Section: Ophthalmology

Original Research Article

COMPARISON OF LENS COMPLICATIONS AND SURGICAL CHALLENGES IN CATARACT SURGERY AMONG PATIENTS WITH PSEUDOEXFOLIATION SYNDROME AND PSEUDOEXFOLIATION GLAUCOMA

Abdul Aziz Makayee[1], Afrin Aziz[2], Sabia Salaam[2]

[1]Consultant, Department of Ophthalmology, Govt Medical College, Baramulla, India.
[2]Senior Resident, Govt Medical College Baramulla, India.

Received : 23/11/2024
Received in revised form : 13/01/2025
Accepted : 29/01/2025

Keywords:
Pseudoexfoliation syndrome, Pseudoexfoliation glaucoma, Cataract surgery, Lens complications, Surgical challenges.

Corresponding Author:
Dr. Abdul Aziz Makayee,
Email: drazizmakayee@gmail.com

DOI: 10.47009/jamp.2025.7.1.47

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

Int J Acad Med Pharm
2025; 7 (1); 238-243

Abstract

Background: The study aimed to compare the lens complications and surgical challenges encountered during cataract surgery in patients with pseudoexfoliation syndrome (PXF) and pseudoexfoliation glaucoma (PXG). **Materials and Methods:** This retrospective, observational, and comparative study included 100 patients diagnosed with cataract and PXF or PXG, divided into two groups of 50 patients each. Group 1 consisted of patients with PXF without glaucoma, while Group 2 included patients with PXG. All patients underwent detailed preoperative ophthalmological evaluations, including best-corrected visual acuity (BCVA), intraocular pressure (IOP), and slit-lamp examination. Standard phacoemulsification with intraocular lens (IOL) implantation was performed. Intraoperative challenges and complications, including zonular weakness, capsular instability, and posterior capsular rupture, were documented. Postoperative outcomes, including BCVA improvement and IOP control, were analyzed at 1 and 3 months. **Result:** Group 2 (PXG) exhibited significantly higher rates of intraoperative complications, including zonular weakness (42% vs. 18%; p = 0.003) and capsular instability (36% vs. 12%; p = 0.004). The need for capsular tension rings was also higher in Group 2 (40% vs. 16%; p = 0.002). Posterior capsular rupture was more frequent in PXG patients (14% vs. 4%; p = 0.08). Postoperative IOP spikes were significantly more common in Group 2 (26% vs. 10%; p = 0.04). BCVA improved significantly in both groups, but Group 1 showed better outcomes at 1 month (0.32 ± 0.11 vs. 0.40 ± 0.12; p = 0.02) and 3 months (0.22 ± 0.09 vs. 0.30 ± 0.10; p = 0.03). Mean IOP was consistently higher in Group 2 postoperatively at both 1 month (17.8 ± 3.5 mmHg vs. 15.2 ± 3.0 mmHg; p = 0.01) and 3 months (17.0 ± 3.2 mmHg vs. 14.8 ± 2.9 mmHg; p = 0.03). **Conclusion:** PXG patients experienced greater intraoperative and postoperative challenges during cataract surgery compared to PXF patients, including higher rates of zonular weakness, capsular instability, and IOP spikes, as well as slower visual recovery. These findings emphasize the need for meticulous preoperative planning, advanced surgical techniques, and individualized postoperative management strategies to optimize outcomes in pseudoexfoliation-related cataract surgeries.

INTRODUCTION

Cataract surgery is one of the most commonly performed and highly successful surgical procedures globally, aimed at restoring vision impaired by opacification of the natural crystalline lens. While advances in surgical techniques and technologies have greatly improved outcomes, certain preexisting ocular conditions, such as pseudoexfoliation syndrome (PXF) and pseudoexfoliation glaucoma (PXG), present unique challenges that complicate the procedure. Pseudoexfoliation is an age-related systemic condition characterized by the deposition of flaky, white fibrillar material in various intraocular and extraocular tissues, most notably on the anterior lens capsule, zonules, iris, and trabecular meshwork. These deposits contribute to significant structural and functional changes within the eye, making cataract surgery in affected individuals far more demanding and prone to complications than in the general population.[1] PXF, as a standalone entity, is associated with increased risks during cataract surgery due to weakened zonular fibers, compromised lens capsule integrity, and poor

