



PRE-OPERATIVE POSTERIOR SEGMENT EVALUATION USING B-SCAN ULTRASONOGRAPHY IN PATIENTS WITH DENSE CATARACT – A CROSS-SECTIONAL STUDY

Ophthalmology

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ABSTRACT

Background: Dense cataracts often preclude direct visualization of the posterior segment, limiting the ability of clinicians to detect coexisting ocular pathologies that may significantly influence surgical planning and postoperative visual outcomes. B-scan ultrasonography is a valuable diagnostic tool for evaluating the posterior segment in the presence of opaque ocular media. **Objective:** To determine the prevalence and spectrum of occult posterior segment pathologies in patients with dense senile cataracts using B-scan ultrasonography. **Methods:** This hospital-based cross-sectional study included 35 eyes of 35 consecutive patients aged ≥ 50 years presenting with dense senile cataract and absent or poor fundal glow. Patients with previous ocular surgery, corneal opacity hindering ultrasonography, or pre-diagnosed posterior segment disease were excluded. All participants underwent standardized B-scan ultrasonography using an 8–10 MHz probe. Axial, horizontal, and vertical scans were performed, and findings were categorized as normal or abnormal. Data were analysed using descriptive statistics, and a chi-square test was used to compare normal versus abnormal findings. **Results:** Of the 35 eyes evaluated, 23 (65.71%) demonstrated a normal posterior segment, while 12 (34.28%) revealed at least one abnormality. The most common pathology was vitreous haemorrhage ($n=5$, 14.2%), followed by retinal detachment ($n=3$, 8.57%), papilledema ($n=2$, 5.71%), posterior vitreous detachment ($n=2$, 5.71%), choroidal melanoma ($n=1$, 2.85%), and disc oedema ($n=1$, 2.85%). **Conclusion:** Over one-third of eyes with dense cataracts harbour clinically significant hidden posterior segment pathologies. Routine pre-operative B-scan ultrasonography is essential for accurate prognostication, patient counselling, and surgical planning.

KEYWORDS

Dense cataract, B-scan ultrasonography, Vitreous haemorrhage, Rhegmatogenous retinal detachment and Tractional retinal detachment, posterior vitreous detachment, choroidal melanoma and choroidal detachment.

INTRODUCTION:

Cataract remains the leading cause of blindness worldwide, and dense cataracts often prevent visualization of the posterior segment using routine examination [1]. In such cases, critical structures like the vitreous, retina, and optic nerve cannot be assessed, limiting surgical planning and prognostication [2]. B-scan ultrasonography serves as a reliable, non-invasive tool for detecting hidden pathologies such as retinal detachment, vitreous haemorrhage, and intraocular tumours [3,4]. This study aims to determine the frequency and types of posterior segment abnormalities in patients with dense cataracts in a tertiary care setting.

MATERIALS AND METHODS:

This descriptive cross-sectional study included 35 consecutive patients (≥ 50 years) with dense senile cataracts characterized by absent/poor fundal glow. Patients with prior ocular surgery, corneal opacities limiting B-scan, or known posterior segment disease were excluded. Ethical approval was obtained. After informed consent, all subjects underwent detailed ophthalmic evaluation followed by B-scan ultrasonography using an 8–10 MHz probe in axial, horizontal, and vertical planes. Findings were documented and analysed using descriptive statistics.

Inclusion Criteria:

- Mature, Hypermature, Brune scent cataracts
- Age ≥ 50 years
- Poor/no fundal glow

Exclusion Criteria

- Prior vitreoretinal surgery
- Corneal opacity preventing B-scan
- Pre-diagnosed posterior segment disease

Data Collection And B-Scan Procedure:

After obtaining informed consent, patients underwent a comprehensive ophthalmic evaluation. B-scan ultrasonography was performed in the supine position using a standard ophthalmic A/B-scan unit equipped with an 8–10 MHz probe. Acoustic coupling gel was applied to the closed eyelid, and the posterior segment was scanned in axial, horizontal, and vertical planes to ensure full coverage of the globe.

RESULTS:

Among 35 eyes, 23 (65.7%) had a normal posterior segment, while 12 (34.3%) showed detectable pathologies on B-scan. Overall B-Scan Findings the majority of the eyes, 23 (65.71%), showed a structurally normal posterior segment (Table 1). However, a significant minority, 12 eyes (34.28%), demonstrated one or more distinct pathologies.

Table 1: Overall Posterior Segment Findings On B-Scan (N=35)

Finding Category	Number of Patients (n)	Percentage (%)
Normal Posterior Segment	23	65.71%
Pathology Detected	12	34.28%
Total	35	100.0%

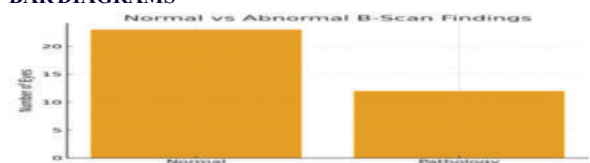
Specific Pathologies Detected The spectrum of pathologies detected among the 12 abnormal eyes is presented in Table 2. Vitreous Haemorrhage (VH) was the most common abnormality.

