

## Role of B-Scan in Advanced cataract Patients

Dr. Jitendra Kumar<sup>1</sup>, Dr. Kanhaiya Prasad<sup>2</sup>, Dr. Amar Nath Ram<sup>3</sup>

<sup>1</sup>Associate Professor & Head, Dept. of Ophthalmology, MLB Medical College Jhansi, India.

<sup>2</sup>Junior Resident, Dept. of Ophthalmology, MLB Medical College Jhansi, India.

<sup>3</sup>Junior Resident, Dept. of Radio-diagnosis, MLB Medical College Jhansi, India.

Corresponding author: Dr. Jitendra Kumar 1

### Abstract

**Aim:** The purpose of the study is to evaluate posterior segment abnormalities with B-scan ultrasound in pre-operative cataract patients. **Materials and methods:** The present study was conducted on 500 cataract patients referred from outpatient departments who were evaluated for posterior segment abnormalities with high resolution ultrasonography. **Results:** Out of 500 patients, 70 patients had posterior segment abnormalities. Among traumatic group of 50 patients, 32 (64%) had positive posterior segment abnormalities, while in the non-traumatic group of 450 patients, only 38 (8.5%) cases had positive posterior segment abnormalities. Out of the 70 positive cases, 18 (3.6%) had retinal detachment, 13 (2.6%) had posterior vitreous detachment, 17 (3.4%) had vitreous hemorrhage, 9 (1.8%) had asteroid hyalosis, 6 (1.2%) were posterior staphyloma while intra-ocular foreign body and choroid detachment were found with the frequency of 5 (1%) and 2 (0.4%), respectively. **Conclusion:** It was concluded that B-scan is a good modality for diagnosing posterior segment abnormalities in cataract patients and thus helps in predicting the visual prognosis.

**Keywords:** B-scan; Ultrasound; Posterior segment pathology; Cataract

Date of Submission: 10-04-2018

Date of acceptance: 26-04-2018

### I. Introduction

B Scan ultrasonography is a non-invasive, efficient, reliable and inexpensive diagnostic technique for evaluation of ocular pathology. Both A scan and B Scan techniques are important for the diagnosis of posterior segment lesion. B (Brightness) mode is useful for a better demonstration of the shape and topographic relationship of lesion in the posterior segment. The most recent estimates from WHO reveal that 47.8% of global blindness is due to cataract and in South Asia region which includes India, 51% of blindness is due to cataract. Cataract surgery has been viewed as one of the most cost-effective health interventions. Cataract has been documented to be the most significant cause of bilateral blindness in India. India is committed to the goal of elimination of avoidable blindness by 2020 in line with the Global Vision 2020: the right to sight initiative [1]. Cataract is defined as an opacity of any portion of the lens, regardless of visual acuity [2]. Many of these cases have advanced cataracts that preclude visualization of fundus prior to cataract surgery. Such visualization is considered important to provide accurate prognosis for vision after cataract surgery. Under such circumstances ultrasonographic examination might provide information regarding such abnormalities [3]. Surgery for traumatic cataracts is a potentially complex procedure. Careful ophthalmic imaging using ultrasound may result in finer pre-operative detail regarding lens support structures, and may therefore give the surgeon the advantage when planning surgery [4]. Indications for examination B-scan ultrasound most useful when direct visualization of intraocular structures is difficult or impossible. Situations that prevent normal examination include-Lid problems e.g. severe edema, partial/total tarsorrhaphy, corneal opacities, scars, severe edema, hyphaema, hypopyon, miosis, papillary membrane, dense cataract, vitreous opacities (e.g. hemorrhage, inflammatory debris). In such case, diagnostic B-scan ultrasound can accurately image intraocular structures and give valuable information and give valuable information on the status of lens, vitreous, retina, choroid, and sclera. Ultrasound is a safe technique, cheaper, easily available and provides more affordability compared to other imaging techniques such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) [5]. Ultrasound is an acoustic wave that consists of an oscillation of particles within a medium. Dynamic scanning is essential for differentiation between retinal detachment and vitreous membranes or tumour and haemorrhage. X-rays can detect only radiopaque foreign bodies and will miss radiolucent ones. B-scan offers more accurate localisation of the foreign body, especially in relation to the ocular wall. Ultrasound was first used in ophthalmology in 1956 by the American ophthalmologists, Mundt and Hughes [6]. They used A-scan mode to evaluate an intraocular tumour. B-scan was introduced in ophthalmic practice by Baum and Greenwood in 1958 [7]. However, it was not until 1972, when Bronson and Turner produced the first contact B-scan method, that

