

Frequency Of Posterior Segmental Pathologies Detected By B-Scan Ultrasound In Preoperative Cataract Patients

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ABSTRACT

Background: When we take dense cataract in consideration, the traditional ophthalmic techniques lacks the access to the posterior segment of the globe so the proper investigation of posterior segment becomes difficult. Ultrasonography is a useful tool for examining the posterior portion of the eye in patients who have cataract and for assessing structural changes in the posterior section of the eye

Objective: To determine the frequency of posterior segmental pathologies detected by B-scan ultrasound in preoperative cataract patients

Material and Methods: A cross sectional study conducted in Ibrahim Trust Eye Hospital. The data was collected using convenient sampling technique from February 2022 to May 2022 after written consent. A sample size of 165 was calculated using mean from previous published studies The patients of all ages were considered .The study included all the patients who had cataract. The equipment used for the evaluation was odm-2100 Ultrasonic A/B Scan

Results: The age group that was most frequently reported were between 51 to 60 (34.5%).The minimum age of 31y and maximum age of 90y were reported .The female patients were more frequent as 91 (55.2%) and males as 74 (44.8%). 92 (55.8%) patients were reported positive for posterior segmental pathologies. The vitreous haemorrhage was most frequent pathology reported as in 50 patients (30.3%) The other pathologies that were reported include Retinal detachment (10.9%), Vitrits (6.7%), Vitreous opacities (4.2%), Posterior vitreous detachment (2.4%) and Choroidal detachment (1.2%)

Conclusion: In conclusion, the current study shows that patients with cataract can have posterior segmental pathologies hidden behind lenticular opacification that is not visible with conventional ophthalmic diagnostic tools.

Keywords: Cataract, Vitreous Opacities, Retinal Detachment, Posterior Segment, B-Scan Ultrasound

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INTRODUCTION

Ultrasound was first used in ophthalmology in 1956 by the American ophthalmologists, Mundt and Hughes.¹ There are two types of modalities used in ultrasound of eye one is A-scan and other is B-scan. In B-scan ultrasonography low-coherence interferometry is used to assess the time delay and intensity of light back-reflected from tissue structures at different depths to produce an image²

In B-scan ultrasound the eye is evaluated generally through the closed eyelid with high-frequency linear transducers, most often 7.5–13.0 MHz with the patient in the supine position. To improve contact, a generous amount of gel should be placed to the closed eyelid³. B-scan is basically used to access different types of posterior segmental pathologies for example vitreous haemorrhage, retinal detachment and different types of cancer, etc.

The most common cause of reversible blindness and visual impairment in the world is cataract.⁴ Cataracts develop slowly and may not be noticeable at first. Cataracts can be detected during a normal eye check-up, which is good news. Even better, surgery can correct your vision and restore your ability to see all of the things you enjoy. The symptoms of cataracts differ depending on the type of cataract you have.⁴

Age-related cataracts are the world's biggest cause of blindness and one of the most prevalent causes of vision loss. Nuclear, cortical, and subcapsular cataracts are the three primary forms of age-related cataracts.⁵ When we take dense cataract in consideration, the traditional ophthalmoscopy lacks the access to the posterior segmental evaluation of the globe so the proper investigation of posterior segment becomes difficult to point out coexisting posterior segmental pathologies that can be present with the cataract which can eventually result in poor prognosis of the patient.⁶ Ultrasonography is a useful tool for examining the posterior portion of the eye in patients who have opaque media and for assessing structural changes in the posterior section of the eye.⁶ The B-scan can be used

to examine the anterior or posterior segment in eyes with opaque media, to measure the dimensions of ocular malignancies, to differentiate PVD and RD from vitreous haemorrhage, to evaluate orbital diseases, and to identify and locate intra-ocular foreign bodies' etc.⁷ Small retinal tears to full retinal detachments are on a spectrum with retinal detachment. Ultrasound shows highly reflecting membranes floating in the vitreous body substance as retinal detachments. Sometimes detached retina can be seen floating and moving inside the vitreous body during the ocular ultrasonography if the patient moves their eye.⁸

