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A STUDY OF EFFICACY AND SAFETY OF A MYDRIATIC COCKTAIL DELIVERED WITH A WICK VERSUS CONVENTIONAL REGIMEN FOR PREOPERATIVE AND INTRAOPERATIVE MYDRIASIS IN CATARACT SURGERY

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ABSTRACT

The aim is to investigate the efficacy and safety of a mydriatic cocktail with a wick versus conventional regimen for mydriasis in cataract surgery. 150 cases from September 2013 to August 2014 at RLJH, Kolar were selected. Randomized into 2 Groups. GROUP I: 75 eyes were dilated with dilating cocktail regimen using Weck cell sponge. GROUP II: 75 eyes were dilated using conventional mydriatic regimen. The mydriasis was measured at 15, 30, and 45 min after instillation using the slit lamp. The intraoperative maintenance of mydriasis was measured with calipers after nucleus delivery and after IOL implantation. The difference in dilation achieved at the in both Groups are 1.26mm, 1.56mm after 30 and 45 minutes. There was a difference of 0.75mm after nucleus delivery and 1.24 mm after intraocular lens implantation. The average pupillary diameter in PXF subgroup was 6.6 mm in Group I and 5.55 mm in control Group and 6.90 mm in Group I and 6 mm in Group II in the diabetic subgroup. These results show that the mydriatic cocktail regimen delivered with a wick is efficacious, safer, and faster acting regimen compared with the conventional method of preoperative mydriasis using topical drops.

Key Words: Mydriasis, Wick, Cocktail, Cataract.

INTRODUCTION

Cataract surgery is the most commonly performed intraocular surgery. (Mc Cormick *et al.*, 2006) and a satisfactory degree of mydriasis, or pupil dilation, is the most important prerequisite. To facilitate uncomplicated cataract surgery, pupil size should equal or exceed 6 mm. Failure to maintain mydriasis during surgery can increase the risk of damage to the iris, incomplete clearance of soft lens matter or more importantly, rupture of the posterior capsule.

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Established methods of achieving optimum pupillary dilation involve administering intraocular medications in one of several traditional manners such as 1% tropicamide with or without phenylephrine, 2% homatropine, 1% cyclopentolate eye drops. Other forms of mydriatic delivery are mydrisert, intra cameral mydriatics and atropine eye ointment. Iris retractors, and sphincterotomy are some of the intraoperative measures to achieve mydriasis. Although all the above methods have been used at some point or the other in cataract surgery worldwide, the problem of poor mydriasis seems to bug most surgeons. Topical non-steroidal anti-inflammatory drugs (NSAIDs) e.g. Flurbiprofen is sometimes used in conjunction to maintain sustained intraoperative mydriasis.

However repeated doses of these drops are necessary which is both time consuming and may also damage the corneal epithelium. (Hirowatari T *et al.,* 2002, 2005). Furthermore, tear clearance can adversely hinder the efficacy of the drops, thus requiring repeated doses. Also repeated pupillary dilation may cause pupillary fatigue, thus interfering with the mydriasis on the operating day.

In 2000, Gills reported the use of pledgets soaked with medication for preoperative mydriasis, and others have since confirmed the benefits of this technique. (Mc Cormic *et al*., 2006; Mouly S *et al.,* 2006; Dubios V *et al.,* 2006; Patel CK *et al*., 1995). In the present study, Gills' technique was modified to streamline preoperative administration of medications, by including antibiotic and anti inflammatory medications in the solution used to soak the pledgets, as reported by Ong-Tone. (Ong Tong L, 2003).

McCormick ET all reported pupillary dilatation prior to cataract surgery can be safely and effectively achieved using a triangular 3mm pledget sponge soaked in mydriatic drugs. (Mc Cormic *et al*., 2006)

Thus the purpose of study was to evaluate efficacy and safety of a mydriatic cocktail with a wick for preoperative and intraoperative mydriasis in cataract surgery.

MATERIALS AND METHODS

150 eyes of 150 patients was included in the study at R.L. Jalappa Hospital and research center , Kolar and the study was carried out over a period of one year.(September 2013 to August 2014). Informed consent was taken from all.

Sample size was calculated on basis of pilot study.

