Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/adthkx58

PREOPERATIVE ASSESSMENT OF POSTERIOR SEGMENT PATHOLOGIES IN CATARACT PATIENTS USING B-SCAN ULTRASONOGRAPHY

Saad Muhammad Iqbal[1], Anam Younas[2*], Muhammad Tariq Khan[1], Sara Hira[3], Aleena Nadeem[4], Nabila Zulfiqar[2]

[1] Department of Ophthalmology, Akhtar Saeed Medical and Dental College, Lahore, Pakistan
[2*] Department of Ophthalmology, Fatima Memorial Hospital, Lahore, Pakistan
[3] Sardar Trust Eye Hospital, Lahore, Pakistan
[4] University of Health Sciences, Lahore, Pakistan

***Correspondence Author:** Anam Younas
*MBBS, FCPS, Department of Ophthalmology, Fatima Memorial Hospital, Lahore, Pakistan
Email: younasanam01@gmail.com

ABSTRACT

Background & Objective: B-scan ultrasonography is routinely used to evaluate posterior segment pathology in patients with dense cataracts. However, data on the incidence and spectrum of these findings in the Pakistani population remain limited. This study aims to report the frequency of posterior segment abnormalities in this cohort.

Methodology: This retrospective observational study was conducted at a tertiary care hospital in between November 2022 and January 2025. Adult patients (≥18 years) scheduled for cataract surgery with an obscured view of the fundus underwent B-scan ultrasonography for preoperative posterior segment evaluation. Data were analyzed using SPSS version 27, with continuous variables presented as mean ± standard deviation (SD) and categorical variables as frequencies and percentages.

Results & Findings: A total of 127 eyes from 127 patients underwent B-scan ultrasonography during the study period. The mean age was 53.95 ± 13.66 years. Of the participants, 90 (70.9%) were male and 37 (29.1%) female. A normal posterior segment was observed in 92 eyes (72.4%). The most common pathological finding was posterior vitreous detachment (PVD) in 23 eyes (18.1%), followed by retinal detachment in 4 eyes (3.1%) and vitreous hemorrhage in 3 eyes (2.36%). ***Conclusion:*** PVD was the most common posterior segment pathology in cataract surgery candidates, followed by retinal detachment and vitreous hemorrhage in local Pakistani population. B-scan ultrasonography proved to be an effective preoperative tool for detecting posterior segment abnormalities, particularly in resource-limited settings.”

Keywords: Cataract, Ultrasound B Scan, posterior segment, posterior vitreous detachment, retinal detachment

INTRODUCTION

Cataracts are responsible for 45.4% of blindness and 38.9% of visual impairment worldwide, affecting approximately 15.2 million blind and 78.8 million visually impaired individuals. The cataract surgical rate (CSR) has been reported from 36 to 12 800 (per million population) across different countries.

[1] Given the global disease burden and variability in cataract surgical rates, effective patient prioritization is essential. Accurate preoperative assessment is critical to identifying those most likely to benefit from surgery, ensuring efficient use of surgical resources, avoiding unnecessary interventions in eyes with limited visual potential, and ultimately enhancing patient outcomes.

B-scan ultrasonography is a non-invasive diagnostic tool used to evaluate posterior segment pathology when direct fundus visualization is obstructed by media opacities. [2] It is also essential in the assessment of ocular trauma, characterization of intraocular and orbital masses, and in preoperative planning and postoperative monitoring of various ocular conditions. In patients with dense cataracts, B-scan ultrasonography plays a vital role by detecting underlying pathologies such as retinal detachment, vitreous hemorrhage, PVD, or intraocular masses that may otherwise go unnoticed. [3] Identifying these conditions before cataract surgery is crucial, as they can significantly influence surgical decision-making, patient counseling, and visual prognosis. Early detection through B-scan ensures that appropriate surgical plans are made and helps prevent unexpected intraoperative or postoperative complications.

Although B-scan ultrasonography is routinely used in the preoperative assessment of cataract patients, there is limited data on the prevalence and spectrum of posterior segment pathologies in the Pakistani population. [4] This study aims to evaluate posterior segment pathologies detected by B-scan ultrasonography in patients with dense cataracts within the local Pakistani population.

MATERIALS AND METHODS

This retrospective observational study was conducted at a tertiary care hospital in Lahore, Pakistan, from November 2022 to January 2025. Informed consent was taken from all the patients. All data were anonymized and handled in accordance with institutional and international ethical standards.

