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Role of Topical NSAIDs in Maintaining Mydriasis during Cataract Surgery with Special Emphasis on Nepafenac, Bromfenac

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ABSTRACT

Cataract surgeries are very commonly performed procedure worldwide. Surgically induced meiosis makes cataract surgery challenging and lead to many post-operative complications like capsular tears, lens decentration, retained lens fragments, postoperative inflammation or vitreous loss. Apart from classical mydriatrics like sympathomimmetics and anti-cholinergics, topical non-steroidal anti-inflammatory drugs (NSAIDs) instilled pre-operatively and perioperatively help to maintain mydriasis during surgery. NSAIDs also prevent post-operative inflammation and risk of cystoid macular edema. Many topical NSAIDs are used for this purpose notably being Ketorolac, Flurbiprofen, Diclofenac, Nepafenac and Bromfenac. Recently FDA has approved marketing of combination eye drop of Phenylepherine and Ketorolac.

Keywords: NSAIDs, Mydriasis, Cataract surgery

Abbreviations: NSAIDs: Non-Steroidal Anti-Inflammatory Drugs; CME: Cystoid Macular Edema; PCMO: Pseudophakic Cystoid Macular Edema; FDA: Food and Drug Administration; LECs: Lens Epithelial Cells

INTRODUCTION

Surgical removal of clouded lens is the most effective treatment for cataract. During surgery, ocular tissue is traumatized leading to the activation of phospholipase A_2 [1] and the liberation of Arachidonic acid metabolites and platelet activating factor. Prostaglandins, one type of Arachidonic acid metabolite, cause meiosis during surgery, postoperative inflammation and increased permeability of the blood-ocular barriers, conjunctival hyperemia and changes in intraocular pressure [2,3]. Maintaining adequate pupil dilatation is considered an important part of ensuring smooth cataract removal.

Topical ophthalmic NSAIDs have shown to be effective in treating a variety of conditions in which prostaglandins are believed to play a causative role, including surgically induced meiosis, post-operative inflammation, treatment and prevention of cystoid macular edema (CME) and to control the pain of refractive surgery [4-6].

In our study, both nepafenac (0.1%) and bromfenac (0.09%) given one day prior to the surgery were effective in maintaining pupil size during the cataract surgery [7]. Our study corroborates fully with the collective findings of the other studies. Cervantes-Coste et al. [8] have reported prophylactic use of nepafenac 0.1% effective and safe in maintaining mydriasis during cataract surgery as well as in reducing postoperative macular edema. Campa et al. [9] have shown that co-administration of nepafenac or bromfenac and steroids post-operatively in patients who underwent routine cataract surgery is associated with a lower incidence of pseudophakic cystoid macular edema (PCMO) compared with steroid monotherapy.

Sarkar et al. [10] have also reported nepafenac to be more efficacious than flurbiprofen in maintaining mydriasis during cataract surgery.

Atanis et al. [11] have showed that topical nepafenac 0.1% is a more effective inhibitor of miosis during cataract surgery compared with topical ketorolac. Capote et al. [12] compared the efficacy, tolerability and safety of bromfenac 0.09%, nepafenac 0.1% or diclofenac 0.1% for the prophylaxis of the cystoid macular edema (CME) after

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phacoemulsification and found bromfenac as the best tolerated and more effective than diclofenac and nepafenac.

Zanetti et al. [13] compared the effects of preoperative use of topical anti-inflammatory prednisolone acetate, ketorolac tromethamine, nepafenac and placebo, on the maintenance of intraoperative mydriasis during cataract surgery and found that ketorolac, prednisolone and nepafenac were effective in maintaining intraoperative mydriasis in comparison to placebo (i.e., carboxymethyl cellulose).

ADVERSE EFFECTS OF TOPICAL NSAIDs [14]

Systemic absorption of most topical NSAIDs is minimal.

Burning, stinging, conjunctival hyperemia and contact dermatitis are the most commonly reported adverse side effects of NSAIDs [15,16]. Most topical NSAIDs are weakly acidic to improve corneal penetration hence they are irritating to eyes in comparison to neutral solutions.

Non-steroidal anti-inflammatory drugs have been reported to cause superficial punctate keratitis [17], sub epithelial infiltrates and immune rings [18], stromal infiltrates [19] and epithelial defects [20].

Every topical NSAID has been implicated in severe corneal events especially in presence of preexisting epithelial defect [21-31] Topical NSAIDs may be an additional trigger following cataract surgery that turns an epithelial defect into a melt in eyes that are at risk for ulceration [26].

