

WHEN LIGHT FAILS, SOUND PREVAILS” THE DIAGNOSTIC EDGE OF B-SCAN IN OCULAR OPAQUE MEDIA

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Abstract

Clear ocular media is the first condition to reach a diagnosis in ocular pathologies. In some conditions, the examination cannot be performed as the media is opaque, and the only solution relies on the B-scan ultrasonography. The utilization of high-frequency ultrasonic waves represents a two-dimensional sketch of the posterior segment and orbit as well, helping in the diagnosis of ocular pathologies that can be missed easily. The inability of the human eye to see through the opaque media before any surgical or non-surgical management may create unsolvable scenarios for final visual outcomes. Through B scanning, we can not only diagnose the hidden pathologies in the posterior segment, but it also helps in the research of diverse conditions of the posterior segment, which can be documented for further references.

Methods: This prospective cross-sectional study is performed in the OPD of the Ophthalmology Department of a Tertiary care hospital, Medical Teaching Institute Lady Reading Hospital, Peshawar on all those patients who presented with Opaque media and where the examination of the Fundus was not possible. The findings on B-scans are correlated clinically for the management of all the patients. The Data is entered in a predefined proforma and statistically analyzed through SPSS version 25.

Result: A total of 105 patients of both genders and of age groups between 1 day to 85 years were included in the study. The most frequent age was less than 10 years followed by age of the patients above 50 years. The male frequency was 58.1. The visual acuity was CF close to eye in more than 70% of patients. In 52.4% of patient the mature cataract was the pathologies causing the opaque media. In 65.7 % of the patients, the fundus view was not visible. The leading pathology seen on B scan was retinal detachment in 12.4%.

Conclusion: The finding of B-scan ultrasonography is one of the most important and helpful tools for the management and counseling of patients with opaque media

INTRODUCTION

The continuum of ocular pathologies can spread from newborn to old age, and any pathological insult can lead to opaque media, the spectrum of which can start from the lid and end at the bony orbit. The opaque media of the eye can be caused by any opacity in the cornea, disfigured anterior chamber, hyphema or traumatized eye, mature or hypermature cataract, vitreous hemorrhage or severe vitritis, intraocular tumor, and other pathologies in the retina(1). All of these conditions' hinders the visibility of the posterior segment of the eye. Blindness because of cataract is caused by poverty, and it's the outcome of it as well.(2) The late presentation of patients because of constrained resources and poverty leads to mature cataract and challenging clinical assessment(2). The other gift given by low socioeconomic status is a larger number of people affected by trauma and its sequelae in the form of ocular opacities, vitreous hemorrhages and intraocular foreign bodies, which is imperceptible to the naked eye, gives a dramatic response in terms of its location, structural morphology by B-scan. To reach the diagnosis or examination, the ophthalmologist relies on clear media. The opaque structure of the eye because of whatever reason, obstructs the direct visualization of intraocular segments and diagnosis through direct or indirect examination methods. In such scenarios, the B-scan is the most important diagnostic tool in ophthalmology. (3)

While managing the patients in terms of surgery or otherwise, it's become very critical that the anatomy and functional capacity of all the structures of the eye be known. The clinical correlation and the outcome of any surgical or nonsurgical management is dependent on the knowledge of the health of the posterior segment. The same is when the patient counseling is performed for the visual outcomes or the visual potential after the treatment, which is dependent on the sound diagnosis and the examination, and all of the above is not possible if the media of the eye is opaque.

B scan or ocular ultrasound utilizes high-intensity ultrasound waves, which, when reflected from any structure, create a two-dimensional sketch, representing the intraocular and orbital structure in a documented, detailed way. The 10 Mhz probe provides an excellent resolution of 940 microns with

a restricted depth of 4 cm imaging the posterior segment of the eye quiet well (4)The B stands for brightness modulation, the bidimensional mode of this device not only helps in the diagnosis of posterior segment pathologies, but also gives the structural details of the cornea, angle, and lens(5).

