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Research Article

B SCAN ULTRASONOGRAPHY IN PREOPERATIVE EVALUATION OF POSTERIOR SEGMENT IN DENSE CATARACT-A CROSS SECTIONAL STUDY

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Abstract

Background: In patients with dense or mature cataract, fundus view maybe obscured or not visible at all .In these cases, B scan ultrasonography before surgery can give vital information regarding the status of vitreous , retina, choroid and sclera B scan ultrasonography is one of the most efficient, reliable, non invasive and inexpensive diagnostic method for evaluation of ocular structure, B-scan can effectively detect an unsuspected posterior segment by displaying abnormal structure in cross section.

Aim: To determine the structural abnormalities of the posterior segment in dense cataract using B-scan ultrasonography.

Methods: A cross-sectional study was conducted on 175 patients who underwent uncomplicated cataract surgery at Rohilkhand Medical College, Bareilly, Dense cataract that obscured the visualization of fundus, irrespective of gender and age(above 18 year and below 80 year) are Include in the study.

Results: Preoperative B-scan ultrasonography in our study detected a normal posterior segment in 40.6% of eyes, vitreous degeneration in 32.0%, and posterior vitreous detachment (PVD) in 25.1%; rare but clinically important pathologies (vitreous haemorrhage, retinal detachment, asteroid hyalosis, posterior staphyloma) were each present in ~0.6% of eyes. This spectrum dominated by degenerative vitreous changes and occasional definitive pathology mirrors other hospital-based study in which B-scan commonly reveals vitreous opacities/PVD and less frequently major surgical contraindications such as retinal detachment.

Conclusion: This study clearly demonstrates that B-scan ultrasonography is an essential, reliable, and accurate diagnostic tool for evaluating the posterior segment in dense cataracts where fundus visualization is not possible, It effectively identifies hidden vitreous and retinal abnormalities, many of which significantly influence surgical decision-making and postoperative visual prognosis.

Key Words: B scan ultra sonography, Dense cataract, Posterior segment pathology, Preoperative evaluation, Retinal detachment, Cross sectional study

INTRODUCTION

The recent estimates from the World Health Organization reveal that 47.8% of global blindness is due to cataract and in the south Asia region which includes India, 51% of blindness is due to cataract [1].

As per national program of control of blindness and visual impairment, the incidence of cataract in India is 0.4 to 0.5 % [2] In patients with dense or mature cataract, fundus view maybe obscured or not visible at all. In these cases, B scan ultrasonography before surgery can give vital information regarding the status of vitreous, retina, choroid and sclera [3,4,5].

B scan ultrasonography is one of the most efficient, reliable, non invasive and inexpensive diagnostic method for evaluation of ocular structure.

B-scan can effectively detect an unsuspected posterior segment by displaying abnormal structure in cross section.

The diagnostic ophthalmic ultrasound had frequency varied from 8 mhz to 10 mhz in detecting posterior segment. Over the last three-decade, ultrasonography advancement enabled the investigation of eye posterior segment in opaque media. With media opacification, the posterior segment can be evaluated with commonly use cataract mode [8].

Posterior vitreous detachment, neoplasia, vitreous haemorrhage, retinal detachment and intraocular foreign body are different posterior segment pathology recorded on B-scan [9,10] With the understanding of the indication for ultrasonography and proper examination technique , a vast amount of information can be gathered ,which would not be possible with clinical examination alone in a case of dense cataract [11]

Since visual outcome in cataract is most important. Therefore this study helps in pre operative evaluation of posterior segment in dense cataract. Also a very few studies have been done in pre operative evaluation of posterior segment in dense cataract.

AIM AND OBJECTIVE

AIM

To determine the structural abnormalities of the posterior segment in dense cataract using B-scan ultrasonography.

OBJECTIVES

1. To assess the preoperative posterior segment pathology like posterior vitreous detachment, , posterior staphyloma, vitreous haemorrhage, and asteroid hyalosis
2. To compare the pre operative B-scan finding with the post operative fundus finding.
3. To assess axial length of the eyeball in posterior staphyloma cases as diagnosed in B-scan.
4. To counsel the patient pre-operatively about posterior segment pathology which may need a treatment later.

MATERIAL AND METHODS

PLACE OF STUDY

This shall be a cross sectional study in 175 patients attending the OPD at Department of ophthalmology, Rohilkhand Medical College and Hospital, Bareilly, U.P.

