

Effects of Topical Combinations of Parasympatholytic and Sympathomimetic Drugs among the Successful Post Dacryocystorhinostomy Patients - A Study

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Abstract

Purpose: The purpose of our study was to assess the post-operative visual outcome after manual small incision cataract surgery in large scale for 1 year from April 2014 to March 2015.

Materials and Methods: A prospective study was conducted on 150 eyes of 75 patients of unilateral nasolacrimal duct obstruction at a tertiary hospital over a period of 2 years (2014–2016). The patients were selected from the out-patient department irrespective of their sex and religion. The age group of the study was 15–50 years. The unaffected eye served as control.

Result: The mean value of differences of pupillary diameter between control and post dacryocystorhinostomy (DCR) cases in pair 1 was ± 1.4000 with standard deviation (SD) of ± 0.44120 ($P < 0.01$) which was statistically significant ($P < 0.05$). The mean value of differences of pupillary diameter between control and post DCR cases in pair 2 was ± 1.32000 with SD of ± 0.38809 ($P < 0.01$) which was statistically significant.

Conclusion: DCR surgery causes altered nasolacrimal anatomy leading to increased absorption of drugs.

Key words: Dacryocystorhinostomy, Phenylephrine 0.8%, Pupillary size, Tropicamide 4%

INTRODUCTION

Autonomic nervous system controls the pupillary action.^[1] The parasympathetic control is slightly more than sympathetic control.^[2] Hence, parasympatholytics, as well as sympathomimetics, have been used to dilate the pupils for various procedures such as cataract surgery, funduscopy, retinal lasers, and refraction. Combination of both drugs offers greater pupillary dilatation than single drug uses.

Tropicamide is also a short-acting cycloplegic available in 0.5–1.0% solutions, acts as a competitive antagonist to acetylcholine.^[3] It has the quickest (onset 20–40 min) briefest duration (3–6 h) action.^[4] It is a competitive antagonist to acetylcholine and inhibits the cholinergic action on pupil and inhibits accommodation (cycloplegia). Phenylephrine is a sympathomimetics drug and it directly acts on the dilator pupillae muscle and has little effect on the ciliary muscle. Hence, it is not a cycloplegic.^[3]

In patients who undergo dacryocystorhinostomy (DCR) surgery, the nasolacrimal passage becomes wider and shortened than the normal. Hence, the chance of absorption of topical drugs is higher than normal due to the exposed nasal mucosa in comparison to the normal side. Hence, ophthalmologists must have the knowledge about these facts. The purpose of our study was whether

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www.ijss-sn.com

Month of Submission : 10-2017
Month of Peer Review : 11-2017
Month of Acceptance : 11-2017
Month of Publishing : 12-2017

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there were any significant changes of local effects of the post DCR patients.^[5]

MATERIALS AND METHODS

A prospective study was conducted on 150 eyes of 75 patients of unilateral nasolacrimal duct obstruction at a tertiary hospital over a period of 2 years (2014–2016). The patients were selected from the outpatient department irrespective of their sex and religion. The age group of the study was 15–50 years. The unaffected eye served as control.

On admission, the pupillary diameter was measured by slide caliper (vertical and horizontal) before and after application of tropicamide 0.8% and phenylephrine 5% drop, and this served as control for study purpose.

After 1½ month of DCR operation, the vertical and horizontal pupillary diameter was measured before and after instillation of tropicamide 0.8% and phenylephrine 5% drop.

The vertical pupillary diameter in control and cases was grouped as pair 1, and the horizontal pupillary diameter in control and cases was grouped as pair 2.

Before measurement of pupillary diameter in both the cases, patients were advised bed rest for half an hour for stabilization of the cardiovascular system.

Inclusion Criteria

Patients who had unilateral nasolacrimal duct obstruction and “HARD STOP” on syringing with the presence of regurgitation through upper punctum.

Exclusion Criteria

- Patients had a syringing finding of “SOFT STOP” which signified common canaliculi system block.
- Pregnant and lactating mothers.
- History of previous ocular surgery.
- History of hypertension, diabetes mellitus, dyslipidemia, and benign hypertrophy of prostate.
- Patients had a h/o glaucoma or other local ocular pathology.
- Ear, nose, and throat examination status to exclude any contraindication for DCR operation.