The patients who present with opaque ocular media as dense cataract and where the vision cannot be correlated clinically with the pathology, need complete evaluation before any type of intervention. The story does not end here, these patients need counselling before any management for the prognosis and visual rehabilitation. The B scan performed in these conditions has a crucial role. In children with congenital cataracts or congenital corneal anomalies where the examination of the posterior segment becomes very difficult, the utilization of B-scan becomes an integral part of the management.

B-scan ultrasound can locate, categorize, and predict the type and associated consequences of ocular trauma, and combined with intraocular foreign bodies.(6) This holds for intraocular tumors as well as the different signals emitted by the ultrasonic waves create identifiable shadows, which are the key factor in the management.(7)

As this study is performed in Peshawar, situated in low-Income group countries, where patients with cataract, the most common cause of blindness(1), present very late, and assessment of the posterior segment is not possible, moreover, the frequency of trauma is very high in LMIC(8), again leading to the visibility of intraocular structure very difficult. Besides this, the congenital cataract prevalence is high (9) where the status of ocular comorbidity could not be evaluated through examination. Pertaining to these facts, this study of the utility of the B scan will help us not only in managing these patients, but will also provide us with a comprehensive insight into the prevalence, characteristics, and progression of the conditions affecting the posterior segment. This study will also help to correlate the clinical signs with the diagnostic findings. This study will also analyze the different causes of the opaque media, including the location.

OBJECTIVES:

The study's objectives are to explore the role of Ocular ultrasound in the diagnosis of critical clinical pathologies of the eye in opaque media.

To analyze the causes of the opaque media and their correlation with the findings of the B-scan.

MATERIAL AND METHODS

This prospective clinical study was conducted in the department of Ophthalmology at the Medical Teaching Institute, Lady Reading Hospital, Peshawar. The approval of the ethical committee was obtained before the start of the study. Patients were selected through a non-probability consecutive sampling technique. A total of 105 patients with opaque ocular media were in the study group. The patients ranged in age from 1 day to over 90 years and included participants of both genders, ethnicities, and geographical backgrounds. The patients with a shattered globe, lid laceration was excluded from the study. These patients presented with dimness of vision in the eye OPD, alongside with symptoms like as pain, watering, and burning. After a briefing about the research, informed consent from the patients or guardians was obtained. The confidentiality of the patients was respected. After complete ocular and systemic history, the Visual acuity, detailed and complete examination of slit lamp, including measuring of intraocular pressure, and funduscopy where possible was performed. The causes leading to the opaque ocular media were assessed. With the patient lying down on the stretcher, a single ophthalmologist performed the B-scan using a QUANTEL MEDICAL COMPACT TOUCH machine, model number 3424. Gel was applied to the probe's surface after it had been cleaned. After that, the A-scan mode was turned on where required. Throughout the procedure, patients were told to keep their eyes closed. Small children were seated on a parent's lap during the B-scan. The patient was asked to move their eyes in different directions during the test. A printout was created, and the results were recorded.

Data Analysis

The data was entered and analyzed using SPSS version 25.

The categorical variable was analyzed for frequency and percentages. The scale variables were analyzed for mean and standard Deviation. The accuracy, sensitivity and specificity, positive and negative predictive value were calculated.