ultrasonography became a more practical investigation [8]. B-scan (brightness) mode is more useful than A (Amplitude) scan for a better demonstration of the shape and topographic relationship of lesions in the posterior segment [5].

**II. Material And Methods**

This was a prospective diagnostic study which was confined to the assessment of posterior segment lesion at pre-operative stage. Diagnostic B-scan ultrasound on 500 cataract patients before surgery were performed from February 2017 to march 2018 in the Department of Ophthalmology, M.L.B Medical College, Uttar Pradesh, India. Detailed history and some eye examination, like slit lamp and tonometry were done in two groups of patients, traumatic and non traumatic. Patients in the age range of 1 to 79 years of both sexes were included. Patients having already posterior segment lesions and those who had previous history of ocular surgery were excluded from the study. Patients were briefly explained the procedure for their co-operation. Nidek Echoscan Model US-3300 with a probe of direct contact was used. Ultrasonic probe was placed over the globe of the eye with closed lid after application of the gel and then antero-posterior, longitudinal and transverse views of B-scan along with A-scan were taken. High gain (80 to 90dB) and low gain (60 to 70dB) sensitivity were selected during ultrasonography. **RESULTS:** Out of a total of 500 patients, 50 (10%) cases were of post-traumatic cataract and 450 (90%) were non-traumatic cataract. The age range was 1 to 79 years in both sexes (Table-1).

**TABLE (1) : AGE AND SEX DISTRIBUTION<sup>[12]</sup>**

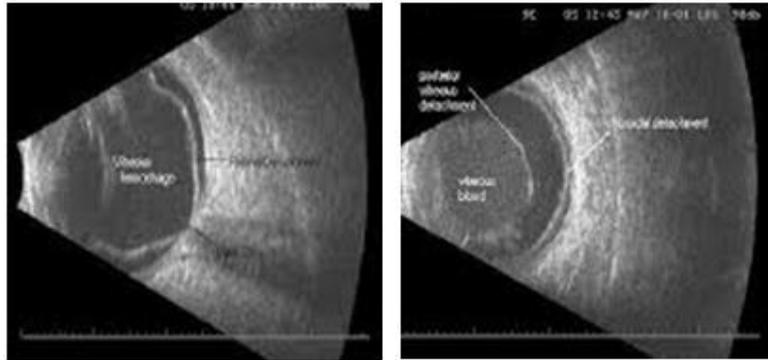
Age (Years)	Non-Traumatic Cataract Group (450Pts)				Traumatic Cataract Group (50Pts)				Total Patients (500 pts)	
	Male		Female		Male		Female		No of cases	%
	No of cases	%	No of cases	%	No of cases	%	No of cases	%		
1 - 9	12	(2.67%)	15	(3.33%)	2	(4%)	2	(4%)	31	(6.2%)
10 - 19	3	(0.67%)	2	(0.45%)	20	(40%)	4	(8%)	29	(5.8%)
20 - 29	6	(1.33%)	3	(0.67%)	6	(12%)	2	(4%)	17	(3.4%)
30 - 39	2	(0.45%)	3	(0.67%)	4	(8%)	1	(2%)	10	(2%)
40 - 49	8	(1.77%)	22	(4.89%)	2	(4%)	2	(4%)	34	(6.8%)
50 - 59	75	(16.67%)	72	(16%)	2	(4%)	0	(0%)	149	(29.8%)
60 - 69	60	(13.33%)	120	(26.67%)	1	(2%)	1	(2%)	182	(36.4%)
70 - 79	15	(3.33%)	32	(7.1%)	1	(2%)	0	(0%)	48	(9.6%)