Vitreous haemorrhage is mostly common in diabetic and hypertensive patients. Blood extravagating into the vitreous body is referred to as vitreous haemorrhage. The age and extent of the haemorrhage will ultimately affect the ultrasound pictures of vitreous haemorrhage. Using the standard gain setting, small vitreous haemorrhage's might not be seen. By turning up the ultrasound machine's gain, they can occasionally be found. As the hyper echoic blood particles are visible swirling about in the vitreous, this eye movement improves vision of the haemorrhage.⁸ The internal

limiting membrane (ILM) of the retina and the posterior vitreous cortex separate when there is a posterior vitreous detachment (PVD). PVD is the result of the ageing changes in the vitreous and can cause a number of pathologic events at the vitreoretinal interface.⁹ In ultrasound imaging, PVD appears as a linear, echogenic membrane in the posterior compartment. In the presence of bleeding or inflammation, thickening could be seen.

When fluid gathers between the uvea and sclera, choroidal detachment (CD) occurs. Additionally, CD can appear in nanophthalmos in connection with trauma, local or systemic inflammation. If CD affects normal eye function, immediate surgical intervention may be necessary.¹⁰ On Ultrasound imaging CD appears as echogenic bands that project posteriorly from the ciliary bodies and are paired and convex.

MATERIAL AND METHODOLOGY

A cross sectional study was done using convenience sampling technique with the sample size of 165 individuals with all having cataract of both traumatic and senile type belonging to different age groups and of all genders. The individuals with previous history of lenticular surgery and of open globe trauma were excluded. After informed written

consent the data was collected using data collection sheet and was analysed using SPSS 26.0 which was used for completion of results. B-scan ultrasound was performed under supervision of expert Optometrists and Ophthalmologists of diagnostic department of Ibrahim Trust Eye Hospital, Gujranwal. Odm-2100 ultrasonic A/B scan machine and B-Probe of frequency 8Mhz was used. The most of positioning of ultrasound was done in a supine or reclining position during the scan; however, some ocular conditions call for the patient to be seated. The eyes were typically closed throughout the scan, and the probe was covered in coupling jelly. If the eyelids were opened during the scan, topical anaesthesia was applied.

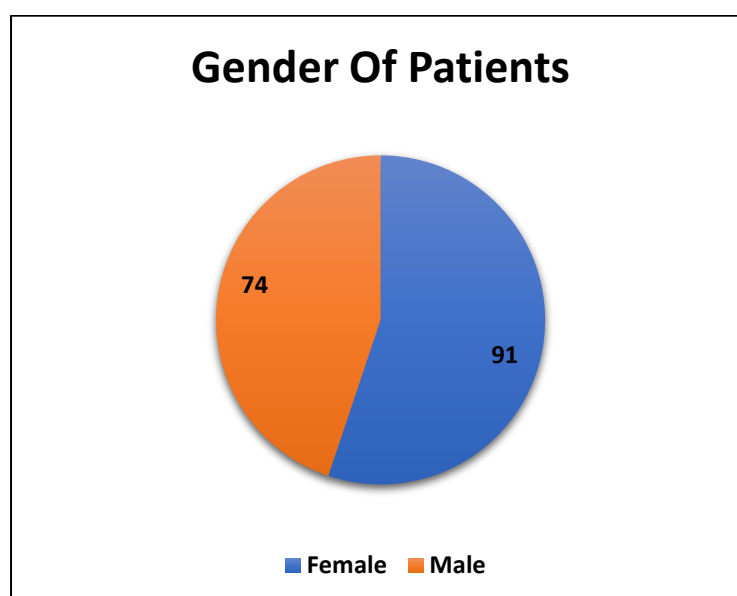
RESULTS

The results of current study was based upon 165 patients. The age encountered was maximum of 90 and minimum of 31 years old. The study include all the patients who had cataract. The patients other than cataracts such as of open globe trauma and patients which were aphakic were excluded from the study. The data was calculated and displayed in form of tables and charts. The findings evaluated on B-scan Ultrasound will be mentioned as frequency and percentage displayed in the forms of tables and charts.