INCLUSION CRITERIA

1. All patient undergoing cataract surgery whose fundus evaluation is not possible pre-operatively due to dense cataract

2. In patients where fundus cannot be viewed by using indirect ophthalmoscopy
3. All patients with dense cataract in age group above 18 years.
4. All patient giving informed consent.

EXCLUSION CRITERIA

1. Patient with active ocular surface infection
2. Old or recent penetrating or blunt orbital trauma
3. Traumatic cataract
4. Old case of posterior segment pathology like diabetic retinopathy, hypertensive retinopathy, retinal detachment
5. Media opacities (example corneal opacity due to anterior segment pathologies)

METHODOLOGY

• All patients coming to Eye OPD at Rohilkhand medical college and hospital, Bareilly which fulfilled the inclusion and exclusion criteria.

• Dense cataract that obscured the visualization of fundus, irrespective of gender and age[above 18 years and below 80years] are included in the study

• A details history is obtained then vision assessment is done by using snellen vision charts and anterior segment evaluation using slit lamp biomicroscope

• Intraocular pressure is done using Goldmann applanation tonometer. Axial length measurement using A-scan and corneal curvature using keratometer is taken for intraocular lens power calculation

• Written consent will be taken from all the patients with dense cataract who fulfill the inclusion criteria for B-SCAN

• B scan ultrasound of each individual is recorded. Individuals are examined in lying position on the table and contact method is used. Coupling gel is applied and a probe is placed on the closed eyelid. B scan ultrasound took images of different section such as longitudinal, axial, and transverse section. Resolution of the image is optimized by maintaining adequate intensity with lowest possible decibel gain.