In the non-traumatic cataract group of patients, more than half (72.67%) were in the range of 50 to 69 years of age, this is the age group where senile cataract is common. The mean (standard deviation) age was 54 (8.25) years, out of which, females were 192 (42.66%) and males were 135 (30%). In traumatic cataract group of mild, blunt and penetrating in nature, most of the patients (48%) were in the range of 10 to 19 years, the mean (standard deviation) age was 13.7 (2.73) years, the age group where trauma is more common; 20 patients (40%) were males, 4 patients (8%) were females (Table-1). Of the total 500 patients in the study, 70 (14%) patients had ultrasonically detectable posterior segment abnormalities (Table-2), 38 (8.5%) cases belonged to the non-traumatic cataract group and 32 (6.4%) to traumatic cataract group.

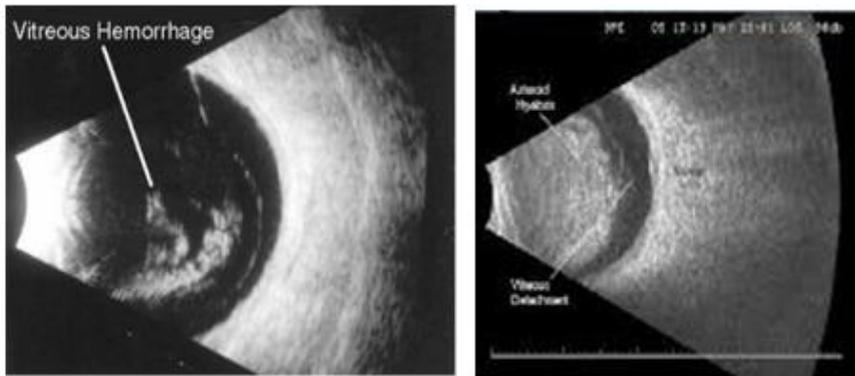
**TABLE (2): ULTRASOUND B-SCAN FINDINGS<sup>[12]</sup>**

Posterior Segment Lesion	Non-Traumatic Cataract Group (450Pts)		Traumatic Cataract Group (50Pts)		Total Patients (500 pts)	
	No of cases	%	No of cases	%	No of cases	%
Retinal Detachment	7	(1.56%)	11	(22%)	18	(3.6%)
Vitreous Hemorrhage	9	(2%)	8	(16%)	17	(3.4%)
Posterior Vitreous Detachment	7	(1.56%)	6	(12%)	13	(2.6%)
Asteroid Hyalosis	9	(2%)	0	(0%)	9	(1.8%)
Intra-Ocular Foreign Body	0	(0%)	5	(10%)	5	(1%)
Posterior Staphyloma	6	(1.33%)	0	(0%)	6	(1.2%)
Choroid Detachment	0	(0%)	2	(4%)	2	(0.4%)

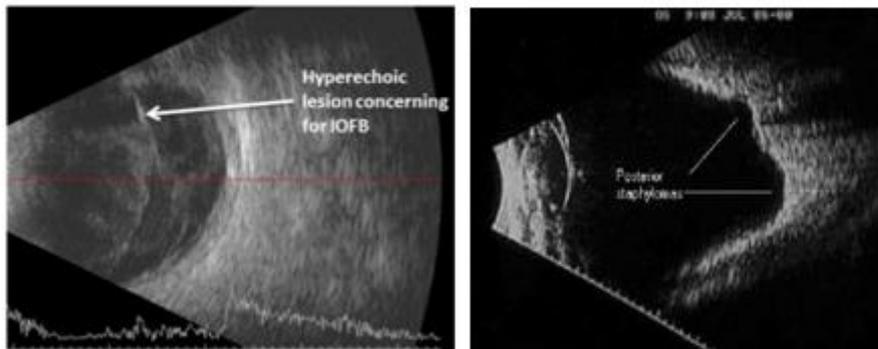
Out of the 70 positive cases, 18 (3.6%) had retinal detachment (Fig-1), 13 (2.6%) had posterior vitreous detachment (Fig-2), 17 (3.4%) had vitreous haemorrhage (Fig-3), 9 (1.8%) had asteroid hyalosis (fig-4), 6 (1.2%) were posterior staphyloma (fig-6) while intra-ocular foreign body (fig-5) and choroid detachment (fig-7) were found with the frequency of 5 (1%) and 2 (0.4%), respectively. (Table-2).