- Mean in Group I = 7.71
- Mean in Group II = 6.43
- Standard deviation in Group I = 0.86
- Standard deviation in Group II = 0.67
- Sample size comes to 150 which yields a power of 100%
- Level of significance is 5%.
- Open EPI software was used in calculating the sample size.
- Total Sample size is 150.
- Substituting these values sample size comes up to 75 eyes in each Group.

All patients were dilated preoperatively during the outpatient visit using topical tropicamide and phenylephrine drops for evaluating the grade of cataract and examining the posterior segment. The degree of mydriasis was recorded. Among them patients requiring cataract surgery were randomized into 2 Groups. Group I had 75 patients randomized to use mydriatic cocktail delivered with a pre sterile wick. Group II had 75 patients randomized to receive the traditional regimen of dilating drops and would serve as control to Group I.

Inclusion Criteria

Patients with senile cataract were included.

Exclusion Criteria

Any active inflammation like uveitis

1. Glaucoma, chance of precipitating an acute attack.
2. Corneal pathologies like corneal dystrophies where corneal integrity and clarity is compromised.
3. Hypertension and IHD patients. (Since use of phenylephrine in the cocktail)
4. Mydriatic failure.

Randomization

Randomization by computerized randomization software, i.e. Graph-pad.

This was a single blinded study. The evaluating and operating surgeon was blinded from the study. The patient could not be blinded because of the nature of intervention.

Preoperatively, at the end of 45 minutes mydriasis achieved was recorded using slit lamp using a horizontal slit beam, by an independent observer who was blinded to the type of mydriatic regimen used for mydriasis. It was not possible to conceal the arm of the trial from the patient because of the nature of the intervention.

Intervention

Group I had 75 patients randomized to use mydriatic cocktail delivered with a wick. A mydriatic cocktail was prepared in a sterile container using equal quantities using 2.5% phenylephrine, 1% cyclopentolate, 0.5% moxifloxacin and 0.03% flurbiprofen.

All the solutions were prepared on the day of the surgery using sterile precautions. Wicks (1cmx2cm) were prepared using a sterile weckcel sponges and will be soaked in the cocktail solution for 1 minute. The mixture was discarded 4 hours after preparation. Then wicks were placed in the lower fornix using sterile forceps after using proparacaine to anaesthetize the ocular surface. The eyes were taped to prevent the wicks from falling. The mydriasis was measured at 15, 30, 45 minutes using slit lamp under scotopic conditions.

Group II had 75 patients randomized to receive the traditional regimen of dilating drops and was served as control to Group I.

The drops used were 2.5% phenylephrine, 1% cyclopentolate, 0.03% flurbiprofen and 0.5% moxifloxacin. This was instilled topically as one drop from standard droppers. A single drop from each drug was instilled every 3 minutes in succession and the

procedure was repeated every 15 minutes for 45 minutes. The mydriasis was noted at 15, 30, 45 minutes.

On the basis of maximal horizontal pupillary diameter at 45 minutes patients were categorized into 3 Groups—Poor mydriasis <5mm, Moderate mydriasis (5.1mm-8mm), and Good mydriasis >8mm. Pupil size was measured by a single person who was blinded from the study.

All patients underwent phacoemulsification using a clear corneal incision by a single surgeon. The intraoperative pupillary diameter was noted at two stages in the surgery, after nucleus delivery and IOL implantation. The pupillary size was measured using Castroviejo calipers.

If there was a mydriatic failure, intracameral adrenaline was used, and they were excluded from the study.

Safety was measured and defined by a set of questionnaire to the operating surgeon and the patient.

Questionnaires (operating surgeon)

1. Was the media clear during the procedure?

a) Very clear
b) Mild haze, no problems with visualization
c) Moderate haze, somewhat difficult visualization
b) Severe haze, difficult visualization.

2) What was the grade of corneal edema?

a) Clear
b) Mild edema
c) Moderate edema
d) Severe edema

3) Was there sustained mydriasis during lens extraction and IOL implantation?

a) Very good and sustained after lens extraction
b) Good mydriasis, ill sustained after lens extraction
c) Moderate mydriasis, poorly sustained.
c) Poor mydriasis, poorly sustained.