Each Patient was Monitored Twice during the Course of the Study

- a) On admission, the pupillary diameter (vertical and horizontal) of the normal eye was measured by a slide caliper before and after application of tropicamide (0.8%) and phenylephrine (5%) eye drop and this served as the control eye for comparison.

- b) After 2 months of DCR operation, the operated eye was monitored with tropicamide (0.8%) and phenylephrine (5%) application which served as the study eye for comparison.

The Following Operative Criteria were followed during DCR Operation

1. Double flap operation with anastomosis with 6–0 vicryl was done.
2. Bony ostium was at about 1 cm square area.

During Application of Tropicamide and Phenylephrine the following Criteria were Monitored

1. Topical ophthalmic solution of tropicamide 0.8% and phenylephrine hydrochloride (5%) was used.
2. The pupillary diameter (vertical and horizontal) was measured before application of tropicamide 0.8% and phenylephrine hydrochloride (5%).
3. A single drop (approx. 30 µL size) was administered into the lower fornix in supine position at 10 min interval, 3 times, and the reading was taken 15 min after the last drop.
4. Patient was advised to keep his eyes closed for 2–3 min after instillation of drop.
5. Pupillary diameter measured again after 45 min of installation of the eye drop.

RESULTS

Out of 75 patients, 42 were male and 33 were female patients [Table 1 and Figure 1]. There were 6 (8.0%) patients in 15–20 years, 21 (28.0%) in 21–30 years, 37 (50.0%) in 31–40 years, and 11 (14.0%) in 41–50 years of age group [Table 2 and Figure 2].

150 eyes of 75 patients having unilateral nasolacrimal duct obstruction of different age group 15–50 years irrespective of sex and religion were analyzed. The unaffected side

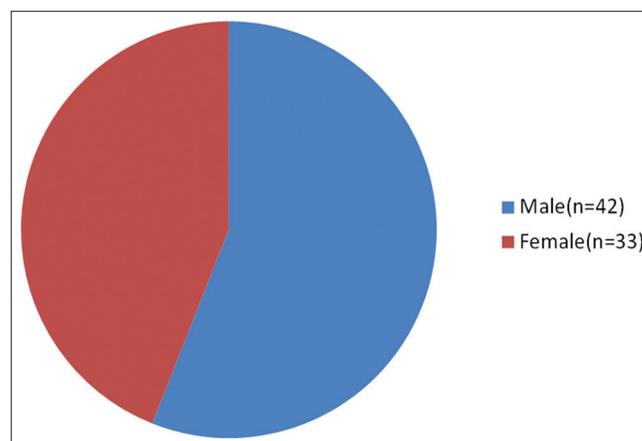


Figure 1: Sex distribution

served as “CONTROL GROUP” and affected side as “STUDY GROUP.”

All the patients were normotensive with normal intraocular pressure. None of them had a history of any ocular surgery, uveitis, posterior synechiae, and infectious disease.

Table 1: Distribution of study subject by sex (n=75)

| Sex of the patients | Number of patients (%) |
|---------------------|------------------------|
| Male | 42 (56.0) |
| Female | 33 (44.0) |

Table 2: Distribution of study subject by age

| Age in years | Number of patients (%) |
|--------------|------------------------|
| 15–20 | 6 (8.00) |
| 21–30 | 21 (28.00) |
| 31–40 | 37 (50.00) |
| 41–50 | 11 (14.00) |
| Total | 75 (100) |

Table 3: The vertical and horizontal pupillary diameter in normal and post DCR cases

| Parameter | Mean | n | SD | Standard error mean |
|--|---------|----|----------|---------------------|
| Pair 1 | | | | |
| Vertical pupillary diameter (control) | ±3.4300 | 75 | ±0.48456 | ±0.06853 |
| Vertical pupillary diameter post DCR pupillary vertical diameter (case) | ±4.7500 | 75 | ±0.53690 | ±0.07593 |
| Pair 2 | | | | |
| Horizontal pupillary diameter (control) | ±3.4000 | 75 | ±0.52489 | ±0.07423 |
| Horizontal pupillary diameter post DCR pupillary vertical diameter (control) | ±4.8000 | 75 | ±0.44030 | ±0.06230 |

P<0.05. DCR: Dacryocystorhinostomy, SD: Standard deviation

Each patient was examined twice during the course of study.

- On admission, the control eye (normal eye) monitored before and after application of tropicamide (0.8%) and phenylephrine hydrochloride (5%) drop.
- 8 weeks after DCR operation the “Study Eye” (post DCR eye) was examined again after application of tropicamide (0.8%) and phenylephrine hydrochloride (5%) drop.