**Fig. 1: Retinal Detachment Fig. 2: Posterior Vitreous Detachment**



**Fig. 3: Vitreous Hemorrhage Fig. 4: Asteroid Hyalosis**



**Fig. 5: Intra-Ocular Foreign Body Fig. 6: Posterior Staphyloma**



**Fig. 7: choroid Detachment**

### III. Discussion

Cataract is an important cause of blindness and due to lack of proper awareness, many patients presents with advanced cataracts that precludes visualization of fundus prior to cataract surgery. Such visualization is considered important to provide accurate prognosis for vision after cataract surgery. Under such circumstances ultrasonographic examination can provide information regarding such abnormalities. Over the last 30 years, ultrasonography has greatly advanced which has enabled us to study posterior segment of the eye even in the presence of opaque media like dense cataract. Posterior segment of a total of 500 eyes in 1-79 years old patients, divided into two groups, were examined under B-scan ultrasound. Non-traumatic group constitutes majority of the patients (90%) and a small number (10%) belongs to traumatic cataract group. Similar groups in different age ranges have also been discussed in other studies.[9-12] In traumatic cataract group, 48% of the patients were 10-19 years old, correlating with the age range when children are more active and involved in outdoor games and other activities. Findings of posterior segment lesions (14%) in this study were similar to other published studies and very much less than that in the study by Haile and Mengistu who found a 66% incidence of detectable abnormalities.[10,12,13,14] However, the latter study included cases with orbital pathology and clear media (10%) and it was not clear whether ultrasonography was being performed routinely on all eyes prior to cataract surgery or only on eyes where intraocular pathology was suspected. In our study 8.45% patients of non-traumatic cataract group and 64% patients in traumatic cataract group had posterior segment lesions. Qureshi et al,[12] reported posterior segment lesions in 8.64 % non-traumatic cataract patients and in 54.93 % patients with traumatic cataract. Ali and Rehman,[9] reported posterior segment lesions in 11% non-traumatic cataract patients and in 65.85% patients with traumatic cataract. Retinal detachment (22%) in traumatic cataract patients and (1.5%) in non-traumatic cataract patients was similar to that reported by Qureshi et al,[12] who found retinal detachment 21.12% in traumatic cataract and 1.47% in non-traumatic cataract patients; and other study,[9] found retinal detachment in 29.26% of traumatic cataract and 3.3% of non-traumatic cataract patients. 12% patients in traumatic group and 1.5% patients in non-traumatic group were found to have posterior vitreous detachment (PVD), which is closer to an earlier report,[12] of 9.86% in traumatic cataract and 1% in non-traumatic cataract patients. Vitreous hemorrhages were present in 16% traumatic cataract patients and 2% in non-traumatic cataract patients. Other investigators reported vitreous hemorrhage in traumatic cataract group as 15.49% and 18.3%.[9,12] whereas in non-traumatic cases vitreous hemorrhage was present in 1.91% cases.[12] A similar incidence of asteroid hyalosis (2%) was noted in non-traumatic cataract patients as compared to that reported by Qureshi et al,[12] (1.77%) and Ali and Rehman,[9] (2.93%) in their study but higher incidence was noted as compared to other study,[11] (0.4%). Intraocular foreign body was found in 10% traumatic cataract patients which is more than earlier reports (8.45%).[7]

### IV. Conclusion

It was concluded that B-scan is a good modality for diagnosing posterior segment abnormalities in cataract patients and thus helps in predicting the visual prognosis.

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