

ROLE OF B-SCAN ULTRASONOGRAPHY IN EVALUATION OF PRE-OPERATIVE CATARACT PATIENTS

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ABSTRACT: The purpose of this study was to visualize the status of posterior segment with diagnostic toll of B-scan ultrasound in pre-operative dense cataract patients. **METHODS:** Diagnostic B-scan ultrasound was done on 200 cataract patients from the age group of 10 to 80 years of both the sexes. The machine used for the above study was B-scan machine – (SONOMED, E-ZSCAN AB 5500+) with frequency 10 MHz. **RESULTS:** Out of total 200 patients, 23 (traumatic & non traumatic cataract) were found having posterior segment lesions. Out of 23, 14 patients belong to non-traumatic cataract group and 9 patients belong to traumatic cataract group. 5 Patients (25%) had PVD and 2 patients (1%) had asteroid hyalosis and 1(0.55) patient had intraocular foreign body, 2(1%) had posterior staphyloma. In non-traumatic cataract group, 74.5% were in the range of 50-60 years of age. In traumatic cataract group, 47.3% were in the age group 10-19 years. In non-traumatic cataract group, 72(39.7%) were male and female were 109(60.2%). In traumatic cataract group, male were 14(73.6%) and female were 3(26.3%). **CONCLUSION:** It was concluded that B-scan ultrasound could be a useful tool for detection of hidden posterior segment lesions in dense cataract patients.

KEYWORDS: RD, VH, Posterior vitreous detachment, asteroid hyalosis, intra ocular foreign body.

INTRODUCTION: Ophthalmic ultrasound has become an indispensable tool that has increased the ability to detect and differentiate many ocular diseases. Ultrasound is an acoustic wave that consists of oscillation of particles within a medium. Ultrasonography of eye in which sound waves are transmitted and received through a probe is called a B-scan. Ultrasound (A-Scan) was first used in ophthalmology in 1956 by American Ophthalmologists, Mundt & Hughes⁽¹⁾ to evaluate an ocular tumor. Baum and Greenwood in 1958 developed the first B-scan for ocular use employing immersion technique, in 1972, Bronson and Turner⁽²⁾ produced first contact B-scan, rendering this examination modality easier, quicker, less invasive and more acceptable to patients. B (Brightness) mode is useful for better demonstration of shape and topographic relationship of lesions in posterior segment.

It provides for cross-sectional display of diseased tissue and is valuable for detecting unsuspected posterior segment diseases. The frequency used in diagnostic ophthalmic ultrasound for posterior segment is 8–10 MHz. Over the last 30 years, ultrasonography has greatly advanced and enabled us to study posterior segment of the eyes with media opacification. The most frequent findings in posterior segment lesions associated with perforating and blunt trauma and also without trauma were recorded on B-Scan, like retinal detachment, vitreous haemorrhage, posterior vitreous detachment, intraocular foreign body.

The purpose of this study was to visualize the status of posterior segment with diagnostic toll of B-scan ultrasound in pre-operative dense cataract patients, to find out posterior segment lesions in such cases. Cataract is the most common cause of reversible blindness in developing countries. The examiner is in dark about the possibilities of posterior segment pathologies in dense and mature

cataract in which fundus is invisible to direct and indirect ophthalmoscopy. Ultrasonography can be used as an additional diagnostic tool to evaluate posterior segment pathologies.

AIMS AND OBJECTIVES:

1. To pre-operative evaluate posterior segment of eye in patients with opaque media.
2. To pre-operatively evaluate and analyse various patients with vitreous degeneration in relation to visual impairment.
3. To prognosticate visual recovery in patients suffering with various posterior segment disorders.
4. To use B-scan ultrasonography as means and measure to find out any posterior segment lesion in cataract patients and help in surgical planning.
5. To use this study as means and measure to analyse the efficacy of B-scan prognostically in evaluating visual outcome of patients with various types of posterior segment disorder.