Due to the potential local side effects of topical NSAIDs, certain ocular and systemic conditions warrant extra consideration and additional monitoring. These conditions include corneal denervation, corneal epithelial defects (especially traumatic, diabetic, neurotrophic and contact lens related), rheumatoid arthritis, rosacea, keratitis sicca complex or repeat ophthalmic surgeries and concomitant use of other medications that inhibit healing or are toxic to the epithelium [32]. Frequent or prolonged dosing, even in low-risk eyes, requires a careful history, examination and monitoring.

The most worrisome side effects of topical steroids in cataract surgery is steroid-induced glaucoma, followed by delayed wound healing, ocular rebound inflammation and opportunistic infections with fungi and herpes simplex virus.

CONCLUSION

Since the approval of flurbiprofen by the FDA in 1988, ophthalmic NSAIDs are being used safely and effectively.

Topical NSAIDs have been useful in preventing intraoperative meiosis, postoperative inflammation, and the development of CME. In addition, they may modulate postoperative pain and inhibit the proliferation of lens epithelial cells (LECs) that are responsible for posterior capsular cataract. In 2014 FDA has approved marketing of new ophthalmic formulation- Omidria which is combination of phenylepherine 1% and ketorolac 0.3% which helps in maintaining intraoperative mydriasis, prevent surgery-induced meiosis and reduce postoperative pain and inflammation after cataract surgery [33,34].

REFERENCES

1. Colin J (2007) The role of NSAIDs in the management of postoperative ophthalmic inflammation. Drugs 67: 1291-1308.
2. Koay P (1996) The emerging roles of topical non-steroidal anti-inflammatory agents in ophthalmology. Br J Ophthalmol 80: 480-485.
3. Drolsum L, Davanger M, Haaskjold E (1994) Risk factors for an inflammatory response after extra capsular cataract extraction and posterior chamber IOL. Acta Ophthalmol (Copenh) 72: 21-26.
4. Nichols J, Snyder RW (1998) Topical non-steroidal anti-inflammatory agents in ophthalmology. Curr Opin Ophthalmol 9: 40-44.
5. Schalnus R (2003) Topical non-steroidal anti-inflammatory therapy in ophthalmology. Ophthalmologica 217: 89-98.
6. Kim A, Stark WJ (2008) Are topical NSAIDs needed for routine cataract surgery? Am J Ophthalmol 146: 483-485.
7. Bansal G, Gupta S, Kumar S, Kansal S (2015) Comparison of the effect of topical bromfenac with nepafenac in maintaining mydriasis during cataract surgery. Delhi J Ophthalmol 26: 97-100.
8. Cervantes-Coste G, Sánchez-Castro YG, Orozco-Carroll M, Mendoza-Schuster E, Velasco-Barona C (2009) Inhibition of surgically induced meiosis and prevention of postoperative macular edema with nepafenac. Clin Ophthalmol 3: 219-226.
9. Campa C, Salsini G, Perri P (2018) Comparison of the efficacy of dexamethasone, nepafenac and bromfenac for preventing pseudophakic cystoid macular edema: An open-label, prospective, randomized controlled trial. Curr Eye Res 43: 362-367.
10. Sarkar S, Mondal KK, Roy SS, Gayen S, Ghosh A, et al. (2015) Comparison of preoperative nepafenac (0.1%) and flurbiprofen (0.03%) eye drops in maintaining mydriasis during small incision cataract surgery in patients with senile cataract: A randomized, double-blind study. Indian J Pharmacol 47: 491-495.
11. Atanis R, Tuaño PM, Vicencio J, Martinez JM, Verzosa L (2011) Effect of topical ketorolac tromethamine and topical nepafenac on maintaining pupillary dilation during phacoemulsification. Philipp J Ophthalmol 36: 23-27.

12. Chinchurreta Capote AM, Lorenzo Soto M, Rivas Ruiz F, Caso Peláez E, García Vázquez A (2018) Group OftaCosta, Ramos Suárez A. Comparative study of the efficacy and safety of bromfenac, nepafenac and diclofenac sodium for the prevention of cystoid macular edema after phacoemulsification. Int J Ophthalmol 11: 1210-1216.

13. Zanetti FR, Fulco EM, Chaves FP, da Costa Pinto AP, Arieta CL, et al. (2012) Effect of preoperative use of topical prednisolone acetate, ketorolac tromethamine, nepafenac and placebo, on the maintenance of intraoperative mydriasis during cataract surgery: A randomized trial. Indian J Ophthalmol 60: 277-281.