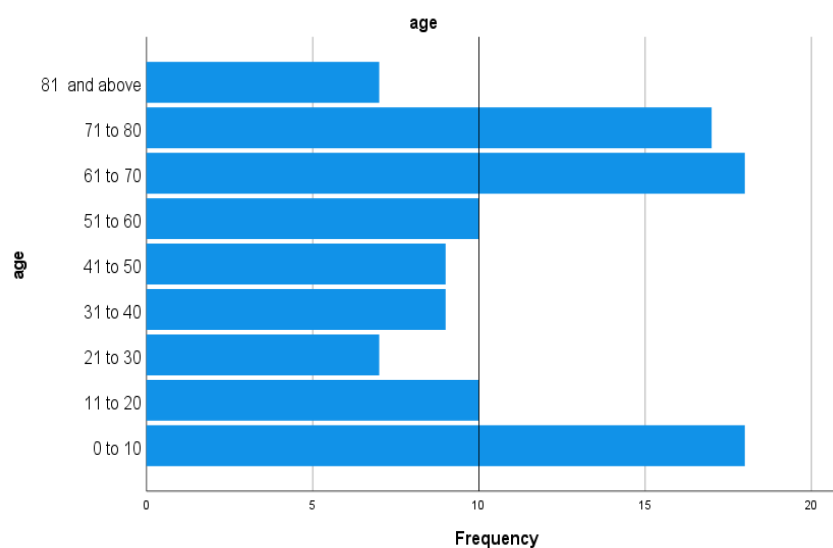
RESULTS

This cross-sectional study was conducted on 105 patients who presented with opaque ocular media. The male population was 58.1% and the rest were female. The age bracket was from 0 to 80 years and above, and as shown in FIGURE NO.1, most of the patients were in the range of 0 to 10 years and above 60 years. Patients presenting with comorbidities are presented in table No1.

The visual acuity on arrival to the OPD is displayed in TABLE NO.1, concluding that 70.5% of patients had the visual acuity of counting fingers close to the eye and worse. Among these patients as 17.1 % were below the age of 10 years, so the visual acuity could not be recorded accurately. B-scan was performed on all 105 patients. As shown in TABLE NO.2, the cause of opaque media was mature cataract in 52.4 % of patients and 21.0% had a hazy view. The finding on B scan is shown in TABLE NO.3, which shows that 63% of patients had normal findings on B scan, including clear vitreous with attached retina. Retinal detachment was the most common pathology seen with a frequency of 12.4% on B-scan behind the curtains of ocular opacity. With further analysis, 26.8 % of patients had a history of trauma leading to opacity in the ocular media.

The statistical analysis of the B scan finding in patients with cataracts only is analyzed through the Chi-square test as shown in TABLE NO.3, which depicts the statistical significance value of P (0.00), concluding a statistically significant association between cataract and diagnostic finding on B scan.

Figure no: 1



Comorbidities	Frequency	Percent
normal	50	47.6
diabetes	12	11.4
trauma	28	26.7
htn	3	2.9
other	12	11.4
Total	105	100.0

Table no :1

Visual acuity	Frequency	Percentage
6/18	2	1.9
6/60	5	4.8
CF 1m	6	5.7
Cf close to eye	25	23.8
HM	27	25.7
PL	22	21.0
NPL	3	2.9
Not recorded	15	14.3
Total	105	100.0

Table no :2

Diagnosis	Frequency	Percentage
corneal opacity	12	11.4
mature cataract	55	52.4
vit hsh	6	5.7
R/D	6	5.7
endophthalmitis	16	15.2
other	10	9.5
Total	105	100.0

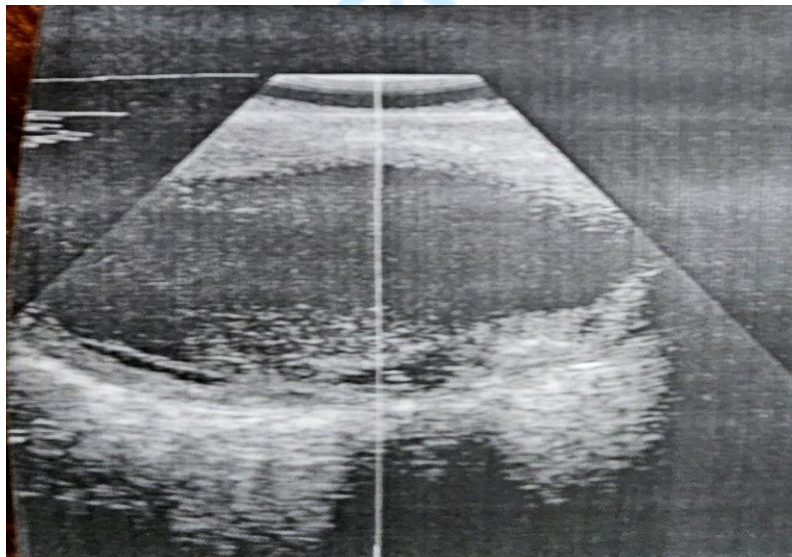
Table no :3

FINDING ON B SCAN	FREQUENCY	PERCENT
vit hgh	8	7.6
vit opacities	9	8.6
R/D	13	12.4
F.body	2	1.9
normal	63	60.0
other	9	8.6
Total	105	100.0

