Original Article

Effect of Provocative Test in Hypermetropic Eyes: A Comparative Study

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Purpose: To determine the effect of Mydriatic provocative test on intraocular pressure in hypermetropic eyes as compared to emmetropic eyes.

Study Design: Prospective analytic cohort study.

Place and Duration: Department of ophthalmology, Abbasi Shaheed Hospital, Karachi between October 2014 to July 2015.

Material and Methods: We recruited 109 patients from eye OPD who were emmetropic, hypermetropic and presbyopic. We excluded known cases of glaucoma, closed angle, operated cases and using topical medications. After taking detail history and examination, IOP was measured then tropicamide was instilled. After mydriasis IOP was again measured. Data was collected and analyzed on SPSS 21. A descriptive analysis of continuous and categorical variables was performed. Means of IOP was compared before and after dilatation in hypermetropes and emmetropes.

Results: We had 109 eyes of 109 patients in which 27 (25%) were males and 82 (75%) were females. Their mean age was 44.2 ± 8.81SD. Emmetropic eyes were 58 (53%) and hypermetropic eyes were 51 (47%). Mean base line IOP before dilatation was 14.7 ± 2.2SD and after dilatation was15.4 ± 2.8.The means of IOP before and after dilatation was compared in hypermetropes with emmetropes with help of Independent t test. Its value was 0.322. Provocative test was not positive in any group so we accept null hypothesis.

Conclusion: There was no statistically significant difference in intraocular pressure after mydriasis in hypermetropes as compared to emmetropes.

Key Words: Provocative test, hypermetropes, mydriasis, intraocular pressure

The leading cause of blindness in Asia is Primary angle – closure glaucoma (PACG) and it is predicted that 26% of 80 million glaucomatous patients will be suffering from primary angle closure glaucoma (PACG) by 2020[1]. The most widespread type of glaucoma to be considered in people with Asian origin is PACC[2]. One of the emergencies that an ophthalmologist faces is an attack of acute angle – closure glaucoma (AACG). Its acute presentation, requirement for immediate management and well – established anatomic pathology make it distinct from other ocular emergencies[3].

Eyes that experience angle closure have short axial lengths, flat corneas and shallow anterior chambers. Their lenses are situated more anterior and more thicker[4]. These eyes are not only anatomically are diverse than normal eyes but are also physiologically different[5].

An early diagnosis of PACG is vital to prevent ocular morbidity. As it is a known fact that a safe procedure is available in recent time. Eyes that need to undergo these diagnostic tests are the ones that have a high index of suspicion for intermittent attacks of

angle closure or after resolution of an acute attack of PACG and asymptomatic eyes with shallow anterior chambers and narrow angles on gonioscopy. Female gender, advancing age, Asian descent, family history of angle closure glaucoma, hyperopia, shallow anterior chamber depth, shorter axial lengths and thicker lens raises suspicion for PACG[2,4]. to achieve this objective, many types of provocative tests have been proposed and assessed over time.[6] Precise and easy to perform provocative test should be proposed as screening tools for glaucoma, as it will not only decrease the number of visual impairment due to glaucoma but also help in reducing the direct and indirect expenses of the disease[7].

Most of the patients coming to the public sector hospitals in third world countries are from low socioeconomic backgrounds. They are unable to go for expensive diagnostic tests and further management. We want to establish a mydriatic provocative test to be a quick and inexpensive screening method for these hospitals with limited resources.

The objective of the study is to determine the effect of Mydriatic provocative test on intraocular pressure in hypermetropic eyes as compared to emmetropic eyes in adults.

MATERIALS AND METHODS

This study was conducted in the department of ophthalmology, Abbasi Shaheed Hospital, Karachi in a tertiary care hospital. It was a prospective analytic cohort study. It was started in October 2014 after approval from ethics and scientific research committee of Karachi Medical and Dental College and was completed by July 2015.

Sample size calculated was 109 with help of WHO software edited by Lawanga and Lemeshaw[8] where alpha = 5%, 1-beta power of the test = 90, Test Value of population proportion Po = 0.8, Anticipated value of population proportion Pa = 0.9

Hypermetropic, emmetropic and presbyopic patients with open angles attending an eye OPD were selected on the basis of nonprobability convenient sampling. Those patients who were known glaucoma patients, Intra ocular pressure of more than 20mm of Hg, closed angle, using any topical pressuring lowering agent and past ocular surgery were excluded from the study.

Patients were enrolled only after written informed consent. They were explained about the side effects of medication. Detailed history about presenting complaints, refractive error, any associated disease of every patient was taken. Their distance visual acuity was checked on Snellen's Chart and near acuity was also checked with help of near vision chart. They were examined on slit lamp for anterior segment including cornea, anterior chamber and its depth with Van Herick's method. Pupillary reflexes were checked before dilatation. Baseline Intraocular pressure was checked with help of fluorescein staining by using Applanation tonometer by a single observer. Gonioscopy was done to examine angles and to make sure angles are open before dilatation. Mydriatic agent i.e. tropicamide 1% was instilled in both eyes three times after every ten minutes. They were asked to keep their eyes closed. Patients were examined after full dilatation of pupil that took minimum of 30 minutes to maximum of 45 minutes. Intraocular pressure was checked again with applanation tonometer and recorded. A rise in IOP of 8 mm Hg[9] was considered to be positive. After dilatation fundus was also examined with direct and indirect ophthalmoscope.