• Any structural abnormality finding in B-scan is noted

OBSERVATION AND RESULTS

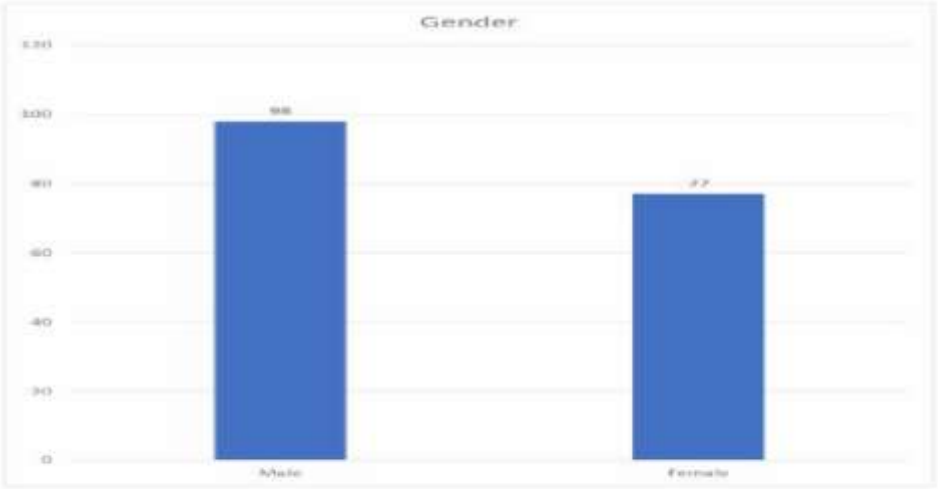

Figure 2: Gender Distribution of Study Subjects

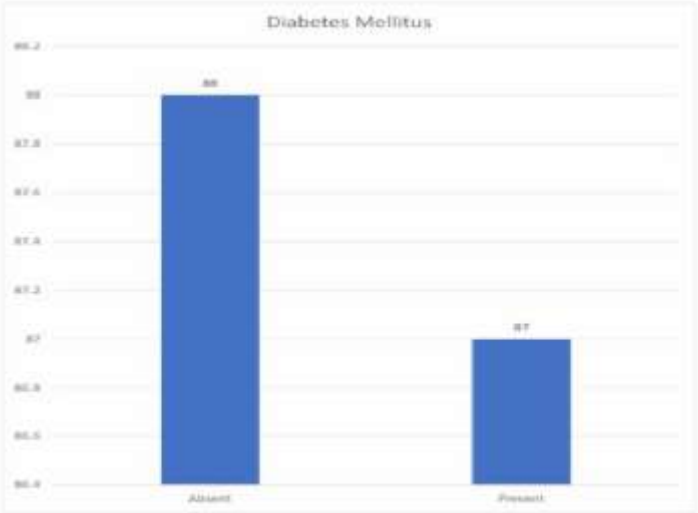

Figure 4: Distribution of Diabetes Mellitus among Study Subjects

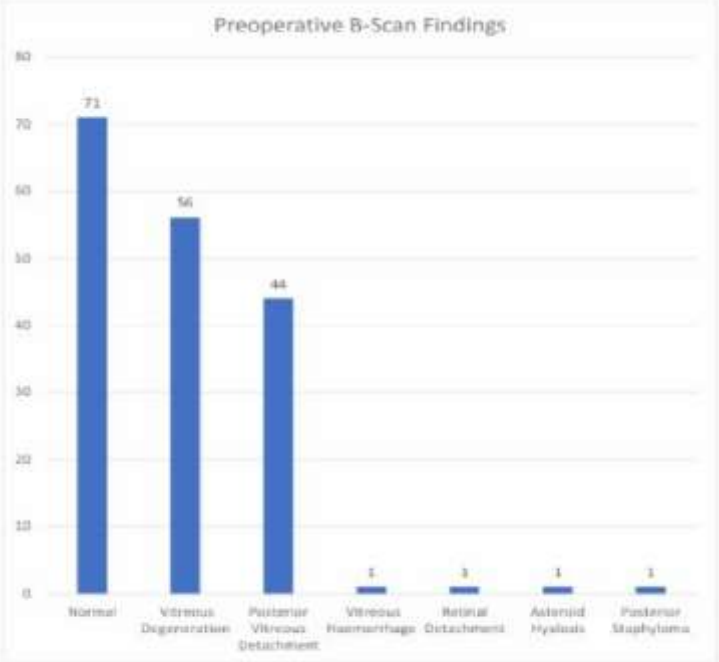

Figure 6: Preoperative B-Scan Findings

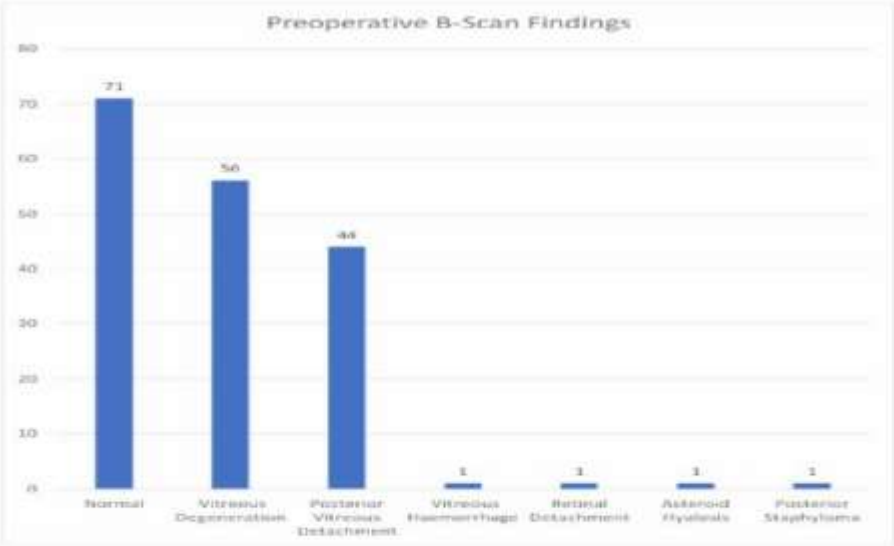

Figure 6: Preoperative B-Scan Findings

Table 7: Postoperative Fundus Findings

Postoperative Fundus Findings	Frequency	Percentage (%)
Normal	93	53.14
PVD + Weiss Ring	40	22.86
Diabetic Retinopathy	15	8.57
Cupping	14	8.0
Hypertensive Retinopathy	5	2.86
Vitreous Degeneration	4	2.29
No Fundus Detail Seen	1	0.57
Retinal Detachment + Myopic Disc	1	0.57
Asteroid Hyalosis	1	0.57
Posterior Staphyloma	1	0.57
Total	175	0.00