Questionnaires (patient)

1) ***Was there foreign body sensation present during and after instillation of the drug?***

a) No, it was comfortable
b) Yes, during instillation only- tolerable
c) Yes, both during and after - tolerable
d) Uncomfortable

2) Did you have any photophobia and glare during and after the instillation of the drug?

a) No
b) Yes, mild glare, transient, tolerable.
c) Yes, both glare and photophobia present -
d) Both present and not tolerable.

3) ***Did u experience ocular pain during and after the instillation of the drug*****?**

a) No
b) Yes, transient stinging sensation during instillation
c) Yes, pain lasted after instillation – tolerable
d) Yes constant ocular pain present.

Figure 1. Pulse, blood pressure and pulse oxymetry was measured pre and post operatively for any adverse cardiovascular events

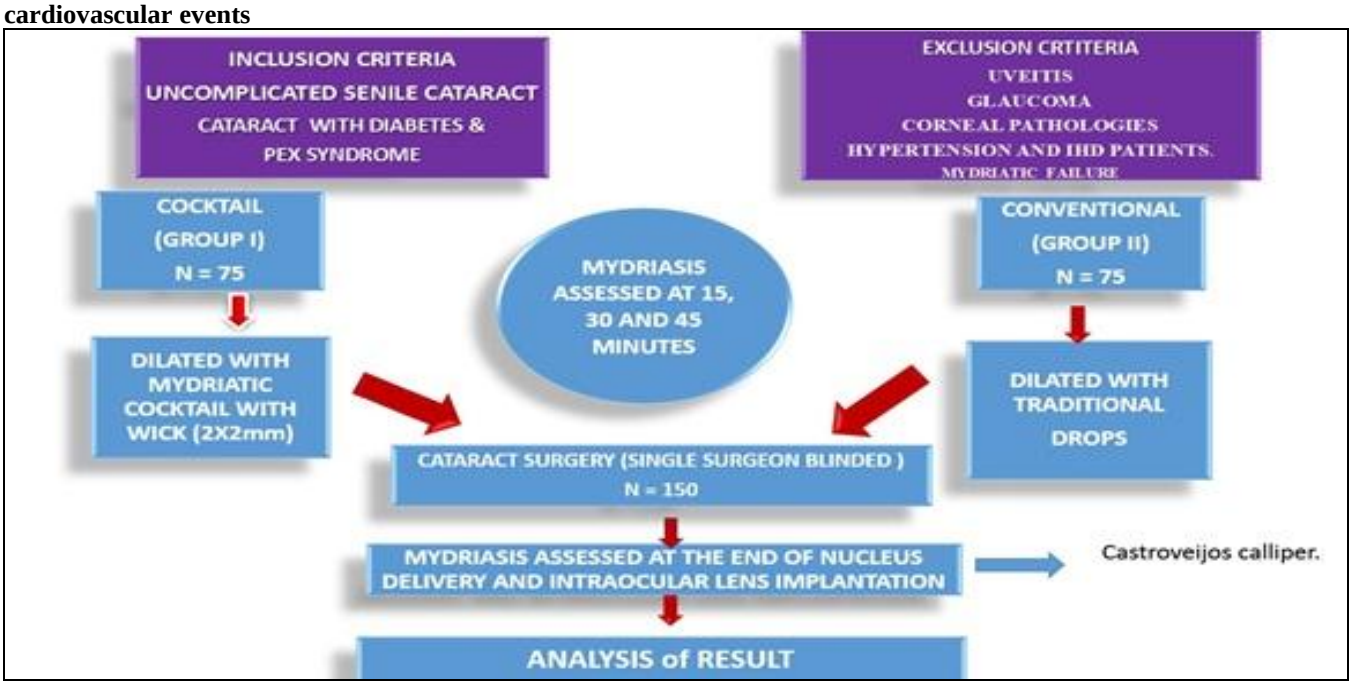

Figure 2. Drug Delivery system

RESULTS

Both Groups (I and II) were compared for differences in proportions by Z test and Chi square test (associations), comparison of differences between mean as done by student independent T test by Graph Pad Prism 5.0 software.

A total of 150 patients were randomized into 2 Groups of 75 each. (Group 1 & Group II)

Group I was dilated using mydriatic cocktail and Group II was dilated using the conventional topical drops regimen.

The male/ female ratio was comparable in both Groups with Group I having 42:33 and Group II having 39:36. The mean age in Group I was 54 years and in Group II was 56 years. In Group I, 18 patients (15%) had a predisposing factor contributing to poor mydriasis, such as diabetes and pseudoexfoliation, and in Group II, 14 patients (16%) had similar predisposing factors.