Data was entered and analyzed on Statistical package for Social Sciences (SPSS 21). A descriptive analysis of continuous and categorical variables was performed. Refractive error was compared with other variables with help of chi square test. Independent t test was used to compare change in IOP in emmetropes with hypermetropes. P value of less than 0.05 was considered to be significant.

RESULTS

There were total of 109 eyes of 109 patients in which 27 (25%) were males and 82 (75%) were females. Their age varied between 28 years to 70 with mean age 44.2 ± 8.81 SD. Emmetropic eyes were 58 (53%) and hypermetropic eyes were 51 (47%). The most common complaint with which they presented was decreased vision in 62 (55%) followed by headache in 18 (16%). Hypertension was most common associated factor in 18 (19%) of them (table 1). Independent t test was used to compare the means of IOP before and after dilatation in hypermetropes with emmetropes (table 1). Mean IOP before dilatation in emmetropes was 14.7 ± 2.2 and in hypermetropes was 15.2 ± 2.5. This changes to 15.1 ± 2.8 in emmetropes and 15.8 ± 2.3 in hypermetropes. Its p value was 0.322, which is also not statistically significant.

DISCUSSION

Literature was thoroughly searched before starting and at concluding this study. Various provocative

Table 1: Demographics.

Variables	Emmetrope	Hypermetrope	Total %	P-value
No	58	51	109	
Age	41.2 ± 8.9	41.4 ± 7.4		
Male **Female**	8 50	19 32	27 (25%)* 82 (75%)	.005
C/O Headache Decreased Vision Pain	 11 36 2	 7 26 6	 18 (16%)* 62 (55%) 8 (7%)	.260
Comorbidites DM HTN	 5 10	 7 8	 12 (14%)* 18 (19%)	.854
Mean IOP Baseline **Mean IOP After**	14.7 ± 2.2 15.1 ± 2.8	15.2 ± 2.5 15.8 ± 2.3		.290 ^ .322

*Chi square test ^ Independent t test

tests have been conceived in literature to induce angle closure and a rise of intraocular pressure (IOP), with contradictory results. These tests includes dark room provocative test[10], prone test[11], ibopamine provocative test,[12] mydriatic provocative test[13] and water drinking test[14] just to predict angle closure in patients at risk. These tests have been employed not only on patients at risk of PACG but also their relatives[13]. These tests need to be cost effective, less time consuming and easy to perform. In literature no one has compared the difference in rise of IOP in hypermetropes with emmetropes after mydriasis up to our knowledge. Due to the structural difference of hypermetropic eyes[4,5] than normal eyes we had this novel idea to compare the change in IOP after mydriatic provocative test.

If we compare our results with other study that was conducted on PAC, PAC suspects and its relatives[11] out of 6 (8.1%) diagnosed PAC4 (66.7%) had a positive dark prone provocative test response (DPPT), 8 (10.8%) were PAC suspects in which 87.5% had a positive or a borderline DPPT response. But in our study the negative results could be due to the fact that we have enrolled all normal patients with open angles and without history of glaucoma. All of these patients were best corrected 6/6. Another dark room test[15] showed 32 (42%) eyes with a positive DRPT, however their results are based on Optical Cohrence Tomography (OCT) and gonioscopy. They measure IOP after 3 minutes and after 1.5 hours of dark adaptation as compared to our study where duration was maximum 45 minutes. The darkroom and prone provocative tests are physiological tests with poor specificity[10]. Additionally these tests have not been found to be very predictive of angle closure[14].

If we compare our results with Ibopamine provocative test[12], it was positive in 44.33% of cases in group 1 that included offspring of at least 1 parent with primary open angle glaucoma with a mean increase in IOP of 5.57 mm Hg ($P < 0.001$). Whereas group 2 that consisted of offspring of healthy parents had negative test results with even 1 to 2 mm Hg of IOP reduction. Group 2 of that study recruited normal patients like our study so the results are similar. Group 1 had patients with family history of open angle glaucoma not angle closure glaucoma so the results differ.

However Pukrushpan et al[16] showed that post-dilatation IOP in non-glaucomatous patients with open angles, undergoing routine diagnostic mydriasis with tropicamide was equivalent to the pre-dilatation IOP. Another study showed that in majority of patients, the changes in IOP were within 2.0 mmHg[17] and we also report the rise in IOP within 2 mm of Hg but statistically insignificant.

Luckily no patient in either group developed an attack of angle closure in our study. Mydriatic or cycloplegic agents can cause a rise in IOP, which might be due to decrease aqueous outflow, caused by decreased pull on the trabecular meshwork due to ciliary muscle paralysis.[18] On the other hand Valle[19] noted an increase in aqueous inflow in patients who experienced a rise in IOP following dilation and suggested a decrease in aqueous outflow in the same patients. Other reason could be due to the duration of dilation. As acute angle closure glaucoma occurs while the pupil constricts over hours after dilatation, when it is mid dilated to a diameter of 3 – 4.5 mm. During this period, the posterior vector force of the iris sphincter muscle reaches its maximum. The peripheral iris is under less tension and is more easily pushed forward into contact with the trabecular meshwork. This dilation results in thickening of the peripheral iris and it also bunches in the angle[3].

Due to lack of similar studies in literature the comparison of results of our study cannot be drawn precisely. This could be taken as limitation of study.

CONCLUSION

Although hypermetropic eyes are immensely diverse anatomically from emmetropic eyes but there was no statistically significant difference in intraocular pressure before and after mydriasis in hypermetropes as compared to emmetropes. Provocative test was not positive in any patient in either group so we accept null hypothesis.

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