REVIEW OF LITERATURE: The first application of diagnostic ultrasound in the eye was reported by Mundt & Hughes in 1956. Their report described the use of industrial flow detection equipment for A-mode examination of in vitro enucleated eyes and patients with intraocular tumors.⁽¹⁾

B-mode techniques for ocular examinations were first developed by Baum & Greenwood in the late 1950's. Their ultrasonic slit lamp utilized a water emersion system soon adapted by many workers.⁽³⁾

In 1958 with the introduction of B-scanning techniques, Baum & Greenwood created a new application of ultrasound in the sectional study of globe and orbit using real time in evaluation of the eye both voluntary and involuntary movements may be studied.⁽³⁾

In 1971, Ossoining K.C. stated that the acoustic characteristics of orbital mass lesions are well defined and information about the nature of an acoustically visible mass may be available from ultrasound alone.⁽⁴⁾

In 1977, Hodes B L et al; by their combined approach for the diagnosis of orbital diseases stated that use of sonography has certainly led to reduction of invasive contrast radiology.⁽⁵⁾

In 1987, Fielding JA, adopted simpler alternative method of doing ultrasound studied in ophthalmology by direct contact method with the transducer on the closed eyelids through a coupling gel, in an attractive alternative with non-dedicated ultrasound scanner and be studied consecutive 200 scans in 184 patients and found to be satisfactory.⁽⁶⁾

Dunarintu S. et al studied 151 patients from Jan. 1998-2007 to evaluate contribution of radio imaging in diagnosis of orbital tumours and establishing clinic- radio imaging and histopathological screening that is needed to supplement with more advanced imaging technique like CT & MRI.⁽⁷⁾

In a case study by Ajnel H.M. et al in the year 2001-2002 to find out whether the sonography is useful in detecting eye or orbit diseases among 50 patients, it was observed that orbital inflammation was diagnosed in 10 cases (20%), 10(20%) cases were found to be vascular tumours, cystic tumours were 3(6%) cases, retinoblastoma in 6(12%) cases, 3 cases of malignant Melanoma (6%), 3(6%) cases were of infiltrating malignant tumour, 4 cases were neurogenic tumour, 2 were lacrimal gland tumour, 5 were Grave's disease (10%) & 1(2%) case was osteoma. It was included that USG is helpful in diagnosing orbital lesion.⁽⁸⁾

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In descriptive study to determine the use fullness of B-scan ultrasonography in evaluating posterior segment lesion by Dawood Z. et al from Feb. 2002 to March 2005. It was observed that out of 320 patients, 218 had posterior segment pathology. Out of 218 patients, 98(44.95%) should vitreous disorders, 58(26.6%) had retinal detachment 16(7.34%) had intraocular tumour and tumour like conditions, 9(4.14%) had optic nerve disorder and remaining 31(14.22%) were placed in miscellaneous group.⁽⁹⁾

Adebayo S.B. et al retrospectively studied around 29 patients with opaque ocular media in 2004-2005 to assess if ocular B- SCAN ultrasound can assist ophthalmology in making the diagnosis and concluded that it is diagnostic and aids in the management decision of several ocular and orbital lesions.⁽¹⁰⁾

Ahmed J. et al carried a study over a period of one year from Jan. To Dec. 2008 to determine diagnostic use of B- SCAN in the detection of vitreo – retinal pathologies in patients with vitreous opacities. They found that out of 73 scans performed, 48 eyes had vitreous haemorrhage 22 eyes showed inflame action in the vitreous and 3 eyes had asteroid hyalosis out of 48 eyes with vitreous haemorrhage, 34% had posterior segment pathology.⁽¹¹⁾

Alam M. et al studied the type and severity of ocular injuries in blast victims from March 2010 to May 2011. B- SCAN was performed in each case especially to diagnose any posterior segment pathology. They observed that ocular injury was unilateral in 50(63.29%) and bilateral in 29(36.70%) patients 41 (37.96%) eyes had closed globe injury and 67(62.03%) had open globe injury. The most common type of injury was corneal/ scleral perforation (48.14%) followed by vitreous hemorrhage (38.88%) and traumatic cataract (30.55%).⁽¹²⁾

MATERIAL & METHODS: This was a prospective diagnostic study which was confined to assessment of posterior segment lesion at preoperative stage. Diagnostic B- SCAN ultrasound on 200 cataract patients attending ophthalmology OPD before surgery was performed from July 2013- 2014.

Detailed history and eye examination, like slit lamp and tonometry were done in two groups of patients, traumatic and non-traumatic. Patients in age group between 10-80 years of both sexes were included patients having already posterior segment lesion and those who had previous history of ocular surgery were excluded from the study.