Grading of mydriasis was done in both Groups after 45 min. In all, 19 patients (25.33%) in Group I and 69 patients (92%) in Group II were in the moderate mydriasis category. A total of 56 patients (74.66%) in Group I and 6 patients (8 %) in Group II were in the good mydriasis category (Table 1).

The dilation in both Groups was evaluated at 15, 30, and 45min. At the 15min mark, there was no statistical difference between the two Groups (Figure 1).

At 30min, a significant difference of 1.26 mm was seen between the two Groups (P Value <0.0001 with 95% CI of the difference from 1.010 to 1.493). (Figure 3)

The average dilation in Group I at 45min was 8.44 mm and that in Group II was 6.88 mm. The difference achieved in both the dilating regimens (1.56 mm) was statistically significant. (P Value <0.0001 with 95%. CI of the difference from 1.358 to 1.772) (Figure 3).

Average intraoperative pupillary diameter noted after nucleus extraction in Group1 was 6.90 mm and in Group II was 6.14 mm. Difference in mean is 0.759 mm. p <0.0001 (Figure 4).

The mean pupillary diameter noted after IOL implantation was 7.92 mm in Group I and 6.88 mm in Group B. Differences in mean 1.243. P value <0.0001. (Figure 4).

The average pupillary diameter at the end of 45 min, in the subset of patients with PXF, was 6.6 mm in the cocktail Group and 5.55 mm in the control Group, and the average dilation in subset of patients with diabetic was 6.9 mm in Group I and 6 mm in Group II. (Figure 5). This difference did not attain statistical significance due to the small sample size. There were no adverse cardiovascular events reported. The single operating surgeon was interviewed postoperatively regarding any loss of corneal clarity, and there were no such occurrences.

The grading of safety of and patient comfort was done using a questionnaire to both the operating surgeon and the patient where each of the questions were scored separately (1 to 4 points each) where a score of 1 was considered to be safest while a score of 4 was most unsafe. (Table 2 and 3). Group I scored more both in terms of safety and patient comfort.

DISCUSSION

All the above drugs used in our regimen have been proved to act singly as well as in combination to achieve good pupillary dilation.

Based on the result of this study, mydriatic cocktail delivered using a weckcel sponge had better mydriatic effect than conventional regimen and the results obtained were statistically significant. These results are of importance as they show that mydriatic cocktail delivered with a weckcel sponge is capable of exerting a faster and sustained mydriasis and its efficacy is superior to the conventional mydriatic regimen.

One weckcel sponge application can produce a similar or even better quality and duration of mydriasis, as minimum of three application and repeated doses of conventional eye drops are needed to achieve the same effect.

Table 1. Grading of Mydriasis (45 MIN)

Group	Poor Mydriasis (<5MM)	Moderate Mydriasis (5MM- 8MM)	Good Mydriasis >8MM
Group I (N=75)	0	19 (25.33%)	56 (74.66%)
Group II (N= 75)	0	69 (92%)	6 (8%)