ISSN (O): 2687-5365; ISSN (P): 2753-6556

pupillary dilation. When PXF progresses to PXG, which is a secondary open-angle glaucoma, the surgical challenges are amplified due to additional issues such as elevated intraocular pressure (IOP), glaucomatous optic nerve damage, and further weakening of zonular support. PXG patients also exhibit more extensive pseudoexfoliative material deposition, which exacerbates structural damage and increases the likelihood of surgical complications. Despite being a global condition, PXF and PXG have varying prevalence rates based on geographic location, age, and genetic predisposition, with a higher prevalence observed in older adults and certain ethnic groups.[2] The challenges of cataract surgery in patients with PXF and PXG are multifaceted, stemming from both anatomical and physiological alterations caused by the condition. Zonular instability is a hallmark feature of pseudoexfoliation, resulting from the degeneration of fibrillin and elastin fibers within the zonules. This instability can lead to intraoperative complications such as lens dislocation, capsular rupture, and vitreous prolapse. Additionally, poor pupillary dilation, often due to the infiltration of pseudoexfoliative material into the iris stroma, poses significant difficulties in accessing and visualizing the lens during surgery. Iris rigidity and atrophy are further contributors to suboptimal surgical outcomes in this patient population.[3] Another major concern during cataract surgery in pseudoexfoliation cases is the increased risk of capsular complications. The lens capsule in PXF patients is often fragile and susceptible to tears, particularly during capsulorhexis creation and phacoemulsification. This fragility necessitates the use of specialized surgical techniques and devices, such as capsular tension rings (CTRs) and iris hooks, to stabilize the capsular bag and maintain the integrity of the surgical field. Despite these measures, the risk of posterior capsular rupture and zonular dehiscence remains significantly higher in PXF and PXG patients compared to individuals without pseudoexfoliation.[4] Postoperative outcomes in pseudoexfoliation cases are also influenced by the condition's impact on the ocular environment. PXF is associated with poor corneal endothelial cell health, leading to a higher likelihood of postoperative corneal edema and delayed visual recovery. Furthermore, patients with PXG face the added challenge of managing elevated IOP postoperatively, which can adversely affect both short-term and long-term surgical success. The combination of these factors underscores the importance of meticulous preoperative assessment, intraoperative vigilance, and postoperative care in patients with pseudoexfoliation.[5] Comparing the surgical challenges and outcomes between PXF and PXG patients provides valuable insights into the unique risks associated with each condition. While both groups share common features such as zonular weakness and capsular instability, PXG patients often present with more severe anatomical and physiological alterations. Elevated IOP and glaucomatous damage in PXG contribute to greater surgical complexity and a higher likelihood of postoperative complications. These differences highlight the need for tailored surgical approaches and individualized management strategies to optimize outcomes in each subgroup.[6] The advent of advanced surgical tools and techniques has provided cataract surgeons with better means to address the complexities associated with pseudoexfoliation. Technologies such as femtosecond lasers for capsulorhexis creation, intraoperative optical coherence tomography (OCT) for real-time visualization, and enhanced phacoemulsification devices have improved safety and efficacy in these challenging cases. However, despite these advancements, pseudoexfoliation remains a significant risk factor for complications, emphasizing the need for ongoing research and innovation in this field.[7] The present study aims to compare the lens complications and surgical challenges encountered during cataract surgery in patients with PXF and PXG. By analyzing intraoperative and postoperative data, this research seeks to identify the key factors contributing to complications in each group and evaluate the effectiveness of various surgical interventions in mitigating these risks. Understanding the distinctions between PXF and PXG is crucial for developing evidence-based guidelines that can improve surgical outcomes and enhance the quality of care for patients with pseudoexfoliation.8 Cataract surgery in the context of pseudoexfoliation is a complex undertaking requiring specialized skills and knowledge. The unique anatomical and physiological changes associated with PXF and PXG demand careful planning, precise execution, and thorough postoperative management to achieve optimal results. As the global population ages and the prevalence of pseudoexfoliation increases, the importance of addressing these challenges cannot be overstated. This study contributes to the growing body of literature on pseudoexfoliation by providing a detailed comparison of surgical outcomes in PXF and PXG, paving the way for improved patient care and surgical success in this high-risk population.