Eligibility Criteria: It included adults (≥18 years) undergoing preoperative B-scan ultrasonography to assess posterior segment pathology when direct fundus visualization was obscured prior to cataract surgery. Patients were excluded if they had active ocular infection or inflammation, ocular trauma or globe rupture, a history of vitreoretinal or glaucoma surgery, silicone oil in the vitreous cavity, or extraocular lesions.

Patient Evaluation: Demographic data, including age and gender, were recorded, along with relevant ocular and medical history. All patients underwent a comprehensive ophthalmic examination, including visual acuity assessment, slit-lamp biomicroscopy, Goldmann applanation tonometry, fundoscopy, and biometry for intraocular lens (IOL) power calculation. B-scan ultrasonography was performed in cases where fundus visualization was not possible due to media opacity.

Procedure: B-scan ultrasonography was performed using the Kaixin KX5600 device with the patient in a supine position. A coupling gel was applied to the probe, and standardized transverse and axial scans were obtained through closed eyelids by a trained ophthalmologist. Care was taken to avoid applying pressure on the globe. All images were saved, and findings were systematically documented.

Statistical Analysis: All statistical analyses were performed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were computed for all variables. Continuous variables were summarized using mean and standard deviation (SD), while categorical variables were presented as frequencies and percentages.

RESULTS & FINDINGS:

A total of 127 eyes from 127 patients underwent B-scan ultrasonography during the study period. The mean age of the patients was 53.95 ± 13.66 years. Of the total study population, 90 patients (70.9%) were male and 37 (29.1%) were female.

B-scan ultrasonography revealed a normal posterior segment in 92 cases (72.44%). Pathological findings involving the posterior segment were observed in the remaining 35 patients (27.55%). The

distribution of specific posterior segment pathologies identified on B-scan ultrasonography is detailed in Table 1.

Finding	n (%)
Normal	92 (72.44)
Posterior Vitreal Detachment (PVD)	23 (18.11)
Partial PVD	1 (0.79)
Vitreous Hemorrhage	3 (2.36)
Coloboma	2 (1.57)
Optic Disc Drusen	1 (0.79)
Retinal Detachment	1 (0.79)
Tractional Retinal Detachment	1 (0.79)
Exudative Retinal Detachment	1 (0.79)
Subtotal Retinal Detachment	1 (0.79)
Thick choroid	1 (0.79)

DISCUSSION

This study evaluated posterior segment pathologies in patients undergoing B-scan ultrasonography as part of the preoperative assessment for cataract surgery. The majority of eyes showed a normal posterior segment, with PVD being the most frequently detected abnormality, followed by retinal detachment and vitreous hemorrhage.

Previous literature has reported a relatively equal distribution of cataract cases between males and females.[5–8] However, our study observed a higher proportion of male patients, consistent with the findings of Boruah and Singh.[9,10] While the higher proportion of male patients in our study may be partly attributed to the convenient sampling method, existing literature presents conflicting data on the incidence of senile cataract. Some studies report a higher prevalence among females, while others indicate greater incidence in males.[11,12] Additionally, Hashemi et al. reported that a greater number of males undergo cataract surgery, which may reflect gender-based differences in health-seeking behavior, access to care, or cultural factors.[1] This underscores the need to explore and address potential barriers that may limit female access to cataract surgical services.

Posterior vitreous detachment (PVD), retinal detachment, and vitreous hemorrhage have been commonly reported in the literature, consistent with the findings of our study.[6,7,9,10,13] Among these, PVD was the most frequently observed posterior segment abnormality. PVD is a common age-related finding with clinical relevance due to its association with retinal tears or detachment, particularly after cataract surgery. Its detection aids in surgical planning, risk assessment, and postoperative counseling. In contrast, Akhter and Parrey reported a higher incidence of vitreous hemorrhage and retinal detachment respectively.[5,14] Although vitreous hemorrhage and retinal detachment were also observed in our cohort, their incidence was lower compared to PVD. Identifying these pathologies preoperatively is critical, as unrecognized retinal detachment or vitreous hemorrhage may significantly impact surgical outcomes and visual prognosis.

Other incidental findings in our study included optic disc drusen, coloboma, and increased choroidal thickness. Optic disc drusen has also been reported by Boruah et al.[9] Additional posterior segment abnormalities documented in the literature include posterior staphyloma, choroidal detachment, persistent hyperplastic primary vitreous (PHPV), retinoblastoma, and choroidal osteoma. [5,7,9] This highlights the broader diagnostic value of B-scan ultrasonography in dense cataracts. These anomalies, though infrequent, may indicate underlying structural conditions that warrant further evaluation and establish a clinical baseline for long-term monitoring.

