation and disruption of blood-aqueous barrier. NSAIDs inhibit cyclooxygenase enzyme, thereby interfering with endogenous prostaglandin production, thus preventing intraoperative miosis and controlling postoperative inflammation.³

However there are only a few studies comparing the effectiveness of Nepafenac 0.1% and Flurbiprofen 0.03% in maintaining intra operative mydriasis. This study is to compare the effect of topical Nepafenac 0.1% vs Flurbiprofen 0.03% on the pupil size intraoperatively.

OBJECTIVES

1. To measure the horizontal and vertical pupil diameters preoperatively and intraoperatively in Nepafenac group using Castroviejo's callipers.
2. To measure the horizontal and vertical pupil diameters preoperatively and intraoperatively in Flurbiprofen group using Castroviejo's callipers.

3. To compare the preoperative and intraoperative horizontal and vertical pupil diameters between Nepafenac group and Flurbiprofen group.

MATERIALS AND METHODS

Source Of Data

This Prospective comparative study was conducted on 110 eyes of patients with senile cataract attending the camps by Sankara Eye Hospital, Ludhiana.

Study Design

Inclusion criteria:

Males and females aged 55 years and above with senile cataract undergoing Small incision cataract surgery with intraocular lens implantation.

Exclusion criteria:

1. Patients with systemic comorbidities like Hypertension, diabetes.
2. Patients with pupil diameter less than 6 mm with mydriatic.
3. Pseudoexfoliation
4. Primary or secondary glaucoma, uveitis
5. History of ocular trauma or ocular surgery to the operating eye
6. Patients on topical or systemic steroids and NSAIDs within 30 days prior to inclusion in the study
7. History of hypersensitivity to nepafenac or flurbiprofen
8. Patient not consenting for the procedure

Method Of Collection Of Data:

A total of 110 eyes of patients with senile cataract were included in this prospective comparative study. All patients fulfilling inclusion criteria underwent similar protocol for standard cataract evaluation, including detailed history, recording of visual acuity by Snellens chart, intraocular pressure measurement, slit lamp examination, fundus evaluation with indirect ophthalmoscopy, B Scan if needed and ultrasound biometry with IOL power calculation by SRK 2 formula.

Randomization:

The selected patients will be randomized into two groups based on random number table prepared using random number generator in to two groups A and B.

GROUP A: 55 EYES- Nepafenac 0.1%

GROUP B: 55 EYES- Flurbiprofen 0.03%

Technique

Preoperative:

Group A received nepafenac 0.1% three times one day before surgery. One drop every 30 minutes was instilled just before the planned time of surgery. Group B received 0.03% of Flurbiprofen eye drops 3 times one day before surgery. One drop every 30 minutes was instilled just before the planned time of surgery. Both Group A and Group B

received Tropicamide 0.8% with Phenylephrine 5% ophthalmic solution 2 times at an interval of 10 minutes, half an hour before surgery. The diameter of the pupil was measured in both horizontal and vertical meridian using Castroviejo's calipers before peribulbar anesthesia.

Intraoperative:

All patients underwent Small incision cataract surgery with posterior chamber IOL implantation under peribulbar anesthesia. During the procedure, the horizontal and vertical pupillary diameters were measured using Castroviejo's calipers following two steps of the surgery

- 1) After initial entry in to the anterior chamber via sideport
- 2) After IOL implantation, upon completing the intervening surgical steps

Statistical Methods Used For This Study

Collected data were coded and entered in MS Excel and analysed using SPSS22 version software. Categorical variable like gender, eye(R/L) will be expressed using proportion(%). Continuous variables like age, mydriasis were expressed using mean $\pm$ SD or median(IQR) depending on normal distribution.

RESULTS

The Average age of patients treated under Group A is 62.87, the average age of Group B is 62.197.

Table 1 - Comparison of age distribution between both groups

Parameter	Nepafenac (n=55)	Flurbiprofen (n=55)
Age (years) (Mean $\pm$ SD)	62.87 $\pm$ 7.86	62.19 $\pm$ 8.38

46% of the participants in group A were males and 54% were females. In group B 59% of the participants were males and 41% were females.

The laterality distribution was equal in nepafenac group and in flurbiprofen group about 62% of the included participants were left eyes.

Table 2 - Comparison of vertical pupillary diameter (mean $\pm$ SD in mm) between both groups at different stages of cataract surgery

Parameter	Group A (Nepafenac)	Group B (Flurbiprofen)	P value
PREOPERATIVELY	7.56 $\pm$ 0.57	7.64 $\pm$ 0.51	0.45
END OF SURGERY	6.95 $\pm$ 0.79	6.31 $\pm$ 1.07	0.001
TOTAL CHANGE	0.59 $\pm$ 0.63	1.33 $\pm$ 1.05	0.001
% LOSS	7.46	16.67	0.002

The above table shows that the average preoperative vertical pupillary diameter was comparable for both groups (7.56 $\pm$ 0.57 mm in group A and 7.64 $\pm$ 0.51 mm in group B) and there was no significant difference found statistically ($P = 0.45$) ($p > 0.05$). The difference in vertical pupillary diameters between both the groups was statistically significant ($P = 0.001$) ($p < 0.05$) at the end of surgery. The total loss of mydriasis was significantly less in group A (mean: 0.59 mm) when compared to group B (mean: 1.33 mm). At the end of surgery, the percentage loss of mydriasis is less in group A (mean: 7.46%) group compared to group B (mean: 16.67 %).

