

Research Article**BRIMONIDINE: MAKING SURGERIES A BREEZE**

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Abstract

Introduction: Intraoperative bleeding during ophthalmic surgeries blurs the line between precision and peril. A surgeon's clarity is clouded when blood obscures the delicate art of extraocular procedures. Proper management of bleeding is crucial for clear visibility and better outcomes. Brimonidine, known for reducing intraocular pressure, also has vasoconstrictive properties. Brimonidine is an alpha-2 adrenergic agonist. It induces vasoconstriction by stimulating alpha-2 receptors on blood vessels. This reduces blood flow, minimizing intraoperative bleeding.

Materials and methods: Prospective interventional Study conducted in Patients undergoing extraocular surgeries (pterygium and squint surgeries) in Santhiram Medical College and General Hospital, Nandyal, Andhra Pradesh from May 2023 to April 2024. Study group was divided into two groups, Group A: 70 eyes (20 patients undergoing strabismus and 50 patients undergoing pterygium surgery) instilled with brimonidine eye drops, Group B: 70 eyes (20 patients undergoing strabismus and 50 patients undergoing pterygium surgery) without brimonidine eye drops. Brimonidine tartrate 0.15% eye drops were applied 5 and 10 minutes before surgery. Intraoperative photos were taken.

Results: Vasoconstriction effects observed with a 60-70% reduction in vessels surface area within 5 minutes in Group A, Effect lasted for 20 minutes, providing a safe and clear operative area. Group A showed significantly less intraoperative bleeding ($P < 0.001$)

Conclusion: Topical brimonidine effectively controls bleeding during strabismus and pterygium surgeries. It enhances surgical visibility and reduces postoperative complications.

Key Words: Intraoperative bleeding, Topical brimonidine, strabismus, pterygium surgery.

INTRODUCTION

Intraoperative bleeding during ophthalmic surgeries blurs the line between precision and peril. A surgeon's clarity is clouded when blood obscures the delicate art of extraocular procedures. Proper management of bleeding is crucial for clear visibility and better outcomes. Brimonidine, known for reducing intraocular pressure, also has vasoconstrictive properties.¹ Brimonidine is an alpha-2 adrenergic agonist. It induces vasoconstriction by stimulating alpha-2 receptors on blood vessels. This reduces blood flow, minimizing intraoperative bleeding.²

Brimonidine tartrate is a selective alpha 2 adrenergic receptor agonist that is used for the treatment of ocular hypertension. It binds to alpha 2 adrenergic receptors located in the ciliary body and iris, reducing the production of aqueous humor and increasing uveoscleral drainage.³ Alpha 2 receptors are predominantly expressed in the veins, and it is possible that alpha 2 receptor agonists for ocular use may have a lower potential for tachyphylaxis and rebound redness.⁴ The alpha 1 receptors agonists appear predominantly expressed in the arteries, and therefore the sustained use of highly selective alpha 1 receptor agonists could produce vasoconstrictor-induced tissue ischemia and release of vasodilators. Due to its high binding affinity with alpha 2 receptors, the appearance of mydriasis is rare with the use of topical brimonidine. This effect is fundamentally associated with drugs with high affinity for alpha 1 receptor agonists. Systemic alpha 2 receptor agonists have been studied pharmacologically for their sedative properties and cardiovascular effects. In previous studies with the use of topical brimonidine at concentrations of up to 0.2%, the reported cardiovascular effects are minimal, although fatigue and drowsiness have been reported, especially in pediatric patients. Cases of allergic ocular surface disease have been reported in association with the use of high doses of brimonidine.⁵

AIM

Our study seeks to determine the impact of brimonidine on intra-operative bleeding rates in extraocular surgeries, with the goal of enhancing procedural efficiency and minimizing complications.

MATERIALS AND METHODS

Type of Study: Prospective interventional Study

Study population: Patients undergoing extraocular surgeries (pterygium and squint surgeries) in Santhiram Medical College and General Hospital, Nandyal, Andhra Pradesh

Study duration: May 2023 to April 2024

Study sample size: 140 patients

Study Design

Study group was divided into two groups

Group A: 70 eyes (20 patients undergoing strabismus and 50 patients undergoing pterygium surgery) used brimonidine eye drops.

Group B: 70 eyes (20 patients undergoing strabismus and 50 patients undergoing pterygium surgery) without brimonidine eye drops.

Brimonidine tartrate 0.15% eye drops were applied 5 and 10 minutes before surgery.

Intraoperative pictures were taken with the help of Photoshop and ImageJ programs.