Figure 3. Average dilation at 15, 30, 45 Minutes

Group – I **Group – II**

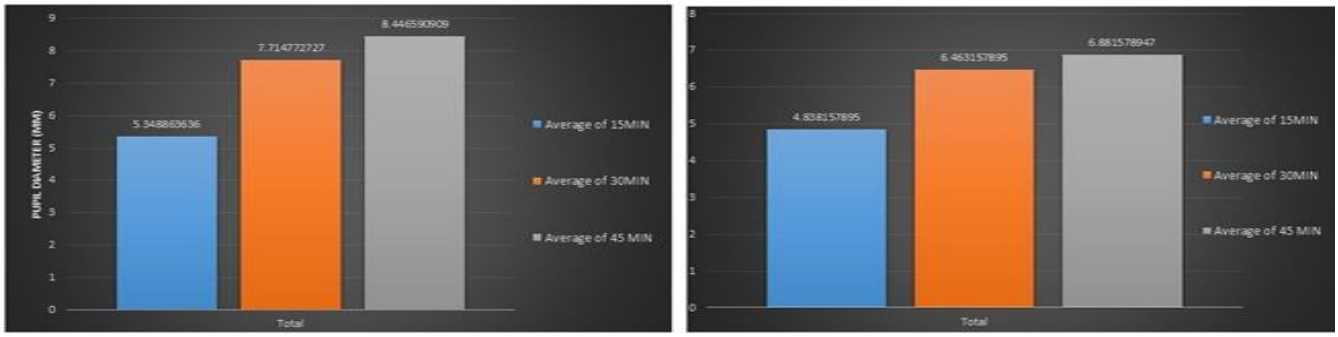

Figure 4. Average intraop mydriasis after Nucleus delivery and iol implantation

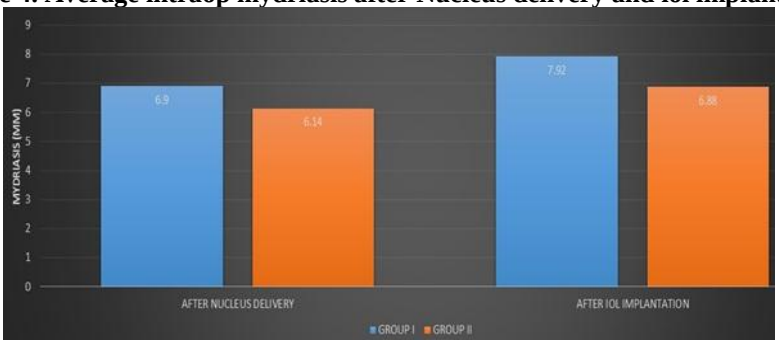

Figure 5. In Pseudoexfoliative and diabetic Eyes

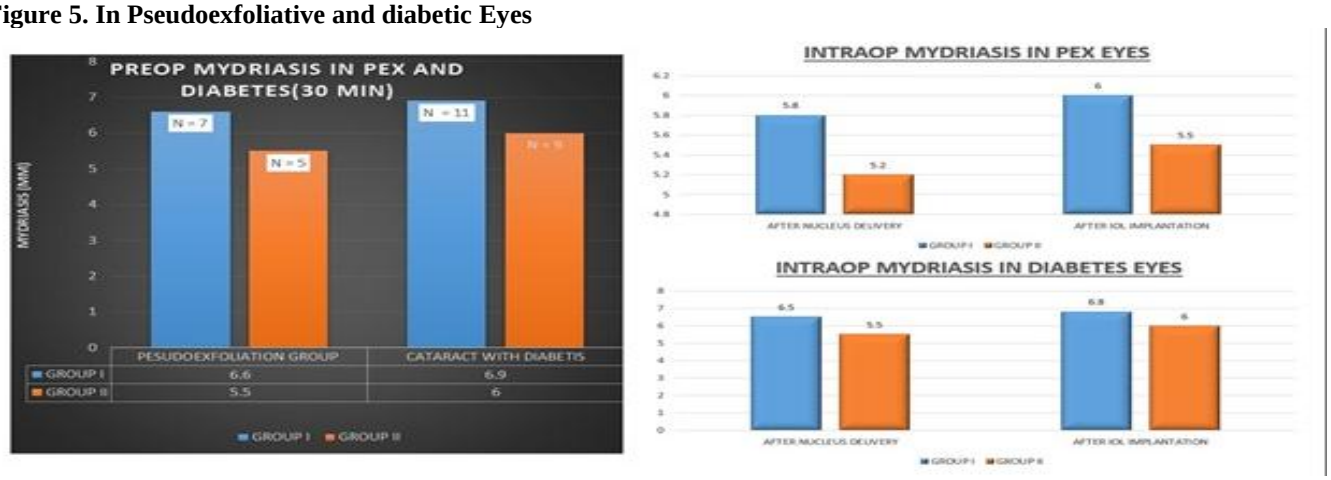

Table 2. Questionnaires (operating surgeon)

Each of the questions is scored separately (1 to 4 points each) where a score of 1 is considered safest while a score of 4 is most unsafe

Group I				Group II			
Score	**Question 1**	**Question 2**	**Question 3**	**Score**	**Question 1**	**Question 2**	**Question 3**
1	**55**	**50**	**38**	**1**	**30**	**30**	**20**
2	**15**	**20**	**32**	**2**	**34**	**36**	**45**
3	**05**	**10**	**05**	**3**	**11**	**09**	**10**
4	**00**	**00**	**00**	**4**	**00**	**00**	**00**

