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EFFECT OF TOPICAL STEROIDS AND NON-STEROIDAL ANTI-INFLAMMATORY DRUGS ON INTRAOCULAR PRESSURE AFTER ND:YAG LASER POSTERIOR CAPSULOTOMY

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ABSTRACT

Background Posterior capsular opacification (PCO) is the most common late complication of cataract surgery and a significant cause of visual impairment in pseudophakic patients. Nd:YAG laser posterior capsulotomy is the standard treatment for visually significant PCO; however, transient intraocular pressure (IOP) elevation is a recognized postoperative complication. This study compared the effects of topical steroids and non-steroidal anti-inflammatory drugs (NSAIDs) on IOP changes following Nd laser posterior capsulotomy. **Methods** This longitudinal study included 102 eyes of patients with visually significant PCO who underwent Nd:YAG laser posterior capsulotomy. Following the procedure, patients were allocated alternately to receive either topical dexamethasone 0.1% with moxifloxacin 0.5% (steroid group) or topical nepafenac 0.1% (NSAID group). IOP was measured before treatment and at three follow-up visits (3-4 days, 7-10 days, and 21-30 days). Data were analysed using Student's t-test and Pearson's Chi-square test, with $p<0.05$ considered statistically significant. **Results** The mean baseline IOP was 14.07 ± 2.59 mmHg. A transient increase in IOP was observed in both groups following capsulotomy. During the first follow-up visit, mean IOP was significantly higher in the steroid group compared to the NSAID group (16.94 ± 3.03 mmHg vs. 15.72 ± 3.04 mmHg; $p=0.023$). No statistically significant differences were observed during the second ($p=0.437$) or third follow-up visits ($p=0.359$). The frequency of eyes demonstrating elevated IOP declined progressively over time in both groups. **Conclusion** Nd:YAG laser posterior capsulotomy is associated with a transient rise in IOP that generally resolves during follow-up. Topical NSAIDs were associated with significantly lower early postoperative IOP compared with topical steroids, suggesting that they may represent a suitable alternative when minimizing early IOP elevation is desirable. Careful IOP monitoring remains important following capsulotomy, particularly in patients at risk of glaucoma.

INTRODUCTION

Posterior capsular opacification (PCO) remains the most frequent late complication following cataract surgery. It develops due to the proliferation and migration of residual lens epithelial cells onto the posterior capsule, resulting in visual disturbances such as decreased visual acuity, glare, and reduced contrast sensitivity. [1][2] The reported incidence of PCO ranges from 5–10% within three years after cataract surgery, with some studies demonstrating a cumulative incidence of up to 25% at five years. [3] Nd:YAG laser posterior capsulotomy is widely regarded as the treatment of choice for visually significant PCO, offering a safe and effective means of restoring visual function. [4] However, the procedure may be associated with transient inflammation and elevations in intraocular pressure (IOP). To minimize these inflammatory responses, topical corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs) are routinely prescribed in the postoperative period. The present study was undertaken to compare the effects of topical steroids and NSAIDs on IOP changes following Nd:YAG laser posterior capsulotomy.

Materials and Methods

This longitudinal study evaluated the effect of topical non-steroidal anti-inflammatory drugs (NSAIDs) and topical steroids on intraocular pressure (IOP) following Nd:YAG laser posterior capsulotomy. The study adhered to the principles of the Declaration of Helsinki. Total 102 eyes of patients with visually significant posterior capsular opacification (PCO) included in the study who had previously undergone phacoemulsification with posterior chamber intraocular lens implantation.

Pre-existing glaucoma, complicated pseudophakia, recent ocular laser treatment, pre-existing macular or significant retinal pathology, a single functional eye, or age below 7 years or above 70 years were excluded. Written informed consent was obtained from all participants.

A comprehensive ophthalmic evaluation was performed before treatment, including visual acuity, best-corrected visual acuity (BCVA), IOP measurement, slit-lamp examination, and fundus assessment.

Nd:YAG laser posterior capsulotomy was performed as an outpatient procedure after adequate pupillary dilatation with tropicamide 0.8% and phenylephrine 5%. A Q-switched Nd:YAG laser was used for capsulotomy, and laser energy and shot count were recorded. Following an uneventful procedure, patients were allocated alternately into two groups. Group I received topical dexamethasone 0.1% with moxifloxacin 0.5% four times daily, tapered over 20 days, while Group II received topical nepafenac 0.1% three times daily for 15 days. No prophylactic IOP-lowering medication was administered.

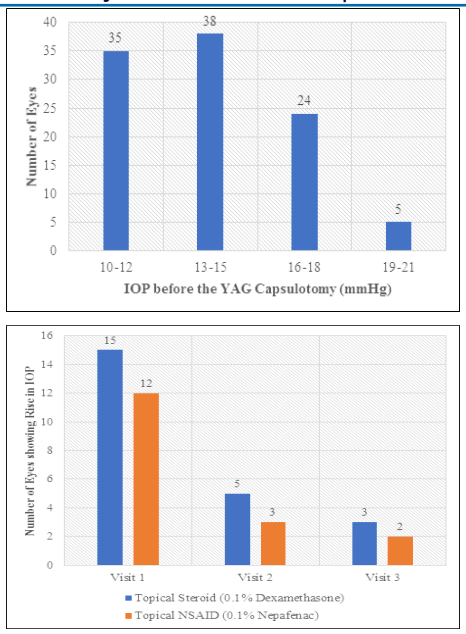
Patients were reviewed at total 3 visit (3-4 days, 7-10 days, and 21-30 days post-procedure). At each visit, BCVA, IOP, slit-lamp findings, fundus examination, and any inflammatory complications were documented. Data were analysed using IBM SPSS Statistics version 20. Pearson's Chi-square test and Student's t-test were applied, with a p-value <0.05 considered statistically significant.

