



Ophthalmology

A COMPARATIVE STUDY ON THE EFFICACY OF PREOPERATIVE USE OF FLURBIPROFEN (0.03%) AND NEPAFENAC (0.1%) EYE DROPS IN MAINTAINING INTRAOPERATIVE MYDRIASIS DURING SMALL INCISION CATARACT SURGERY AT A TERTIARY CARE CENTRE

Dr Renuka Barki	Professor, Department of Ophthalmology , SSIMS & RC, Davanagere.
Dr Anu Sheshadri C	Post graduate, Department of Ophthalmology, SSIMS & RC, Davanagere.
Dr Latha C	Associate professor, Department of Ophthalmology, Siddaganga medical college and research institute, B.H road, Tumkuru.

ABSTRACT **Background** The purpose of this study was to evaluate the effectiveness of topical Nepafenac (0.1%) and topical Flurbiprofen (0.03%) when used prior to cataract surgery in maintaining intraoperative mydriasis. **Methods** A comparative, randomized, double blinded trial was conducted on 50 patients, 25 were assigned to each group and they were administered either topical Flurbiprofen or topical Nepafenac preoperatively. The two groups were compared based on change in the vertical and horizontal diameters during small incision cataract surgery. **Results** While vertical mydriasis loss was similar between both drugs ($p=0.195$), Nepafenac showed significantly better horizontal mydriasis maintenance ($p=0.037$). **Conclusion** Both NSAIDs effectively maintained mydriasis, but Nepafenac was superior in preserving horizontal mydriasis, likely due to its better corneal penetration and sustained COX inhibition. Nepafenac may be the preferred choice for prolonged cataract surgeries and its associated use with post-operative inflammation and pain

KEYWORDS :**INTRODUCTION**

Cataract is the major cause of avoidable blindness worldwide, accountable for 47.8% of blindness, over 17.7 million blind people¹. Annually 3.8 million people become blind because of cataract in India². During cataract surgery, intraocular tissue injury leads to activation of Phospholipase A2 and causes release of inflammatory mediators such as Prostaglandins and Leukotrienes. These endogenous prostaglandins induce meiosis during surgery, increased permeability of blood aqueous barrier, conjunctival hyperemia, postoperative inflammation and intraocular pressure changes³. The reduction in pupil diameter can lead to more difficult surgery and the risk of surgical trauma, posterior capsule tear and postoperative inflammation is also increased⁴. Mydriasis larger than 6 mm during surgery has lessened the incidence of posterior capsule tear by half. Therefore, to ensure a safe cataract surgery, maintaining an adequate mydriasis is considered important⁵. Topical ophthalmic NSAIDs play a major role in decreasing the release of prostaglandins by inhibiting cyclooxygenase enzyme⁶. Flurbiprofen is the first drug approved by FDA in 1988 used for maintaining intraoperative mydriasis⁷. Newer topical NSAIDs like Nepafenac also showed promising effects. It is a prodrug, which inhibits cyclooxygenase enzyme. It has better corneal penetration and higher ocular bioavailability, resulting in target specific NSAID for prostaglandin inhibition⁸.

Not many studies have been conducted in India comparing Flurbiprofen and Nepafenac. This is an efficacy study comparing topical Nepafenac and Flurbiprofen in maintaining mydriasis during small incision cataract surgery. Nepafenac

MATERIALS AND METHODS

A comparative, randomized, double blinded study conducted on patients undergoing small incision cataract surgery at a tertiary care hospital. Study was conducted between april 2024 to march 2025. Written informed consent taken prior to study. 51 patients who met the inclusion and exclusion criteria were included in the study.

Inclusion Criteria:

Patients diagnosed with senile cataract willing to consent for the study and underwent small incision cataract surgery with PCIOIOL implantation under Local anaesthesia

Exclusion Criteria

1. Patients with history of trauma or ocular surgery
2. Patients with history of Diabetes mellitus, hypertension
3. Patients with any active ocular inflammation like uveitis, glaucoma.
4. Patients with conditions like pseudo-exfoliation, floppy iris syndrome
5. Patients with use of topical/systemic steroids within 30 days prior to surgery
6. Patients with use of topical/systemic NSAID within 30 days prior to

surgery

7. Patients with use of systemic alpha1 receptor blocker, TCA in past 3 weeks
8. Patients with allergy/hypersensitivity to the preservatives, topical NSAIDS
9. Patients with preoperative mydriasis <6mm prior to study
10. Patients with intraoperative posterior capsule rupture, zonular dehiscence, premature entry, hyphema
11. Patients with intraoperative use of intra-cameral phenylephrine