Table no :4

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.355 ^a	2	.000
Likelihood Ratio	37.648	2	.000
N of Valid Cases	105		

Table no :5



DISCUSSION:

This study analyzes the clinical relationship between the 105 patients with opaque ocular media and the B-scan results. Low socioeconomic countries, like our own, are impoverished and have few resources, which hinders the early treatment of ocular diseases and ultimately leads to irreversible blindness (1). One of

the most common eye conditions in both children and adults is cataract, which, when presented late, not only impedes vision but also makes it impossible to examine the posterior segment of the eye, making the potential rehabilitation of vision very difficult. The leading cause of ocular medium opacity was mature cataract in 52.4% of cases in our study. A study done

in India has the same results, with 60% of patients having lenticular opacities obscuring the fundus view.(3) The reason for no fundus view was the delayed presentation, making the lens very opaque. As it's evident from the literature, the prevalence of congenital cataract is very high in underdeveloped countries (9) and preoperative assessment becomes very difficult. Trauma, another significant cause of ocular media opacity, has a subpar treatment plan (8). Given their lower levels of education and awareness and poverty, the higher incidence of cataract and traumatic corneal opacities in this age group is explained by the fact that over 17% of the patients in our study were in the first decade of life. The other common diagnosis leading to poor visibility of fundus in our study was endophthalmitis 15.2 % of patients, followed by corneal opacity in further 11.4% of patients.(10) One study found that the most common cause of fundus haziness in trauma patients was hyphaema, which was followed by vitreous hemorrhages and lid ecchymosis. (10). In a Saudi Arabian study, posterior segment diseases were present in 17.3% of cataract patients (11). The trauma history was positive in 26.7% of patients in our study. Another study found that 87.5% of patients who arrived with opaque media also had a history of trauma (30.59%) (12). The finding of retinal detachment in 12.4% of patients with opaque media is very alarming in our study. According to one study only 1.3% of patient had RD, but as this study was on patients with mature cataract (11). One study has different results with Posterior vitreous detachment was the leading finding on B scan (12) One study concluded that 18.5% of patients had vitreous hemorrhage and only 8% had retinal detachment. A study done by E Ibrahim et al the vitreous hemorrhage was present in 66.6% of diabetic patients on B scan(13). The large number of VH is because the study done on diabetic patients which were different from our inclusion criteria. In our study 1.9% of patients had intraocular foreign bodies, while in other study done on trauma or other wise had more patients with intra ocular foreign bodies(14).

In our study, diabetes was a co-morbidity in 11.4% of patients, which is the same as the study done in India(15). In the same study, 27.05% of patients had VA of perception of light only,(16) while in our study, 21.0% of patients had a perception of light vision(17)

The percentage of male patients in our study was 58.1 % which is almost the same in multiple studies as the male can easily access to the health services in countries with low socioeconomic status (17)(18).

CONCLUSIONS

The phrase "When light fails, sound prevails" perfectly sums up the crucial role that B-scan ultrasonography plays in ocular diagnostics when the visual axis is obscured. Conventional examination techniques are invaluable when dealing with opaque ocular media, such as corneal opacities, Dense cataract and vitreous hemorrhage. By using the penetrating power of sound waves to visualize posterior segment structures, the B-scan becomes an essential diagnostic tool. Clinicians can accurately identify and assess conditions like retinal detachment, intraocular tumors, or vitreous abnormalities thanks to its non-invasive, quick, and dependable nature. Therefore, when optical clarity is lost, B-scan not only fills the diagnostic gap but also reaffirms the importance of ultrasound in maintaining and regaining vision. It also helps in counselling the patients with mature cataract before their surgeries regarding the status of Posterior segment.

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