Table 2: Specific Pathologies Detected In Abnormal Eyes (n=12)

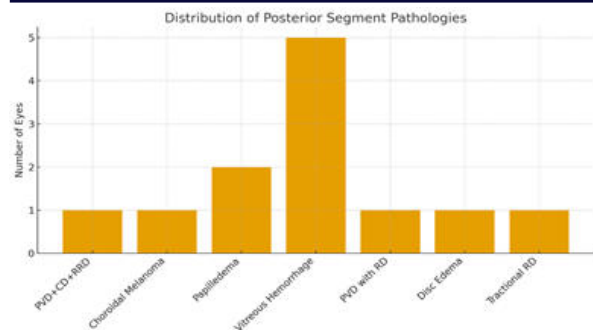
Specific Pathology	Number of Eyes (n)	Percentage of Total Sample (N=35)
Posterior Vitreous Detachment with choroidal detachment and rhegmatogenous retinal detachment	1	2.85%
CHOROIDAL MELANOMA	1	2.85%
PAPILLEDEMA	2	2.9%
Vitreous Haemorrhage (VH)	5	14.2%
PVD with RD	1	2.85%
DISC EDEMA	1	2.85%
TRACTIONAL RD	1	2.85%

Some patients may have presented with multiple pathologies (e.g., PVD with RRD and CD) and (PVD with RD) though in this sample, findings were treated individually.