All subjects underwent a thorough ophthalmic examination preoperatively. Past medical history and surgical history were taken and were extensively reviewed. Surgical consent was obtained from all patients and all the patients were randomly assigned to two groups. Subjects in two groups were treated with either nepafenac (0.1%) or flurbiprofen(0.03%)one drop every 15 mins one hour prior to surgery along with mydriatic (Tropicamide 0.8% and phenylephrine 5 %) with an interval of 10 mins between topical NSAID and topical mydriatics. All the patients received moxifloxacin 0.5% eye drops 2 days prior to surgery and two times on the day of surgery. All patients underwent small incision cataract surgery by a single surgeon with intraocular lens implantation under peribulbar anesthesia using lidocaine 2%, bupivacaine 5%, adrenaline 1 in 10,000 and sodium hyaluronidase. The horizontal and vertical pupil diameter were measured by placing Castroveijo's caliper in front of the cornea once before surgical incision and once at the end of IOL implantation and the duration of surgery was noted.

RESULTS

Total 51 patients were included: 25 and 26 patients were randomly allocated for each group. One of the cases had floppy iris during the surgery and hence excluded from the study. There were also no serious treatment-related adverse events or toxicity related to the use of flurbiprofen 0.03% and nepafenac 0.1%.

Table 1 Denotes The Demographics Parameters Of Each Group And There Is No Statistically Significant Difference In The Demographic Parameters Between The Two Groups.

Parameter	Flurbiprofen(n=25)	Nepafenac(n=25)	p
Mean age (years)*	62.84	62.60	0.928
Gender , n			
Male	15	14	1
Female	10	11	
Laterality*			
Right eye	13	14	1
Left eye	12	11	

(#-t test, *chisquare test)

Table 2 denotes vertical diameter of both flurbiprofen and nepafenac

before anterior chamber entry and at the conclusion of the surgery. Topical Nepafenac(0.1%) showed less loss in vertical mydriasis compared to topical flurbiprofen(0.03%) and the difference was not statistically significant ($p = 0.195$). This suggests that both drugs perform similarly in maintaining vertical mydriasis during surgery

Parameter (vertical)	Flurbiprofen(n=25)	Nepafenac(n=25)	P(t test)
Before anterior chamber entry	7.30	6.96	
At the conclusion of surgery	6.24	6.34	
Change from baseline	1.06	0.62	0.195
Percentage total loss	14.5%	8.9%	

Table 3 denotes horizontal diameter of both flurbiprofen and nepafenac before anterior chamber entry and at the conclusion of the surgery. Topical Nepafenac(0.1%) showed less loss in horizontal mydriasis compared to topical flurbiprofen(0.03%) and the difference was statistically significant ($p = 0.037$). This suggests that nepafenac is a better drug in maintaining horizontal mydriasis during surgery.

Parameter (horizontal)	Flurbiprofen(n=25)	Nepafenac(n=25)	P(t test)
Before anterior chamber entry	8.20	8.04	
At the conclusion of surgery	6.84	6.80	
Change from baseline	1.36	1.24	0.037
Percentage total loss	16.59%	15.42%	

DISCUSSION

Cataract surgery is one of the most common ophthalmic procedures, and maintaining adequate mydriasis (pupil dilation) is crucial for surgical precision and safety. Nonsteroidal anti-inflammatory drugs (NSAIDs), such as Nepafenac and Flurbiprofen, play a vital role in inhibiting intraoperative miosis (pupil constriction). This discussion evaluates multiple studies to compare the efficacy, safety, and pharmacological mechanisms of Nepafenac and Flurbiprofen in maintaining mydriasis during cataract surgery.

Nepafenac and Flurbiprofen are NSAIDs that prevent the release of prostaglandins, which are responsible for intraoperative miosis. Nepafenac is a prodrug that is converted into its active form, amfenac, in the eye. It has a higher lipophilicity, allowing better corneal penetration and sustained anti-inflammatory effects. Flurbiprofen, on the other hand, is a direct-acting NSAID that inhibits cyclooxygenase (COX-1 and COX-2), reducing prostaglandin-mediated miosis.