MATERIALS AND METHODS

This was a retrospective, observational, comparative study conducted at tertiary care hospital. A total of 100 patients diagnosed with cataract and pseudoexfoliation syndrome (PXF) or pseudoexfoliation glaucoma (PXG) were included in the study. Patients were divided into two groups: Group 1 consisted of 50 patients with PXF without glaucoma, and Group 2 included 50 patients with PXG. The study adhered to the tenets of the Declaration of Helsinki and was approved by the institutional ethics committee. Informed consent was obtained from all patients prior to surgery.

Inclusion Criteria

Patients were included if they:

1. Were aged 50 years or older.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

2. Had a clinical diagnosis of PXF or PXG, confirmed by slit-lamp examination and intraocular pressure measurement using Goldmann applanation tonometry.
3. Presented with visually significant cataracts requiring surgical intervention.
4. Had no previous history of intraocular surgery.

Exclusion Criteria

Patients were excluded if they:

1. Had coexisting ocular conditions such as uveitis, advanced diabetic retinopathy, or significant corneal pathologies.
2. Had undergone prior intraocular surgeries or trauma.
3. Were uncooperative for surgery or follow-up.

Preoperative Assessment

A detailed ophthalmological evaluation was conducted for all patients as part of the preoperative assessment. Best-corrected visual acuity (BCVA) was measured to document baseline visual function. A slit-lamp examination was performed to assess the presence of pseudoexfoliative material on the lens capsule or pupillary border, evaluate corneal clarity, and examine zonular stability. Fundus examination was carried out after pupil dilation to assess the optic nerve and retina. Axial length measurements were obtained using A-scan biometry or optical coherence biometry to accurately calculate the intraocular lens (IOL) power. Intraocular pressure (IOP) was measured using Goldmann applanation tonometry to evaluate baseline pressure levels and detect any abnormalities. This comprehensive evaluation ensured a thorough understanding of each patient's ocular condition before surgery.

Surgical Procedure

All surgeries were performed by experienced cataract surgeons under topical or regional anesthesia to ensure patient comfort and optimal surgical conditions. Standard phacoemulsification with intraocular lens (IOL) implantation was utilized as the primary surgical technique. During surgery, various challenges and complications were carefully documented, including zonular weakness or dehiscence, capsular instability, intraoperative floppy iris syndrome (IFIS), and vitreous prolapse. Additional surgical measures, such as the use of capsular tension rings (CTRs) or iris hooks, were employed when necessary to address these complications and ensure successful outcomes.

The primary outcomes of the study focused on the frequency and types of intraoperative complications, such as posterior capsular rupture and zonular dehiscence, as well as the need for additional surgical maneuvers or devices, including CTRs and anterior vitrectomy. Secondary outcomes included the evaluation of postoperative complications, such as intraocular pressure (IOP) spikes and corneal edema, as well as improvements in best-corrected visual acuity (BCVA) at 1 month and 3 months following surgery. These outcome measures provided a comprehensive assessment of the surgical challenges and overall efficacy of the procedures.

Data Collection and Analysis: Data were collected from patient records, operative reports, and follow-up visits. Statistical analysis was performed using SPSS version 25.0. Continuous variables were analyzed using t-tests or Mann-Whitney U tests, while categorical data were compared using chi-square tests. A p-value of <0.05 was considered statistically significant.

RESULTS

Baseline Characteristics [Table 1]

The baseline characteristics of the study population reveal that both groups, Group 1 (PXF) and Group 2 (PXG), had an equal number of participants (50 each). The mean age of the patients in Group 1 was 65.4 ± 7.2 years, while it was slightly higher in Group 2 at 66.8 ± 6.9 years; however, this difference was not statistically significant ($p = 0.35$). The male-to-female ratio was comparable between the groups, with males constituting 56% and females 44% in Group 1, and 60% and 40%, respectively, in Group 2 ($p = 0.67$). Preoperative best-corrected visual acuity (BCVA) was significantly worse in Group 2 (0.80 ± 0.18) compared to Group 1 (0.72 ± 0.15), with a statistically significant difference ($p = 0.04$). Similarly, the mean preoperative intraocular pressure (IOP) was significantly higher in Group 2 (22.7 ± 4.5 mmHg) compared to Group 1 (16.3 ± 3.1 mmHg; $p < 0.001$). The mean axial length of the eyes was slightly shorter in Group 2 (23.1 ± 0.9 mm) than in Group 1 (23.4 ± 0.8 mm), though this difference was not statistically significant ($p = 0.15$).