Study subjects:

Inclusion criteria:

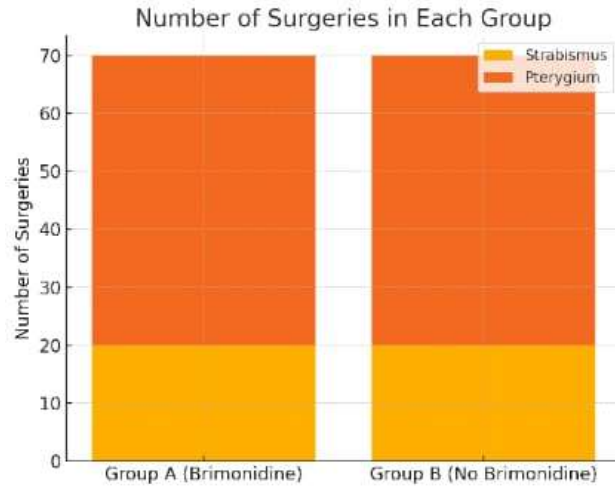
1. **Type of surgery:** Patient undergoing strabismus surgery. Patient undergoing pterygium surgery.
2. **Age:** Patients of any age who underwent either of the surgeries.

Exclusion criteria:

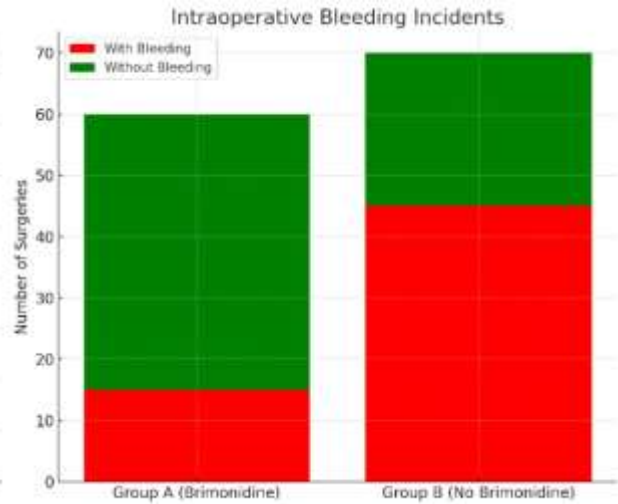
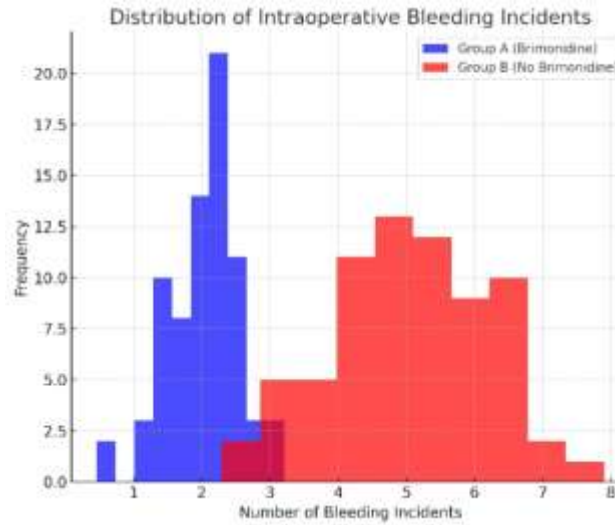
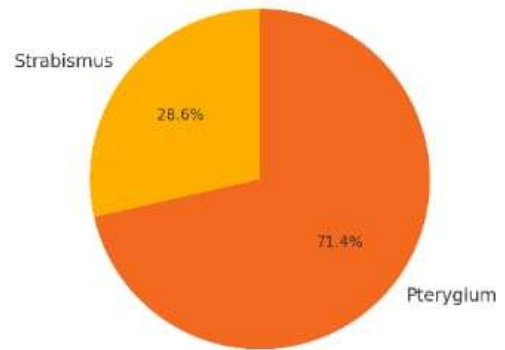
1. **Previous ocular surgery:** Patients with a history of previous ocular surgeries in the same eye, which could effect bleeding and healing.
2. **Systemic conditions:** Patients with systemic conditions like bleeding disorders (eg. Hemophilia) or those on anticoagulant therapy, which could influence intraoperative bleeding independently of brimonidine.
3. **Concurrent use of other medications:** Patients who received other vasoconstrictive agents or medications that might influence bleeding or vascular response during perioperative period.
4. **Allergy or Adverse reaction:** Patients with a known allergy to brimonidine or those who experienced adverse reactions to the drug that necessitated discontinuation.

