



SMALL PUPIL IN PSEUDOEXFOLIATION: A HINDRANCE FOR CATARACT SURGERY — A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Pseudoexfoliation (PXF) is a common age-related fibrilopathy characterized by the accumulation of extracellular material in ocular tissues. It is associated with small pupil size and zonular weakness, complicating cataract surgery. **Objective:** To assess pupil size and the effect of mydriatics in patients with pseudoexfoliation syndrome. **Methods:** A cross-sectional study conducted over 5 months at Santhiram Medical College, Nandyal. Adult patients with PXF underwent pupillary diameter measurement before and after administration of mydriatic drops. **Results:** 40% of patients had a small pupil pre-dilatation; post-dilatation, 84% still had pupils ≤ 6 mm. No significant association between pupil size and age or sex was found. **Conclusion:** Small pupil in PXF patients poses challenges for cataract surgery. Early recognition and proper preoperative planning can reduce intraoperative complications and improve surgical outcomes.

KEYWORDS :

INTRODUCTION

Pseudoexfoliation (PXF) syndrome is an age-related systemic disorder marked by the production and deposition of fibrillar material in the anterior segment of the eye. Affecting approximately 60–70 million people globally, PXF incidence increases with age and varies geographically.

This material accumulates on the pupillary rim, anterior lens capsule, and other ocular structures, causing poor pupil dilatation and zonular instability. Genetic studies have linked the LOXL1 gene, CACNA1A, and clusterin with PXF, though the presence of risk alleles alone is not predictive of disease development.

PXF contributes to increased risk during cataract surgery due to miosis, zonular weakness, corneal endothelial damage, and elevated postoperative IOP. With tailored surgical techniques, these challenges can be mitigated.

Aims And Objectives

To study the pupil size and the effect of mydriatics in patients diagnosed with pseudoexfoliation syndrome.

Ethical Considerations

The study was approved by the Institutional Ethical Review Board of Santhiram Medical College, Nandyal.

MATERIALS AND METHODS

Study Design: Cross-sectional

Location: Santhiram Medical College and General Hospital, Nandyal

Duration: December 2024 – April 2025 (5 months)

Participants: Adult patients (>40 years) attending the Ophthalmology department with diagnosed PXF

Inclusion Criteria:

1. Age > 40 years
2. Written informed consent
3. Diagnosed with PXF

Exclusion Criteria:

1. Refusal to consent

2. History of ocular trauma or surgery
3. Zonular dialysis

Each participant underwent a detailed slit-lamp examination. PXF diagnosis was confirmed by identifying material on the pupillary ruff or anterior lens capsule.

Vertical pupil diameter was measured using a Haag-Streit slit lamp in a semi-dark room. Tropicamide 0.8% with phenylephrine 5% was administered at 0, 5, 10, 15, and 20-minute intervals. Pupil size was re-measured at 60 minutes. Pupils ≤ 6 mm post-dilatation were classified as small.

RESULTS

Table 1: Distribution Of Study Participants By Age

AGE CATEGORY	FREQUENCY	PERCENTAGE(%)
<60 yrs	22	22%
61-70 yrs	50	50%
71-80 yrs	28	28%
TOTAL	100	100%

50% of participants were aged 61–70 years. Gender distribution: 48 males, 52 females.

Table 2: Distribution of study participants by size of the pupil before dilatation

PUPIL SIZE	NUMBER OF EYES	PERCENTAGE (%)
2mm	40	40%
3mm	45	45%
4mm	15	15%

40% had small pupils (<6 mm); average pre-dilation pupil size was 3 mm.

Table 3: Distribution Of Study Participants By Size Of The Pupil After Dilatation

PUPIL SIZE	NUMBER OF EYES
4mm	12
5mm	52
6mm	20
7mm	10
8mm	6

84% had pupils ≤6 mm post-dilation. Mean size: 6 mm.

Table 4: Distribution Of Study Participants By Normal Size Vs Small Pupil Before And After Dilatation

	BEFORE DILATATION	AFTER DILATATION
NORMAL PUPIL	62(62%)	18(18%)
SMALL PUPIL	38(38%)	82(82%)

No statistically significant correlation found.

PXF material was observed in various iris tissues. It contributes to iris atrophy and poor mydriasis via stromal disruption and vascular anomalies. Zonular abnormalities, such as fragmentation and loss, were noted via ultrasound biomicroscopy (UBM), often causing challenges in capsulorhexis and increasing intraoperative complication risk.

DISCUSSION

Intraoperative Management:

- **Corneal Protection:** Dispersive OVDs protect the endothelium.
- **Chamber Maintenance:** Cohesive OVDs support anterior chamber stability.
- **Pupil Management:**
- **Pharmacological:** NSAIDs + mydriatics
- **Mechanical:** Iris retractors, hooks, pupil rings, Beehler dilators
- Synechiolysis and OVD-assisted stretching for persistent miosis

Excessive iris manipulation may cause hyphema, pigment dispersion, or atonic pupils. Floppy iris syndrome should be cautiously managed, avoiding aggressive stretching techniques.

CONCLUSION

Cataract surgery in PXF patients involves unique challenges across all perioperative phases. Early identification of risk factors like small pupils and zonular weakness allows for better surgical planning. Use of appropriate devices and techniques enables outcomes comparable to non-PXF cases. With a comprehensive preoperative evaluation and meticulous surgical approach, complications can be minimized, resulting in favorable visual outcomes for PXF patients.

REFERENCES

1. Ritch R, Schlotzer-Schrehardt U. Exfoliation syndrome. *Surv Ophthalmol.* 2001;45:265–315.

2. Belovay GW, Varma DK, Ahmed II. Cataract surgery in pseudoexfoliation syndrome. *Curr Opin Ophthalmol.* 2010;21(1):25–34.

3. Halkiadakis I, et al. Causes and management of small pupil in patients with cataract. *Oman J Ophthalmol.* 2017;10(3):220.

4. Thorleifsson G, et al. Common sequence variants in the LOXL1 gene confer susceptibility to exfoliation glaucoma. *Science.* 2007;317(5843):1397–1400.

5. Ocular Surgery News. Ophthalmologists explore causes, consequences of pseudoexfoliation syndrome. June 25, 2016.

6. Kastelan S, et al. Cataract surgery in eyes with pseudoexfoliation syndrome. *J Clin Exp Ophthalmol.* 2013;1(9).

7. Shingleton BJ, et al. Outcomes of phacoemulsification in patients with and without PXF. *J Cataract Refract Surg.* 2003;29:1080–1086.

8. Hyams M, et al. Intraoperative complications of phacoemulsification in PXF eyes. *J Cataract Refract Surg.* 2005;31:1002–1005.

9. Akinci A, et al. Phacoemulsification in pseudoexfoliation syndrome. *Ophthalmologica.* 2008;222:112–116.

10. Shingleton BJ, et al. Outcomes of phacoemulsification in fellow eyes with unilateral PXF. *J Cataract Refract Surg.* 2008;34:274–279.