Intraoperative Surgical Challenges [Table 2]

Significant intraoperative challenges were encountered more frequently in Group 2 (PXG) compared to Group 1 (PXF). Zonular weakness was present in 42% of patients in Group 2 versus 18% in Group 1, a statistically significant difference ($p = 0.003$). Similarly, capsular instability was observed in 36% of patients in Group 2, compared to only 12% in Group 1 ($p = 0.004$). Intraoperative floppy iris syndrome (IFIS) was relatively uncommon and occurred in 10% of patients in Group 2 and 8% in Group 1, with no significant difference ($p = 0.72$). Vitreous prolapse was observed more frequently in Group 2 (14%) than in Group 1 (6%), though the difference was not statistically significant ($p = 0.18$). The use of capsular tension rings (CTRs) was significantly higher in Group 2 (40%) compared to Group 1 (16%), with a p-value of 0.002. The need for iris hooks was more frequent in Group 2 (18%) compared to Group 1 (10%), but this difference was not statistically significant ($p = 0.25$).

Intraoperative Complications [Table 3]

Intraoperative complications were more prevalent in Group 2 (PXG). Posterior capsular rupture occurred in 14% of patients in Group 2 compared to 4% in Group 1, though this difference approached but did not reach statistical significance ($p = 0.08$). Zonular dehiscence was significantly more common in Group

ISSN (O): 2687-5365; ISSN (P): 2753-6556

2, affecting 32% of patients compared to 10% in Group 1 (p = 0.002). The need for anterior vitrectomy arose in 12% of patients in Group 2 and 4% in Group 1; however, this difference was not statistically significant (p = 0.13).

Postoperative Complications [Table 4]

Postoperative complications were more frequent in Group 2. IOP spikes were observed in 26% of patients in Group 2 compared to 10% in Group 1, and this difference was statistically significant (p = 0.04). Corneal edema was seen in 22% of Group 2 patients compared to 12% in Group 1, though the difference was not significant (p = 0.22). Delayed visual recovery occurred in 18% of Group 2 patients compared to 6% in Group 1, with the difference approaching but not reaching statistical significance (p = 0.08).

Visual and IOP Outcomes at Follow-up [Table 5]

At follow-up, Group 2 patients exhibited slower visual recovery and less improvement in IOP compared to Group 1. At 1 month, the mean BCVA improved to 0.32 ± 0.11 in Group 1 and 0.40 ± 0.12 in Group 2, with a significant difference between the groups (p = 0.02). By 3 months, BCVA further improved to 0.22 ± 0.09 in Group 1 and 0.30 ± 0.10 in Group 2, with the difference remaining significant (p = 0.03). Mean IOP at 1 month was significantly lower in Group 1 (15.2 ± 3.0 mmHg) compared to Group 2 (17.8 ± 3.5 mmHg; p = 0.01). At 3 months, IOP stabilized further in both groups but remained significantly lower in Group 1 (14.8 ± 2.9 mmHg) than in Group 2 (17.0 ± 3.2 mmHg; p = 0.03).

Use of Additional Surgical Interventions [Table 6]

Additional surgical interventions were more commonly required in Group 2. The use of capsular tension rings (CTRs) was significantly higher in Group 2 (40%) compared to Group 1 (16%; p = 0.002). Similarly, iris hooks were needed more frequently in Group 2 (18%) than in Group 1 (10%), though the difference was not statistically significant (p = 0.25). Anterior vitrectomy was required in 12% of Group 2 cases and 4% of Group 1 cases, but this difference was also not statistically significant (p = 0.13).

Table 1: Baseline Characteristics of Study Participants.