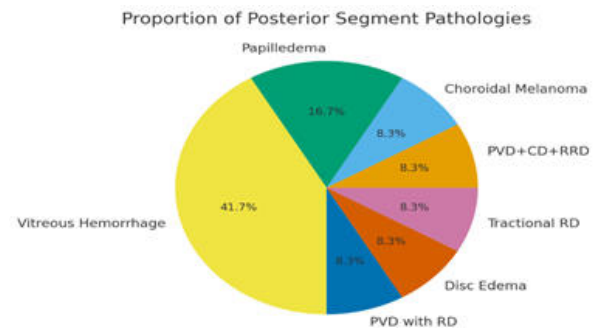
BAR DIAGRAMS



Bar Diagram 1



Bar Diagram 2



Pie Chart 1

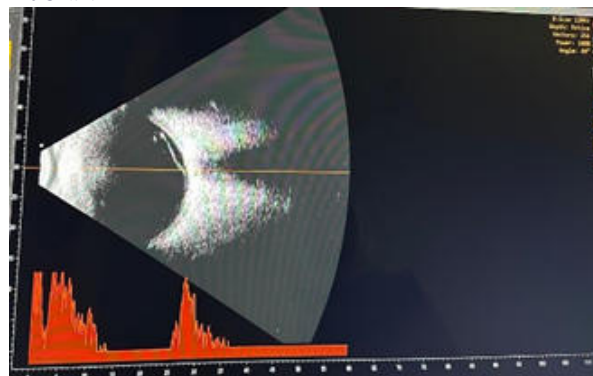


Figure 1: Tractional Retinal Detachment

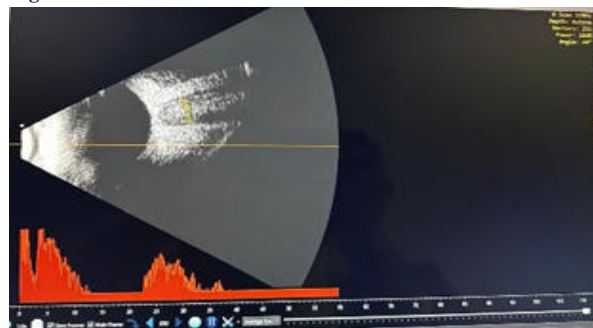


Figure 2: Disc Edema

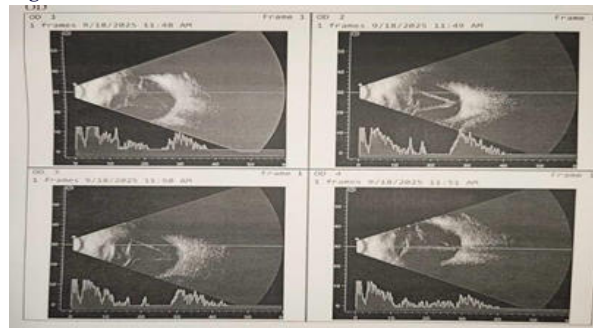


Fig 3: PVD With RD

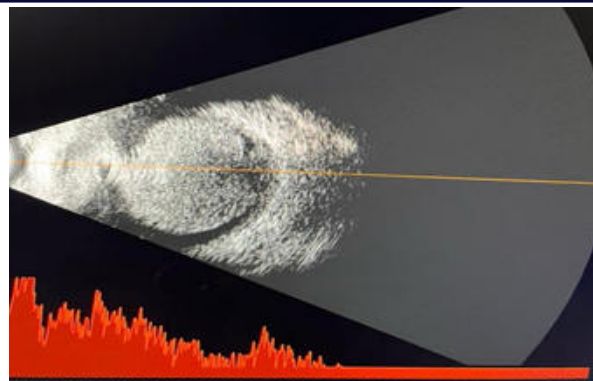


Fig 4: Choroidal Melanoma

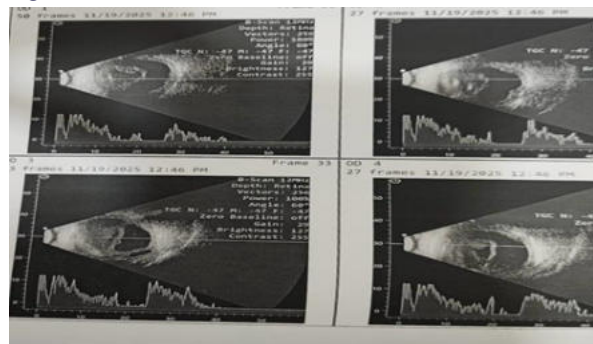


Fig 5: RRD With CD With PVD

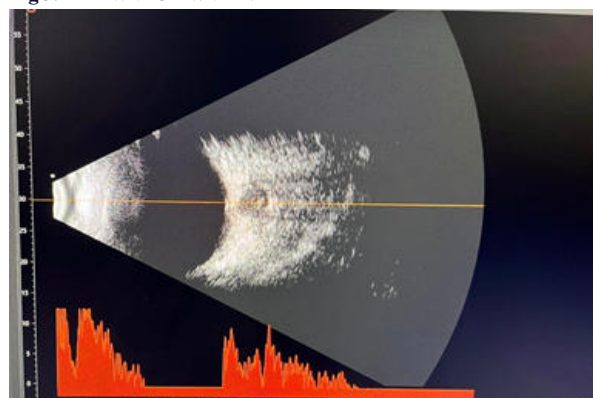


Figure 6: Pappiledema OD

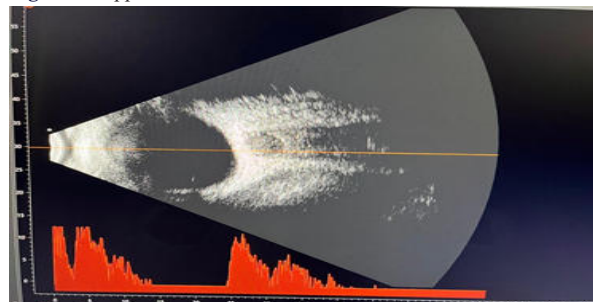


Figure 7: Pappiledema OS

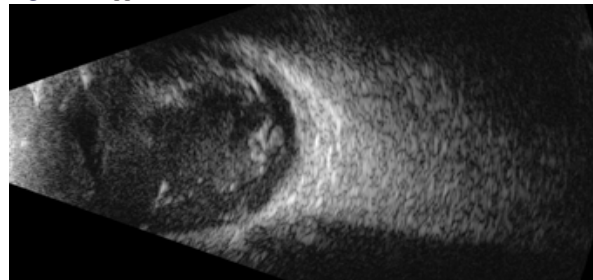


Figure 8: Vitreous Haemorrhage

DISCUSSION:

B-scan ultrasonography is a crucial component of the pre-operative assessment of dense cataracts. In our study, posterior segment pathology was detected in 34.28% of cases, which is consistent with reported ranges in international literature (ranging from 7% to over 50% depending on patient selection and trauma status) [2, 5, 6]. Retinal detachment, identified in 8.57%, is particularly important, as pre-operative detection enables planned vitrectomy or combined surgery rather than routine cataract extraction, preventing delayed management and poor outcomes [7]. Vitreous haemorrhage, seen in 14.2%, also influences surgical planning and may signal underlying proliferative diabetic retinopathy. Posterior vitreous detachment, though not a contraindication, remains essential to document for proper counselling and realistic post-operative expectations. The main limitations of this study are its small sample size (n=35) and cross-sectional design, limiting correlation with post-operative visual outcomes. Despite this, the findings reinforce that B-scan ultrasonography is an indispensable, safe, and cost-effective tool for identifying occult pathology and optimizing surgical planning in dense cataract patients [8].

CONCLUSION:

Routine pre-operative B-scan in dense cataracts is essential. Our study found a high rate of occult posterior segment pathology (34.28%). B-scan detects critical conditions such as retinal detachment, vitreous haemorrhage, and tumours—findings that significantly influence surgical planning and improve patient care and post-operative visual prognosis.

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Conflict Of Interest- NIL

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