Table 3.Questionnaires (Patient)

Each of the questions is scored separately (1 to 4 points each) where a score of 1 is considered comfortable while a score of 4 is most uncomfortable

Group I				Group II			
Score	**Question 1**	**Question 2**	**Question 3**	**Score**	**Question 1**	**Question 2**	**Question 3**
1	**30**	**45**	**32**	**1**	**30**	**42**	**20**
2	**40**	**18**	**41**	**2**	**45**	**30**	**52**
3	**03**	**12**	**01**	**3**	**00**	**03**	**03**
4	**02**	**00**	**01**	**4**	**00**	**00**	**00**

This can affect compliance, thus decreasing the nursing efficiency and may also interfere with the corneal clarity. The differences in the two Groups were statistically significant at 30 min, and maximal mydriasis was obtained at 45 min.

Ong-Tone has carried out a similar study with 4 mm wick kept for 10 min, and the results were comparable. It showed that wick delivered better quality of mydriasis than conventional drops, but formal pupillary measurements were not performed. (Ong-Tone L, 2003).

McCormick et al safely and effectively achieved mydriasis using 3 mm pledget sponge soaked in mydriatic cocktail and kept in the lower fornix for 20 min, but contrary to our study no statistically significant difference was found with pledget and conventional drops, but the duration of the pledget placed in the fornix in his study was 20 min where as in our study maximal dilation was only found after 45 min. ((Mc Cormic *et al*., 2006).

The limitation of our study was that there was a potential risk of contamination, in spite of all sterile precautions taken, inherent to the study design. Though it was better in delivering better and sustained mydriasis in the pseudoexfoliative and diabetic Group, where the problem of poor mydriasis is commonly encountered, significant results were not obtained due to the small sample size in the study.

CONCLUSION

Thus, the mydriatic cocktail we used improved patient comfort and convenience, while providing excellent mydriasis that was reliable and safe. Because the technique is faster, time saving and more consistent than traditional methods of mydriasis, it increases nursing efficiency in the surgery center and maximizes utilization of beds and nursing staff.

REFERENCES

Dubois V, Wittles N, Lamont M, Madge S, Luck J. Randomized controlled single-blind study of conventional versus depot mydriatic drug delivery prior to cataract surgery. *BMC Ophthalmology*. 2006; 6: 36.

Gills JP. Consultation Section. *Journal of Cataract and Refractive Surgery*. 2000; 26: 955.

Hirowatari T, Tokuda K, Kamei Y, Miyazaki Y, Matsubara M. Evaluation of a new preoperative ophthalmic solution. *Can J Ophthalmol*. 2005; 40: 58–62.

Hirowatari T, Tokuda K, Kamei Y, Miyazaki Y, Matsubara M. TPD ophthalmic solution (mixture of tropicamide, phenylephrine hydrochloride and diclofenac sodium) for cataract surgery. *Nippon Ganka Gakkai Zasshi*. 2002; 106: 630–33.

McCormick A, Srinivasan S, Harun S, Watts M. Pupil dilation using a pledget sponge: a randomized controlled trial. *Clin Experiment Ophthalmol*. 2006; 34(6): 545-9

Mouly S, Mahe I, Haouchine B, Sanson-le- Pors MJ, Blain P, Tillet Y, et al . Pharmacodynamics of a new ophthalmic mydriatic insert in healthy volunteers: potential alternative as drug delivery system prior to cataract surgery. *Basic Clin Pharmacol Toxicol*. 2006; 98(6): 547-54.

Ong-Tone L. Use of a wick to deliver preoperative mydriatics for cataract surgery. *J Cataract Refract Surg*. 2003; 29: 2060-2.

Patel CK, Bui TA, Gregariou G, Pereira S, Chopdar A, McLeod BK. A pre-operative mydriatic regimen using a single application of tropicamide novel ophthalmic delivery system and guttae phenylephrine 10%. *Eye*. 1995; 9: 337-40.

Sachdev MS, Singh K, Talwar D, Gupta SK, Dada VK. Comparative efficacy of diclofenac and flurbiprofen for maintenance of pupillary dilation during cataract surgery. *Oph Surg*. 1994; 25: 92–4.