Table 1: Showing frequency distribution for age (n=165)

Age Group	Frequency	Percent
31-40	29	17.6
41-50	30	18.2
51-60	57	34.5
61-70	35	21.2
71-80	9	5.5
81-90	5	3.0

Among 165 patients we noted the highest incidence of cataract in 51-60 age group 57 (34.5%) followed by 61-70 age group 35 (21.2%) with minimal incidence in 71-80 age group 9 (5.5%) and only 3.0% incidence in 81-90 age group.

Graph 1: Pie chart showing gender distribution (n=165)

Among 165 patients, in which females were most frequent 91 (55.2%) and males having frequency of 74 (44.8%)

Table 2: Showing Distribution Of Presence Of Cataracts (n=165)

Literality	No.	Percent
Both Eyes	39	23.6
Right Eye (OD)	57	34.5
Left Eye (OS)	69	41.8
Total	165	100.0

Among 165 patients, cataract that is present most frequently was in left eye (O.S) 69 (41.8%) while the frequency in right eye (O.D) was 57 (34.5 %) and frequency of cataract in both eyes was 39 (23.6%) .

Table 3: Showing distribution of Presenting Symptoms (n=165)

Among 165 Patients, 65 (39.3%) patients were presented with blurring of vision, 41 (24.8%) patients were

Presenting Symptoms	No.	Percentage
Vision Blurring	65	39.3
Light Flashes	41	24.8
Black Spots	27	16.3
Itchy Eyes	18	10.9
Shrunken Eyes	14	8.4

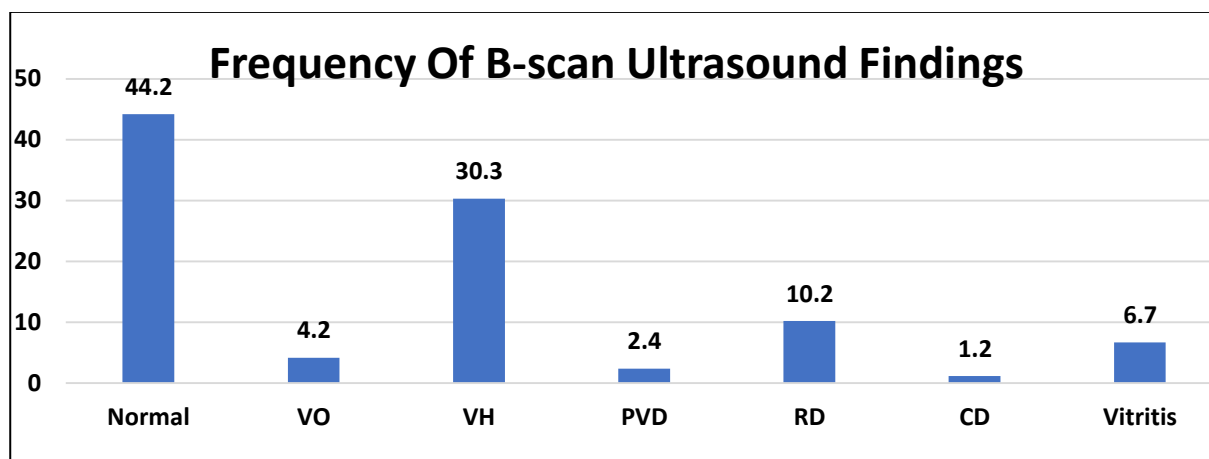
presented with flashes of light, 27 (16.3%) patients were presented with black spots, 18 (10.9%)

patients were presented with Itchy eyes and 14 (8.4%) patients were presented with shrunken eyes.