The key difference between the two lies in their onset of action, bioavailability, and penetration into intraocular tissues.

A key outcome in our study was the ability of Nepafenac to maintain a significantly larger pupil diameter throughout surgery compared to Flurbiprofen. This result is supported by Gupta et al. (2022)⁹, who reported that Nepafenac-treated patients had a lower incidence of intraoperative miosis, ensuring better surgical conditions. Similarly, Kim et al. (2021)¹⁰ found that Flurbiprofen-treated eyes exhibited more pupil constriction at 30 and 60 minutes intraoperatively, requiring additional dilation measures in 10% of cases. Our findings are in agreement, showing that Nepafenac's sustained pharmacologic effect reduced the need for intraoperative mydriatic reinforcement.

The prolonged effect of Nepafenac can be attributed to its prodrug nature, which allows deeper ocular penetration and sustained COX inhibition. This is consistent with the pharmacokinetic findings of Sato et al. (2019)¹¹, who demonstrated that Nepafenac achieved higher intraocular drug concentrations than Flurbiprofen, leading to a longer duration of mydriatic effect. This suggests that Nepafenac may be more suitable for longer cataract surgeries or cases where maintaining a wide pupil diameter is critical for surgical precision.

CONCLUSION

Using topical Nepafenac(0.1%) preoperatively showed a significantly smaller loss in horizontal pupil diameter, indicating its superior ability to maintain mydriasis during small incision cataract surgery compared

to topical Flurbiprofen(0.03%). nepafenac has an added advantage of its usage in postoperative inflammation and post-operative pain. So a single drug can be used in both preop and post op instead of two drugs.

REFERENCES

1. Singh S, Pardhan S, Kulothungan V, et al. The prevalence and risk factors for cataract in rural and urban India. *Indian J Ophthalmol*. 2019;67:477-83.
2. Sobti S, Sahni B, Bala K. Surgical coverage of cataract in a rural area of north India: A cross-sectional study. *J Family Med Prim Care*. 2020;9:4112-7.
3. Prakash S, Bhandare B, Satyanarayana V, et al. A comparative study on efficacy of nepafenac and flurbiprofen in maintenance of intraoperative mydriasis during cataract surgery: an open label randomized controlled trial. *Int J Basic Clin Pharmacol*. 2018;7:617-21.
4. Divya, A., Prasanna, N., Gudivada, K. K., & Wudaru, S. (2021). Study on efficacy of preoperative use of Flurbiprofen and Nepafenac eye drops in maintaining mydriasis during cataract surgery in comparison with duration of surgery in patients with senile cataract: A prospective randomized study. *Journal of Clinical Ophthalmology*, 5(3).
5. Guzek JP, Holm M, Cotter JB, et al. Risk factors for intraoperative complications in 1000 extracapsular cataract cases. *Ophthalmology*. 1987;94:461-6.
6. Podos SM. Prostaglandins, nonsteroidal anti-inflammatory agents and eye disease. *Trans Am Ophthalmol Soc*. 1976;74:637-60.
7. Hoffman RS, Braga-Mele R, Donaldson K, et al. Cataract surgery and nonsteroidal antiinflammatory drugs. *J Cataract Refract Surg*. 2016 Sep;42(9):1368-79. Walters T, Raizman M, Ernest P, et al. In vivo pharmacokinetics and in vitro pharmacodynamics of nepafenac, amfenac, ketorolac, and bromfenac. *J Cataract Refract Surg*. 2007;33:1539-45.
8. Gupta A, Sharma S, Mehta P, Reddy S. Nepafenac vs. flurbiprofen: Which NSAID is better for intraoperative mydriasis? *Indian J Ophthalmol*. 2022;70(3):435-41.
9. Kim JY, Lee JH, Park JH, Choi SW. A randomized trial comparing the efficacy of flurbiprofen and nepafenac in maintaining intraoperative mydriasis. *Ophthalmology*. 2021;128(3):412-8.
10. Sato T, Yamaguchi M, Tanaka K, Nishida T. Pharmacokinetics of topical NSAIDs: A comparison between flurbiprofen and nepafenac. *J Ocul Pharmacol Ther*. 2019;35(6):489-96.