Parameter	Group 1 (PXF)	Group 2 (PXG)	p-value
Number of patients (n)	50 (100%)	50 (100%)	-
Mean age (years)	65.4 ± 7.2	66.8 ± 6.9	0.35
Male-to-female ratio	28:22 (56%:44%)	30:20 (60%:40%)	0.67
Mean BCVA (logMAR)	0.72 ± 0.15	0.80 ± 0.18	0.04
Mean preoperative IOP (mmHg)	16.3 ± 3.1	22.7 ± 4.5	<0.001
Mean axial length (mm)	23.4 ± 0.8	23.1 ± 0.9	0.15

Table 2: Intraoperative Surgical Challenges

Surgical Challenge	Group 1 (PXF)	Group 2 (PXG)	p-value
Zonular weakness	9 (18%)	21 (42%)	0.003
Capsular instability	6 (12%)	18 (36%)	0.004
IFIS	4 (8%)	5 (10%)	0.72
Vitreous prolapse	3 (6%)	7 (14%)	0.18
Use of CTRs	8 (16%)	20 (40%)	0.002
Use of iris hooks	5 (10%)	9 (18%)	0.25

Table 3: Intraoperative Complications

Complication	Group 1 (PXF)	Group 2 (PXG)	p-value
Posterior capsular rupture	2 (4%)	7 (14%)	0.08
Zonular dehiscence	5 (10%)	16 (32%)	0.002
Need for anterior vitrectomy	2 (4%)	6 (12%)	0.13

Table 4: Postoperative Complications

Postoperative Complication	Group 1 (PXF)	Group 2 (PXG)	p-value
IOP spikes	5 (10%)	13 (26%)	0.04
Corneal edema	6 (12%)	11 (22%)	0.22
Delayed visual recovery	3 (6%)	9 (18%)	0.08

Table 5: Visual and IOP Outcomes at Follow-up

Parameter	Group 1 (PXF)	Group 2 (PXG)	p-value
BCVA at 1 month (logMAR)	0.32 ± 0.11	0.40 ± 0.12	0.02
BCVA at 3 months (logMAR)	0.22 ± 0.09	0.30 ± 0.10	0.03
Mean IOP at 1 month (mmHg)	15.2 ± 3.0	17.8 ± 3.5	0.01
Mean IOP at 3 months (mmHg)	14.8 ± 2.9	17.0 ± 3.2	0.03

Table 6: Use of Additional Surgical Interventions

Surgical Intervention	Group 1 (PXF)	Group 2 (PXG)	p-value
CTRs	8 (16%)	20 (40%)	0.002
Iris hooks	5 (10%)	9 (18%)	0.25
Anterior vitrectomy	2 (4%)	6 (12%)	0.13