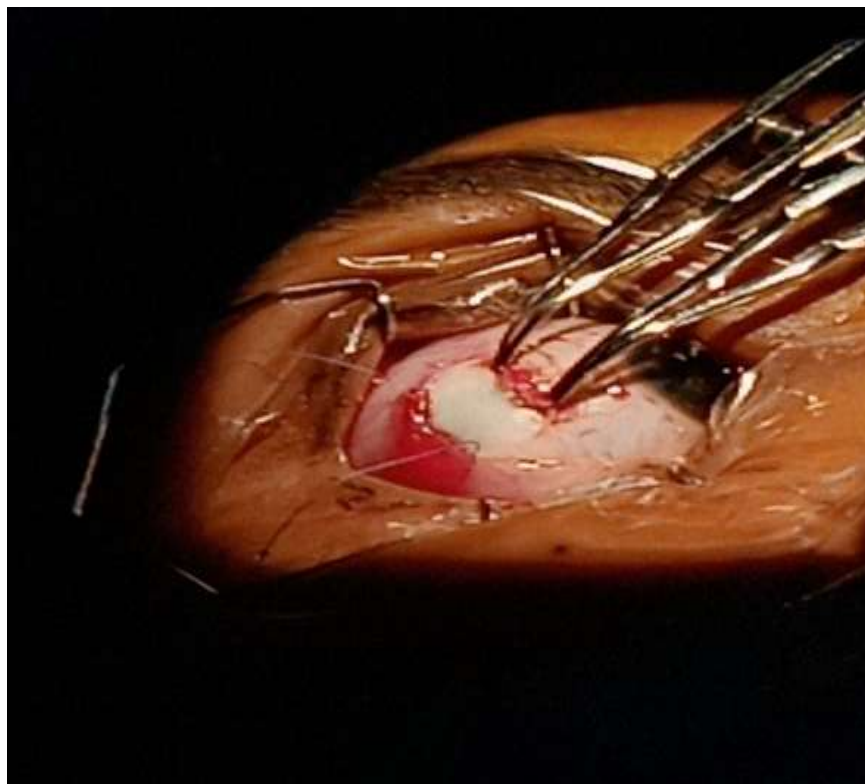
RESULTS

Vasoconstriction effects observed with a 60-70% reduction in vessels surface area within 5 minutes in Group A, Effect lasted for 20 minutes, providing a safe and clear operative area. Group A showed significantly less intraoperative bleeding ($P < 0.001$), so the conjunctival whitening formed by brimonidine tartrate provides a safe and comfortable operative area throughout the surgery.



Group A: Distribution of Surgeries





Intra operative photos of strabismus surgery



Pterygium surgery

DISCUSSION

Pterygium is a proliferative, fibrovascular disease that extends from the conjunctiva to the cornea, showing prominent vascularity. It is treated with steroid and artificial tear eye drops, but if it affects vision, it is excised surgically (American Academy of Ophthalmology, 2009; Liu et al., 2013).⁶ Brimonidine tartrate, which is a selective α -2 adrenergic receptor (AR) agonist, is used for ocular hypertension and glaucoma. It decreases aqueous humor production and increases uveoscleral outflow.⁷ In decreased concentration brimonidine causes conjunctival whitening (blanching) and reduces bleeding; for this reason, it is used in intravitreal injections and ophthalmic surgeries. Its affinity to α -2 receptors is 790-fold more than to that of α -1 receptors. Now a day's, topical brimonidine is used as an agent to control haemorrhage in many ocular surgeries. This study was designed to evaluate the efficacy of topical brimonidine as an agent to control per-operative bleeding during pterygium surgery.⁸

In the present study, regarding age distribution mean age of patients was 40.6 in group A and 39.8 in group B. Similar observations were made by Rohatgi et al, Viso et al. and Yoon et al. showing that, prevalence of pterygium increases with advancement of age.

The mean pre-operative IOP (intra-ocular pressure) in group-A was 15.0 ± 1.46 (SD) mm of Hg and group-B was 14.9 ± 1.81 (SD) mm of Hg and mean post-operative IOP (intra-ocular pressure) in group-A was 13.6 ± 2.02 (SD) mm of Hg and group-B was 14.3 ± 1.6 (SD) mm of Hg. Brimonidine is commonly used as anti-glaucoma agents to lower IOP. In this study though the mean IOP is reduced in study group, it was statistically non-significant to IOP.⁹

Per-operative haemorrhage often hampers quality of surgery as well as causes wastage of time especially in microsurgery like excision of pterygium followed by conjunctival autograft. Proper agent should be looked for which control per-operative bleeding with minimum adverse effects. Topical brimonidine may be a choice for control of bleeding.¹⁰

CONCLUSION

Topical brimonidine effectively controls bleeding during strabismus and pterygium surgeries. It enhances surgical visibility and reduces postoperative complications.

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