Table 4. Showing Distribution of B-scan ultrasound findings (n=165)

Findings	No. of cases	Percent
Normal	73	44.2
Vitreous Opacities	7	4.2
Vitreous Haemorrhage	50	30.3
Posterior Vitreous Detachment	4	2.4
Retinal Detachment	18	10.9

Choroidal Detachment	2	1.2
Vitritis	11	6.7



Graph 2: Showing distribution of B-scan ultrasound findings

Among 165 patients, 73 (44.2) patients have normal ultrasound findings and reported negative for posterior segmental pathologies while 92 (55.8%) patients were reported positive for posterior segmental pathologies. The vitreous haemorrhage (VH) was most frequent pathology reported as in 50 patients (30.3%). The other pathologies that were reported include Retinal detachment (RD) (10.9%), Vitritis (6.7%), Vitreous opacities (VO) (4.2%), Posterior vitreous detachment (PVD) (2.4%) and Choroidal detachment (CD) (1.2%).

DISCUSSIONS

In current study 55.8% patients were found have posterior segmental pathologies which is in accordance with previous results reported by Manzoor A Qureshi et al. who have reported 55% of posterior segmental pathologies detected by B-scan in Preoperative Cataract Patients.⁶ Another previous study reported by Ianny J et al. reported results that shows 54.2% patients have posterior segmental pathologies detected by B-scan in patients with cataracts with is also in accordance with current study.¹¹ In current study vitreous hemorrhage was most detected posterior segmental pathology 30.3% which is in accordance with previous results reported by Rafiq I. Haddad et al. 26 who have reported 29.2% patients with vitreous haemorrhage detected by B-scan in

preoperative cataract patients.¹² Another previous study reported by Dr. Ridham Nanda et al. reported results that shows the most common posterior segmental pathology detected by B-scan was Vitreous haemorrhage 18.50% which is in accordance with current study.¹³ The previous study conducted by Dr. Ridham et al. also reported the results which shows 8% retinal detachment was detected by B-scan 27 which is in accordance with current study that shows 10.9% of retinal detachment was detected by B-scan in preoperative cataract patients.¹³ In current study the percentage of choroidal detachment detected by B-scan ultrasound in preoperative cataract patients is 1.2% which is in accordance with previous studies reported by Dr. Jitendra Kumar et al.¹⁴, Dr. Mohd Mobin et al.¹⁵ and Dr. Ridham

Nanda et al.¹³ which reports results in which percentage of choroidal detachment detected by B-scan ultrasound was 1%, 1.6% and 1.5% respectively

CONCLUSION

In conclusion, the current study found that B-scan can be used to access various posterior segmental pathologies. It can also be used to differentiate between different pathologies depending upon their echo texture seen in ultrasound image. The current study also shows that patients with cataract can have posterior segmental pathologies hidden behind lenticular opacification that is not visible with conventional ophthalmic diagnostic tools. The current study also shows that Patients with older age groups are more prone to develop cataracts because of senile lenticular changes which can be seen people seen in people with older ages.. Ultrasound should be preferred over traditional ophthalmic techniques in presence of cataract so that exact check-up of posterior segment can be done to rule out any pathology in which other techniques may lack due to opacification

Conflict of Interests: The authors of this research paper proclaim that there is no conflict of interest for the current study.

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Contribution statement:

Taloot Atiq: Conceptualization, Methodology, Software, Resources, Formal analysis, Writing - Original Draft, Writing - Review & Editing, Investigation, Visualization.

Ahmad Naeem: Formal analysis, Review & Editing, Supervision, Project administration, Visualization.

Abid Ali: Supervision.

Akash Jhon: Supervision.

Ethical Approval: The Hospital Ethical Panel granted ethical approval. During the data collection and procedure, the study's subject was kept safe.

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