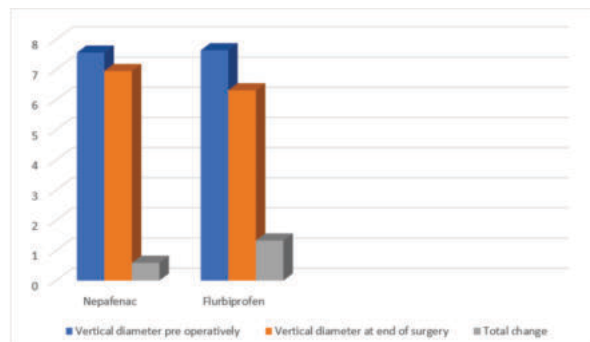


Table 3 - Comparison of horizontal pupillary diameters (mean $\pm$ SD in mm) between both groups at different stages of cataract surgery

Parameter	Group A (Nepafenac)	Group B (Flurbiprofen)	P value
PREOPERATIVELY	7.51 $\pm$ 0.60	7.64 $\pm$ 0.50	0.22

END OF SURGERY	6.79 $\pm$ 1.24	6.33 $\pm$ 1.06	0.04
TOTAL CHANGE	0.57 $\pm$ 0.63	1.31 $\pm$ 1.05	0.001
% LOSS	7.53	16.25	0.002

The above table shows that the average preoperative horizontal pupillary diameter was comparable for both groups (7.51 $\pm$ 0.60 mm in group A and 7.64 $\pm$ 0.50 mm in group B) and there was no significant difference found statistically ($P = 0.22$) ($p > 0.05$). The difference in horizontal pupillary diameters between both the groups was statistically significant ($P = 0.04$) ($p < 0.05$) at the end of surgery. The total loss of mydriasis was significantly less in group A (mean: 0.57 mm) when compared to group B (mean: 1.31 mm). At the end of surgery, the percentage loss of mydriasis is less in group A (mean: 7.53 %) compared to group B (mean: 16.25%).

It was found that the percentage loss in both vertical and horizontal diameters were more in group B when compared to group A.

DISCUSSION

A study by Guzek et al revealed that there is a fifty percent reduction in incidence of posterior capsule rupture if pupillary diameter is maintained above 6 mm throughout the surgery and each 1 mm reduction in pupil size doubles the risk of complications.(4)

Since, few studies have been done to compare the different topical NSAIDs amongst themselves and with the placebo to maintain the intraoperative mydriasis.

Zanetti et al compared the NSAIDs [Nepafenac (0.1%) and Ketorolac (0.4%)] with placebo and found that they were more effective in maintaining intra-operative mydriasis as compared to placebo. However, they found no statistical difference between the two NSAIDs.(5)

Gimbel et al, however, have compared a different set of NSAIDs [Flurbiprofen (0.03%) with Indomethacin (1%)] proving both to be equally efficacious in preventing miosis during phacoemulsification.(6)

A study by Rodríguez-García compared the effectiveness of three different topical nonsteroidal anti-inflammatory drugs (NSAIDs) in inhibiting surgically induced miosis during uncomplicated cataract phacoemulsification. They found that the percentage of pupillary area loss at the end of surgery was 7.50% with nepafenac, 9.84% with flurbiprofen, 10.09% with ketorolac, and 13.83% with control. A trend to larger pupillary area and diameters was found in the nepafenac, flurbiprofen, and ketorolac groups compared with the control group, with better performance in maintaining larger pupil diameters and area in the nepafenac group at all surgical stages. Thus, they concluded that all NSAIDs are effective in maintaining intraoperative mydriasis during uncomplicated cataract phacoemulsification compared to the control group.(7)

Previously, only very few randomized control trials have compared the efficacy of topical Nepafenac (0.1%) with Flurbiprofen (0.03%) in maintaining intra-operative mydriasis have been reported from the Indian sub-continent. While Prakash et al studied the efficacy of these two drugs in extra capsular cataract extraction; Sarkar et al compared their effect in small incision cataract surgery (SICS).(8,9) However, both these surgical procedures, as compared to phacoemulsification, involve more handling of iris tissue and thus increased incidence of intraoperative miosis. Sarkar et al in their study administered topical NSAIDs one day preoperatively and evaluated both vertical and horizontal pupillary diameter and showed no significant difference.

A study by Shrivastava et al showed that topical Nepafenac (0.1%) proved to be more efficacious in maintaining intra-operative mydriasis during phacoemulsification surgery as compared to topical Flurbiprofen (0.03%). They also showed that the mean phacoemulsification time in the Nepafenac group was significantly less as compared to that of the Flurbiprofen group ($P < 0.05$). This could probably be due to sustained maintenance of intra-operative mydriasis in the Nepafenac group, which allowed the surgeon better visibility of the rhexis margin and posterior chamber structures.(10)

Multicentric randomized studies are required to assess the exclusive safety and efficacy of NSAIDs on postoperative inflammation which if proven can substitute the steroids. This study has taken into consideration only uncomplicated cataract surgery. Also the

comparative efficacy of the these drugs in diabetics and eyes with ocular inflammation needs to be studied. In this study Nepafenac was found to be better than flurbiprofen in maintaining mydriasis intraoperatively.

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