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

The baseline characteristics showed comparable demographic profiles between the two groups. The mean age in both groups was consistent with the findings of other studies, such as Shingleton et al. (2008), who reported a mean age of 68 ± 6 years in patients with pseudoexfoliation syndrome (PXF) undergoing cataract surgery.[9] The male-to-female ratio was also balanced and similar to findings by Konopińska et al. (2021), who noted no significant gender-based differences in their study of PXF and pseudoexfoliation glaucoma (PXG).[10] Preoperative BCVA was significantly worse in Group 2 (PXG) compared to Group 1 (PXF), consistent with the understanding that elevated intraocular pressure (IOP) and glaucomatous optic neuropathy in PXG can contribute to decreased visual function before surgery. The significantly higher preoperative IOP in Group 2 (22.7 ± 4.5 mmHg) compared to Group 1 (16.3 ± 3.1 mmHg; $p < 0.001$) aligns with the findings of Pohjalainen et al. (2001), who observed higher IOP in PXG patients, reflecting the more severe clinical presentation of this group.[11] Intraoperative challenges were more frequent in the PXG group. Zonular weakness (42% vs. 18%; $p = 0.003$) and capsular instability (36% vs. 12%; $p = 0.004$) were significantly more prevalent in Group 2. These findings are comparable to the study by Rao et al. (2019), who reported a 30–40% incidence of zonular compromise in PXG patients, highlighting the increased risk due to chronic IOP elevation and deposition of pseudoexfoliative material, which weakens the zonules over time.[12] Intraoperative floppy iris syndrome (IFIS) was relatively rare, with no significant difference between groups ($p = 0.72$). Similar results were observed by Chang et al. (2005), where IFIS was not significantly associated with pseudoexfoliation but rather linked to systemic medications like alpha-blockers.[13] The use of capsular tension rings (CTRs) was significantly higher in Group 2 (40% vs. 16%; $p = 0.002$), in line with prior studies like Prasad et al. (2016), who emphasized the importance of CTRs in managing zonular instability in PXG patients. The need for iris hooks (18% vs. 10%; $p = 0.25$) was more common in Group 2, though not statistically significant, reflecting the need for additional pupil expansion tools in cases of IFIS or poor pupil dilation.[14] Posterior capsular rupture occurred in 14% of PXG cases compared to 4% in PXF cases, a difference that approached statistical significance ($p = 0.08$). This aligns with Shingleton et al. (2008), who reported a 12–15% risk of capsular rupture in PXG cases due to capsular fragility. Zonular dehiscence was significantly more common in PXG patients (32% vs. 10%; $p = 0.002$), consistent with studies highlighting chronic zonular stress in glaucomatous eyes.[9] The need for anterior vitrectomy, although more frequent in Group 2 (12% vs. 4%; $p = 0.13$), was not statistically significant, likely reflecting the small sample size. Studies like Gogate et al. (2017) also reported higher rates of vitreous loss in PXG cases due to increased intraoperative risks.[15] Postoperative complications were more common in the PXG group. IOP spikes were observed in 26% of PXG cases compared to 10% in PXF cases, a significant difference ($p = 0.04$). This finding supports the work of Shingleton et al. (2008), who highlighted the risk of IOP fluctuations in PXG patients postoperatively.[9] Corneal edema (22% vs. 12%; $p = 0.22$) was more frequent in PXG patients, consistent with studies noting compromised corneal endothelial function in glaucomatous eyes due to chronic stress (Lindberg et al., 2008).[16] Delayed visual recovery was more common in Group 2 (18% vs. 6%; $p = 0.08$), reflecting the increased surgical challenges and pre-existing optic nerve damage in PXG patients. This aligns with the findings of Pohjalainen et al. (2001), who reported slower visual improvement in PXG cases compared to PXF cases.[11] At follow-up, Group 2 (PXG) exhibited slower visual recovery and less improvement in IOP compared to Group 1 (PXF). At 1 month, BCVA improved significantly in both groups, though Group 1 had better outcomes (0.32 ± 0.11 vs. 0.40 ± 0.12; $p = 0.02$). Similar trends were noted at 3 months (0.22 ± 0.09 vs. 0.30 ± 0.10; $p = 0.03$). These results align with Rao et al. (2019), who observed slower BCVA recovery in PXG patients due to pre-existing optic nerve damage.[12] IOP reduction was achieved in both groups, but PXG patients had persistently higher IOP at both 1 month (17.8 ± 3.5 mmHg vs. 15.2 ± 3.0 mmHg; $p = 0.01$) and 3 months (17.0 ± 3.2 mmHg vs. 14.8 ± 2.9 mmHg; $p = 0.03$). This corroborates studies by Konopińska et al. (2021), who reported that PXG patients often require additional postoperative interventions to achieve target IOP levels.[10] The use of CTRs was significantly higher in Group 2 (40% vs. 16%; $p = 0.002$), consistent with Prasad et al. (2016), who recommended CTRs in cases of zonular instability. Similarly, iris hooks were used more frequently in PXG cases (18% vs. 10%; $p = 0.25$), though the difference was not statistically significant. The need for anterior vitrectomy was higher in PXG cases (12% vs. 4%; $p = 0.13$), reflecting the increased risk of complications in these patients.[14]

CONCLUSION

In conclusion, this study highlights the increased surgical complexity and higher complication rates in cataract surgery among patients with pseudoexfoliation glaucoma (PXG) compared to pseudoexfoliation syndrome (PXF). PXG patients exhibited significantly more zonular weakness, capsular instability, and the need for additional surgical interventions, such as capsular tension rings, resulting in slower visual recovery and higher postoperative intraocular pressure. While both groups require meticulous surgical planning, PXG

ISSN (O): 2687-5365; ISSN (P): 2753-6556

cases demand heightened intraoperative vigilance and tailored management strategies. These findings emphasize the need for advanced surgical techniques and individualized approaches to optimize outcomes in pseudoexfoliation-related cataract surgeries.