Our study has several limitations. Being a retrospective, single-center study, the findings may not be generalizable to broader or more diverse populations. The small sample size may also limit the detection of less common posterior segment pathologies. . Future research should prioritize prospective, multicenter studies to enhance the external validity of findings across different demographic and healthcare settings. Notably, in resource-limited environments and low-income countries where access to advanced imaging modalities is restricted, B-scan ultrasonography remains a practical, cost-effective, and valuable diagnostic tool for preoperative assessment.

Conclusion

This study evaluating posterior segment pathologies using B-scan ultrasonography in patients undergoing preoperative assessment for cataract surgery identified posterior vitreous detachment as the most common finding, followed by retinal detachment and vitreous hemorrhage. These results highlight the diagnostic value of B-scan in cases where direct fundus visualization is obscured. Its utility is particularly important in resource-limited settings, where advanced imaging modalities may not be readily available.

REFERENCES

[1] Hashemi H, Fayaz F, Hashemi A, et al. Global prevalence of cataract surgery. Curr Opin Ophthalmol 2025;36:10. https://doi.org/10.1097/ICU.0000000000001092.
[2] Aironi V, Gandage S. Pictorial essay: B-scan ultrasonography in ocular abnormalities. Indian J Radiol Imaging 2009;19:109–15. https://doi.org/10.4103/0971-3026.50827.
[3] Wu F, Wang Q, Zheng T, et al. Diagnostic accuracy of B scan ultrasound for posterior segment ocular disorders: a meta-analysis. Doc Ophthalmol Adv Ophthalmol 2025;150:73–85. https://doi.org/10.1007/s10633-025-10005-6.
[4] Akhter MS, Abbas MR, Jamal Y, et al. Role of B-Scan Ultrasonography in Cataract Patients; A Single Centered Cross Sectional Study. J Islam Int Med Coll JIIMC 2024;19:240–3.
[5] Akhter MS. Role of B-Scan Ultrasonography in Cataract Patients; A Single Centered CrossSectional Study. J Islam Int Med Coll n.d.;19.
[6] Asim U, Niaz A. Role of Real Time Ultrasound B-Scan in Eyes with Advanced Cataract, by Documenting Frequency of Different Posterior Segment Pathologies n.d.
[7] Karim S, Hamid Rehman, Nazullah. Ultrasonography in Detecting the Posterior Segment Pathology in Pre-Operative Cataract Patient. J Health Rehabil Res 2024;4:1014–8. https://doi.org/10.61919/jhrr.v4i2.949.
[8] Pallamreddy S, Devi Nookala G, Damdamraju M, et al. Posterior segment evaluation by ultrasound B-scan in dense cataract patients – A cross-sectional study in a tertiary hospital. J Dr YSR Univ Health Sci 2023;12:166. https://doi.org/10.4103/jdrntruhs.jdrntruhs_1_23.
[9] Boruah DK, Vishwakarma D, Gogoi P, et al. Utility of High-Resolution Ultrasonography in the Evaluation of Posterior Segment Ocular Lesions Using Sensitivity and Specificity. Acta Medica Litu 2023;30:177–86. https://doi.org/10.15388/Amed.2023.30.2.9.
[10] Singh M, Shukla P. Assessment of incidence of intraocular pathologies detected by B-Scan ultrasound examination in patients having dense cataracts: A clinical study. J Adv Med Dent Sci Res n.d.
[11] Fang R, Yu Y-F, Li E-J, et al. Global, regional, national burden and gender disparity of cataract: findings from the global burden of disease study 2019. BMC Public Health 2022;22:2068. https://doi.org/10.1186/s12889-022-14491-0.
[12] Geiger MD, Lynch AM, Palestine AG, et al. Are there sex-based disparities in cataract surgery? Int J Ophthalmol 2024;17:137–43. https://doi.org/10.18240/ijo.2024.01.19.
[13] Ngweme G, Bambi MTN, Lutete LF, et al. Ophthalmic Ultrasonography in Sub-Saharan Africa—A Kinshasa Experience. Diagnostics 2021;11:2009. https://doi.org/10.3390/diagnostics11112009.
[14] Mujeeb Ur Rehman Parrey MOB. POSTERIOR SEGMENT EYE DISEASES DETECTED BY B-SCAN ULTRASONOGRAPHY IN ADVANCED CATARACT 2019. https://doi.org/10.5281/ZENODO.3236391.