RESULTS

A total of 102 eyes from 86 patients with posterior capsular opacification (PCO) who underwent Nd:YAG laser posterior capsulotomy were enrolled in the study. The mean age of the participants was 62 ± 7 years, with the majority (72.5%) belonging to the 61–70 years age group. Female patients constituted a slightly higher proportion of the study population than males (56.9% vs. 43.1%). Most cases of visually significant PCO were observed within two years of cataract surgery. Fibrous PCO was the most frequently encountered morphological subtype, and the majority of eyes presented with moderate grades of opacification. Baseline intraocular pressure was within the normal range in all enrolled eyes, with a mean pre-procedural IOP of 14.07 ± 2.59 mmHg (Graph 1).

An increase in IOP was observed more frequently during the early post-procedural period, with the incidence declining progressively over subsequent follow-up visits in both treatment groups (Graph 2).

Graph 1: Distribution of IOP before the YAG Capsulotomy



Graph 2: Number of Eyes showing Rise in IOP after YAG Capsulotomy during follow-ups

Following capsulotomy, a transient increase in IOP was observed in both treatment groups, with a significantly greater rise in the steroid group during the first follow-up visit. Subsequent follow-ups showed no significant intergroup difference in IOP (Table 1).

Table 1: Mean IOP after Nd:YAG Capsulotomy during follow-ups

	Baseline IOP (mmHg) (mean ± SD)	Visit 1 IOP (mmHg) (mean ± SD)	Visit 2 IOP (mmHg) (mean ± SD)	Visit 3 IOP (mmHg) (mean ± SD)
Topical Steroid	14.07 ± 2.73	16.94 ± 3.03	14.62 ± 3.42	14.5 ± 3.19
Topical NSAID	14.07 ± 2.48	15.72 ± 3.04	14.52 ± 2.87	14.29 ± 2.83
P-value	N/A	0.023	0.437	0.359

(SD = standard deviation; IOP = intraocular pressure)

DISCUSSION

Posterior capsular opacification (PCO) remains the most common late complication of cataract surgery and continues to be an important cause of visual impairment in pseudophakic patients. Nd:YAG laser posterior capsulotomy is widely regarded as the treatment of choice for visually significant PCO because of its effectiveness, safety, and rapid visual rehabilitation. However, transient elevation of intraocular pressure (IOP) remains one of the most frequently reported complications following the procedure. [4] The present study was undertaken to compare the effect of topical steroids and non-steroidal anti-inflammatory drugs (NSAIDs) on post-capsulotomy IOP changes.

In the present study, 102 eyes of 86 patients underwent Nd:YAG laser posterior capsulotomy. Baseline IOP was within normal limits in all enrolled eyes, with a mean pre-procedural IOP of 14.07 ± 2.59 mmHg. A transient increase in IOP was observed following capsulotomy in both treatment groups. During the first follow-up visit, eyes receiving topical steroids demonstrated a significantly higher mean IOP compared to those treated with topical NSAIDs. However, this difference was not sustained, and no statistically significant difference was observed between the two groups during subsequent follow-up visits. These findings suggest that although both treatment regimens are associated with a temporary rise in IOP after capsulotomy, topical NSAIDs may be associated with a lower tendency for early post-procedural IOP elevation.

Our findings are comparable to those reported by Monica Deshwal et al., who observed a significant rise in IOP shortly after Nd:YAG capsulotomy, followed by a gradual return towards baseline values during subsequent follow-up visits. Their study demonstrated that post-procedural IOP elevation is generally transient and self-limiting in nature, with most patients showing normalization of IOP over time. [5]

The mechanism of IOP elevation following Nd:YAG capsulotomy is believed to be multifactorial. Capsular debris, inflammatory cells, pigment dispersion, and shock-wave induced alterations in aqueous humour dynamics may contribute to temporary obstruction of the trabecular meshwork, resulting in reduced aqueous outflow and transient ocular hypertension. [6] Previous studies have shown that the magnitude of IOP elevation is influenced by procedural factors, particularly the total laser energy delivered and the number of laser shots used during capsulotomy. [7][8]

The findings of the present study have important clinical implications. While topical corticosteroids remain effective anti-inflammatory agents following Nd:YAG capsulotomy, their potential association with early IOP elevation may be a concern in susceptible individuals.

Topical NSAIDs may provide a suitable alternative in such cases, particularly in patients with glaucoma risk factors, ocular hypertension, or a history of steroid responsiveness. Nevertheless, both treatment regimens demonstrated favourable IOP outcomes over the study period, and the overall incidence of sustained IOP elevation remained low.

Conclusion

Nd laser posterior capsulotomy remains a safe and effective outpatient procedure for the management of visually significant posterior capsular opacification. Although transient intraocular pressure (IOP) elevation is a recognized complication following the procedure, the rise is generally temporary and resolves during subsequent follow-up in most patients.

The present study demonstrates that both topical corticosteroids and non-steroidal anti-inflammatory drugs are associated with favourable IOP outcomes following Nd capsulotomy. However, eyes treated with topical NSAIDs exhibited significantly lower IOP during the early postoperative period compared to those receiving topical steroids. These findings suggest that topical NSAIDs may be considered a suitable first-line alternative to corticosteroids in patients undergoing routine Nd capsulotomy, particularly when minimizing early IOP elevation is desirable. Careful postoperative IOP monitoring remains essential, especially in patients with risk factors for glaucoma.

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