Sex Wise Distribution

Out of 75 patients, 42 (56.0%) were male and 33 (44.0%) were female patients [Table 1 and Figure 1].

Ocular Parameters

In control eyes (normal eyes), the pupillary diameter (vertical and horizontal) was measured before and 45 min after application of drop.

The mean value of vertical pupillary diameter in control and cases in pair 1 was ±3.4300 and ±4.7500, respectively, with a standard deviation (SD) of ±0.48456 and standard error ±0.06853 (P < 0.05) [Table 3].

The mean value of horizontal pupillary diameter in control and cases in pair 2 was ±3.4000 and ±4.8000, respectively,

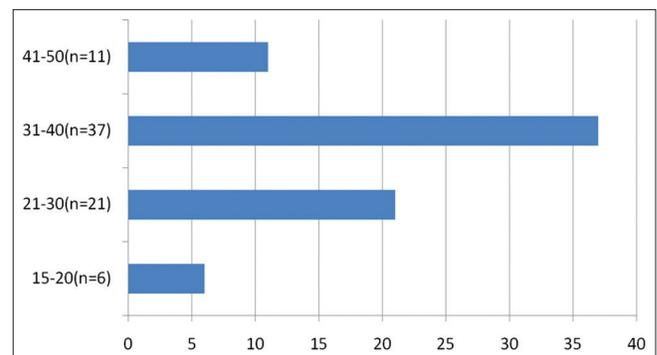


Figure 2: Age distribution of the patient

Table 4: The paired difference between vertical and horizontal pupillary diameter of pupil in normal and post DCR case

| Paired differences | Parameter | Mean | SD | Standard error mean | 95% confidence interval of the difference | | t | Df | Significance (two-tailed) |
|--------------------|--|----------|----------|---------------------|---|----------|--------|----|---------------------------|
| | | | | | Upper | Lower | | | |
| Pair 1 | | | | | | | | | |
| | Difference between normal side pupillary vertical diameter and post DCR side pupillary vertical diameter | ±1.4000 | ±0.44120 | ±0.0623 | ±1.29077 | ±1.59230 | 25.103 | 49 | 0.000 |
| Pair 2 | | | | | | | | | |
| | Difference between normal side horizontal pupillary diameter and post DCR side pupillary horizontal diameter | ±1.32000 | ±0.38809 | ±0.05488 | ±1.20971 | ±1.43029 | 24.051 | 49 | 0.000s |

P<0.01. DCR: Dacryocystorhinostomy, SD: Standard deviation

with a SD of ± 0.44030 and standard error ± 0.06230 ($P < 0.05$) [Table 3].

The mean value of differences of pupillary diameter between control and post DCR cases in pair 1 was ± 1.4000 with SD of ± 0.44120 ($P < 0.01$) which was statistically significant [Table 4].

The mean value of differences of pupillary diameter between control and post DCR cases in pair 2 was ± 1.32000 with SD of ± 0.38809 ($P < 0.01$) which was statistically significant [Table 4].

DISCUSSION

In this study, ocular parameters were observed as below:

The vertical and horizontal pupillary diameter in the study eyes increased significantly in comparison to the normal eye 45 min after application of tropicamide 0.8% and phenylephrine 5% eye drops ($P < 0.05$). This finding is corroborative with the earlier findings of Roy *et al.*^[5] who reported a quicker highway for transport of ocular medications to the nasal mucus membrane, thereby causing greater systemic absorption.

It signifies that after removal of obstruction and shortening of the nasolacrimal passage, the local uptake of the eye drop is higher on the operated side in comparison to the normal side.

CONCLUSION

It is reiterated that DCR surgery offers altered nasolacrimal anatomy and hence cause altered drug absorption in that anatomical location. Consequently, alteration in the pharmacodynamics of a drug and systemic adverse effects of drugs such as tropicamide 0.8% and phenylephrine 5% drop should be kept in consideration before its administration.

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How to cite this article: Ray S, Saha M (Dutta Chowdhury), Saha S, Islam MS, Ray TG, Islam MN. Effects of Topical Combinations of Parasympatholytic and Sympathomimetic Drugs among the Successful Post Dacryocystorhinostomy Patients - A Study. *Int J Sci Stud* 2017;5(9):21-24.

Source of Support: Nil, **Conflict of Interest:** None declared.