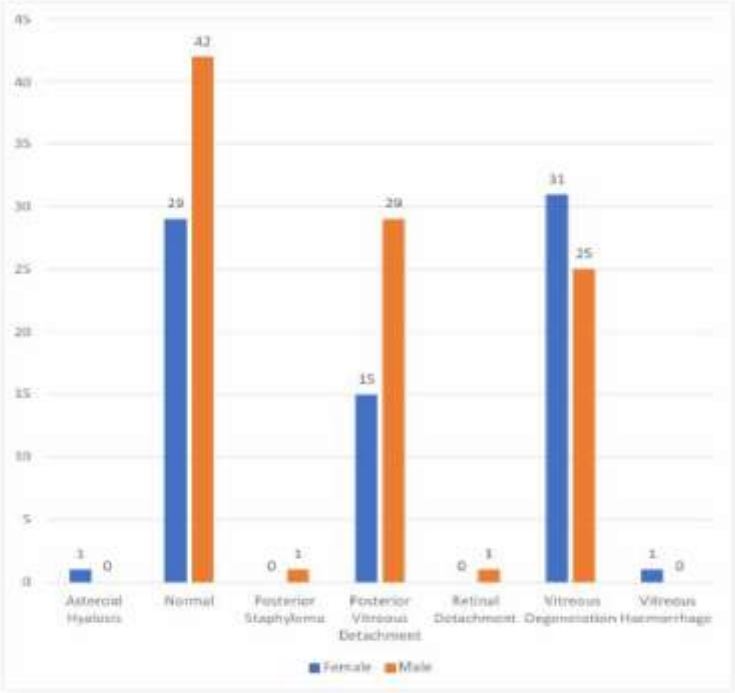

Figure 9: Gender-wise Distribution of Preoperative B-Scan Findings

Table 10: Type of Cataract vs Preoperative B-Scan Findings

Type of Cataract	Asteroid Hyalosis	Normal	Posterior Staphyloma	Posterior Vitreous Detachment	Retinal Detachment	Vitreous Degeneration	Vitreous Haemorrhage	Total	p-value
Dense Post Subcapsular	0	31	0	13	0	17	0	61	
Hypermature Cataract	0	11	0	9	0	7	1	28	
Intumescent Cataract	0	0	0	0	0	2	0	2	0.001
Pre Senile Dense Cataract	0	2	0	2	0	4	0	8	
Senile Mature	1	27	1	20	1	26	0	76	

DISCUSSION

The present cross-sectional study was conducted on 175 patients aged 28-80 years (mean age 62.71 ± 10.07 years) with dense cataracts Males constituted 56% and females 44%. The most common cataract types were senile mature cataract (43.43%), dense posterior subcapsular cataract (34.86%), and hypermature cataract (16%).

Systemic comorbidities were common, with 49.7% diabetics and 34.3% hypertensives, reflecting the strong association between metabolic disorders and cataract progression. Preoperative B-scan ultrasonography in our study detected a normal posterior segment in 40.6% of eyes, vitreous degeneration in 32.0%, and posterior vitreous detachment (PVD) in 25.1%; rare but clinically important pathologies (vitreous haemorrhage, retinal detachment, asteroid hyalosis, posterior staphyloma) were each present in ~0.6% of eyes.

This spectrum dominated by degenerative vitreous changes and occasional definitive pathology mirrors other hospital-based study in which B-scan commonly reveals vitreous opacities/PVD and less frequently major surgical contraindications such as retinal detachment

Postoperative fundus examination showed normal findings in 53.14% of patients. PVD with Weiss ring appeared in 22.86%, diabetic retinopathy in 8.57%, cupping in 8%, and hypertensive retinopathy in 2.86%. We also observed a significant association between the type of cataract and B-scan findings ($p = 0.001$). Senile mature cataracts were commonly associated with PVD and vitreous degeneration, dense posterior subcapsular cataracts more often had normal scans, and hypermature cataracts showed a higher tendency toward PVD and haemorrhagic/degenerative sequelae. These relationships likely reflect differences in disease chronicity and pathophysiology hypermature lenses are long-standing and may be associated with greater vitreoretinal traction or secondary complications — a pattern that has been described in multiple institutional studies.6

CONCLUSION

This study clearly demonstrates that B-scan ultrasonography is an essential, reliable, and accurate diagnostic tool for evaluating the posterior segment in dense cataracts where fundus visualization is not possible. It effectively identifies hidden vitreous and retinal abnormalities, many of which significantly influence surgical decision-making and postoperative visual prognosis. The strong correlation between preoperative B-scan findings and postoperative fundus findings affirms its diagnostic precision. Its widespread adoption would substantially reduce avoidable postoperative visual loss, enhance surgical outcomes, improve patient satisfaction, and support national efforts to reduce cataract-related blindness

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