14. Hoffman RS, Braga-Mele R, Donaldson K, Emerick G, Henderson B, et al. (2016) Cataract surgery and non-steroidal anti-inflammatory drugs. J Cataract Refract Surg 42: 1368-1379.

15. Flach AJ (1992) Cyclo-oxygenase inhibitors in ophthalmology. Surv Ophthalmol 36: 259-284.

16. Gaynes BI, Fiscella R (2002) Topical non-steroidal anti-inflammatory drugs for ophthalmic use; a safety review. Drug Saf 25: 233-250.

17. Gills JP (1994) Voltaren associated with mediation keratitis [letter]. J Cataract Refract Surg 20: 110.

18. Probst LE, Machat JJ (1996) Corneal sub epithelial infiltrates following photorefractive keratectomy [letter]. J Cataract Refract Surg 22: 281.

19. Sher NA, Krueger RR, Teal P, Jans RG, Edmison D (1994) Role of topical corticosteroids and non-steroidal anti-inflammatory drugs in the etiology of stromal infiltrates after excimer photorefractive keratectomy [letter]. J Refract Corneal Surg 10: 587-588.

20. Shimazaki J, Saito H, Yang HY, Toda I, Fujishima H, et al. (1995) Persistent epithelial defect following penetrating keratoplasty: An adverse effect of diclofenac eyedrops. Cornea 14: 623-627.

21. Flach AJ (2001) Corneal melts associated with topically applied non-steroidal anti-inflammatory drugs. Trans Am Ophthalmol Soc 99: 205-210.

22. Asai T, Nakagami T, Mochizuki M, Hata N, Tsuchiya T, et al. (2006) Three cases of corneal melting after instillation of a new non-steroidal anti-inflammatory drug. Cornea 25: 224-227.

23. Bekendam PD, Narváez J, Agarwal M (2007) Case of corneal melting associated with the use of topical nepafenac. Cornea 26: 1002-1003.

24. Congdon NG, Schein OD, von Kulajta P, Lubomski LH, Gilbert D, et al. (2001) Corneal complications associated with topical ophthalmic use of non-steroidal anti-inflammatory drugs. J Cataract Refract Surg 27: 622-631.

25. Di Pascuale MA, Whitson JT, Mootha VV (2008) Corneal melting after use of nepafenac in a patient with chronic cystoid macular edema after cataract surgery. Eye Contact Lens 34: 129-130.

26. Guidera AC, Luchs JI, Udell IJ (2001) Keratitis, ulceration and perforation associated with topical non-steroidal anti-inflammatory drugs. Ophthalmology 108: 936-944.

27. Isawi H, Dhaliwal DK (2007) Corneal melting and perforation in Stevens Johnson syndrome following topical bromfenac use. J Cataract Refract Surg 33: 1644-1646.

28. Lin JC, Rapuano CJ, Laibson PR, Eagle RC Jr, Cohen EJ (2000) Corneal melting associated with use of topical non-steroidal anti-inflammatory drugs after ocular surgery. Arch Ophthalmol 118: 1129-1132.

29. Wolf EJ, Kleiman LZ, Schrier A (2007) Nepafenac-associated corneal melt. J Cataract Refract Surg 33: 1974-1975.

30. Abelson MB, Lilyestrom L (1996) Melting away the myths of NSAIDs. Rev Ophthalmol 14: 124-128.

31. Gaynes BI, Onyekwuluje A (2008) Topical ophthalmic NSAIDs: A discussion with focus on nepafenac ophthalmic suspension. Clin Ophthalmol 2: 355-368.

32. Drug Class Review Ophthalmic Non-steroidal Anti-Inflammatory Drugs (NSAIDs) (2009) VHA pharmacy benefits management services and the medical advisory panel.

33. Gonzalez-Salinas R, Guarnieri A, Guirao Navarro MC, Saenz-de-Viteri M (2016) Patient considerations in cataract surgery - The role of combined therapy using phenylephrine and ketorolac. Patient Preference and Adherence 10: 1795-1801.

34. Rosenberg ED, Nattis AS, Alevi D, Chu RL, Bacotti J, et al. (2018) Visual outcomes, efficacy and surgical complications associated with intracameral phenylephrine 1.0%/ketorolac 0.3% administered during cataract surgery. Clin Ophthalmol 12: 21-28.