REFERENCES

1. Kumar S, Ram J, Sukhija J, Severia S. Cataract surgery in eyes with pseudoexfoliation (PEX) syndrome. Adv Ophthalmol Vis Syst. 2016;4(5):00122. doi:10.15406/aovs.2016.04.00122
2. Shah M, Vasavada A, Praveen MR, et al. Pseudoexfoliation syndrome: a dreaded complication or another routine case? Cataract Refract Surg Today. 2021;21(4):45-47.
3. Belovay GW, Varma DK, Ahmed IIK. Cataract surgery in pseudoexfoliation syndrome. Curr Opin Ophthalmol. 2010;21(1):25-34. doi:10.1097/ICU.0b013e328332f814.
4. Detorakis ET, Bontzos G, Drakonaki EE, Spandidos DA. Changes in peri-ocular anatomy and physiology in pseudoexfoliation syndrome (Review). Exp Ther Med. 2021;21(6):650. doi:10.3892/etm.2021.10082.
5. Lau S, Jarstad A, Khorram D, Oliva M. Managing pseudoexfoliation during manual small-incision cataract surgery. Cataract Refract Surg Today. 2020;August:52-54.
6. Sangal N. Postoperative considerations for pseudoexfoliation after cataract surgery. Optometry Times. 2013;5(6):24-26.
7. Arbisser LB. Surgical management of pseudoexfoliation and prevention of the impending epidemic of pseudophakic bag-lens subluxation. Am Acad Ophthalmol. 2010;March:1-5.
8. Shah M, Vasavada A, Praveen MR, et al. Pseudoexfoliation syndrome: a dreaded complication or another routine case? Cataract Refract Surg Today. 2021;April:45-47.
9. Shingleton BJ, Crandall AS, Ahmed IIK. Pseudoexfoliation and the cataract surgeon: Preoperative, intraoperative, and postoperative issues related to intraocular pressure, cataract, and intraocular lenses. J Cataract Refract Surg. 2008;34(10):1811-1820. doi:10.1016/j.jcrs.2008.07.031
10. Konopińska J, Deniziak M, Saeed E, Kozera M, Mariak Z, Rękas M. Characteristics and management of cataract surgery complications in pseudoexfoliation syndrome and pseudoexfoliation glaucoma: A systematic review. J Clin Med. 2021;10(6):1191. doi:10.3390/jcm10061191
11. Pohjalainen T, Vesti E, Uusitalo RJ, Laatikainen L. Long-term prognosis of visual field and intraocular pressure in pseudoexfoliation glaucoma. Ophthalmology. 2001;108(10):1782-1787. doi:10.1016/S0161-6420(01)00709-5
12. Rao SK, Aravind P, Harsha A, Sangwan V, Sinha R. Management of zonular weakness during cataract surgery: An overview. Indian J Ophthalmol. 2019;67(12):1973-1981. doi:10.4103/ijo.IJO_1798_18
13. Chang DF, Campbell JR. Intraoperative floppy iris syndrome associated with tamsulosin. J Cataract Refract Surg. 2005;31(4):664-673. doi:10.1016/j.jcrs.2004.12.052
14. Prasad S, Foster G, Goel S, Wong V, Hounsome B, Ang GS. Use of capsular tension rings in pseudoexfoliation syndrome and glaucoma: Meta-analysis of randomized controlled trials. J Cataract Refract Surg. 2016;42(11):1556-1564. doi:10.1016/j.jcrs.2016.09.012
15. Gogate PM, Deshpande M, Wormald RP. Is cataract surgery in adults with pseudoexfoliation more challenging? Results of a population-based case-control study in Western India. Indian J Ophthalmol. 2017;65(12):1429-1435. doi:10.4103/ijo.IJO_619_17
16. Lindberg JG, Kivelä T, Tarkkanen A. Corneal endothelial cell density and morphology in patients with exfoliation syndrome. Acta Ophthalmol. 2008;86(8):878-882. doi:10.1111/j.1755-3768.2008.01408.x

ISSN (O): 2687-5365; ISSN (P): 2753-6556