B- SCAN machine (SONOMED, E- Z Scan AB 5500+) with frequency 10MHz, with probe of direct contact was used. Ultrasonic probe was placed over the globe of the eye with closed lid after application of gel and then antero – posterior, longitudinal and transverse view of B- SCAN were taken. High gain (80-90dB) and low gain (60-70dB) were selected during ultra sonography.

OBSERVATION: Out of 200 patients, 19(9.5%) cases were of post-traumatic cataract and 181 (90.5%) were non traumatic cataract.

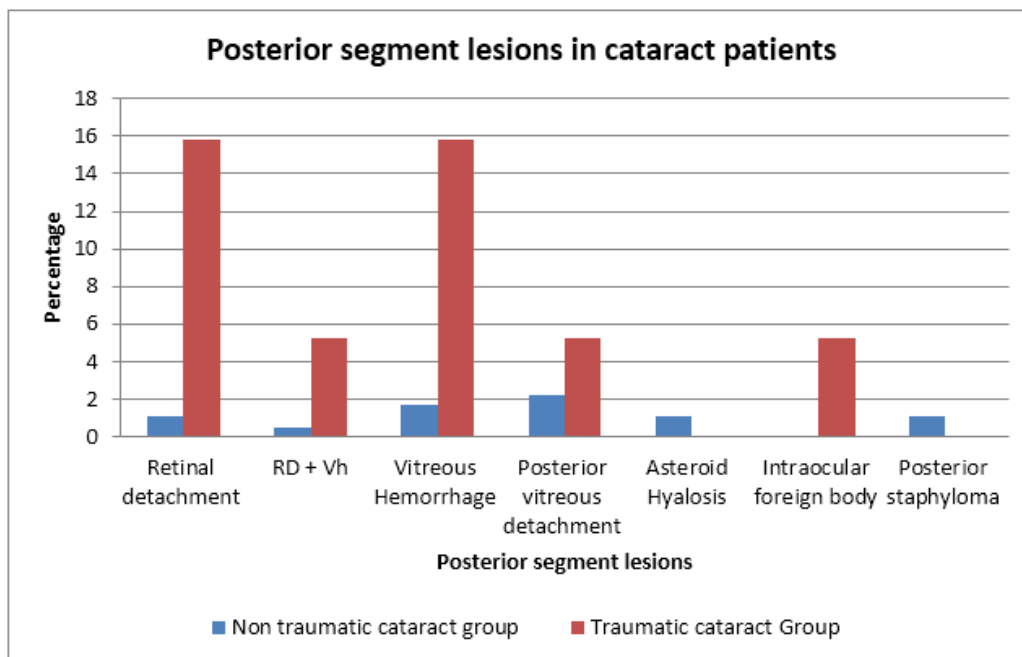
Out of 200 patients, 23(12%) had posterior segment lesion. Among traumatic group of 19 patients, 10(52.66%) has posterior segment lesion, while in the non- traumatic group of 181, only 14(7.73%) cases had positive posterior segment lesions.

ULTRA SOUND B-SCAN FINDINGS: Out of 23 positive cases, 5(2.5%) had retinal detachment, 5 (2.5%) had posterior vitreous detachment 6(3.9%) had vitreous hemorrhage, 2(1%) were asteroid hyalosis, while posterior staphyloma and intraocular foreign body were found with frequency of 2(1%) and 1(0.5%) respectively.

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Sl. No.	Posterior segment lesions	Non traumatic cataract group (181 pts)	Traumatic cataract Group (19 pts)	Total (200 pts)
1.	Retinal detachment	2(1.10%)	3(15.78%)	5(2.5%)
2.	RD + VH	1(0.5%)	1(5.20%)	2(1%)
3.	Vitreous Hemorrhage	3(1.65%)	3(15.78%)	6(3%)
4.	Posterior vitreous detachment	4(2.20%)	1(5.2%)	5(2.5%)
5.	Asteroid Hyalosis	2(1.10%)	0(0%)	2(1%)
6.	Intraocular foreign body	0(0%)	1(5.2%)	1(0.5%)
7.	Posterior staphyloma	2(1.10%)	0(0%)	2(1%)

Table 1: Posterior segment lesions in cataract patients



AGE AND SEX DISTRIBUTION: In the non-traumatic cataract patient more than half (74.5%) were in the range of 50-60 years of age, the age where senile cataract is common. The mean age was 54 years out of which females 79(43.64%) and males 56(30.91%).

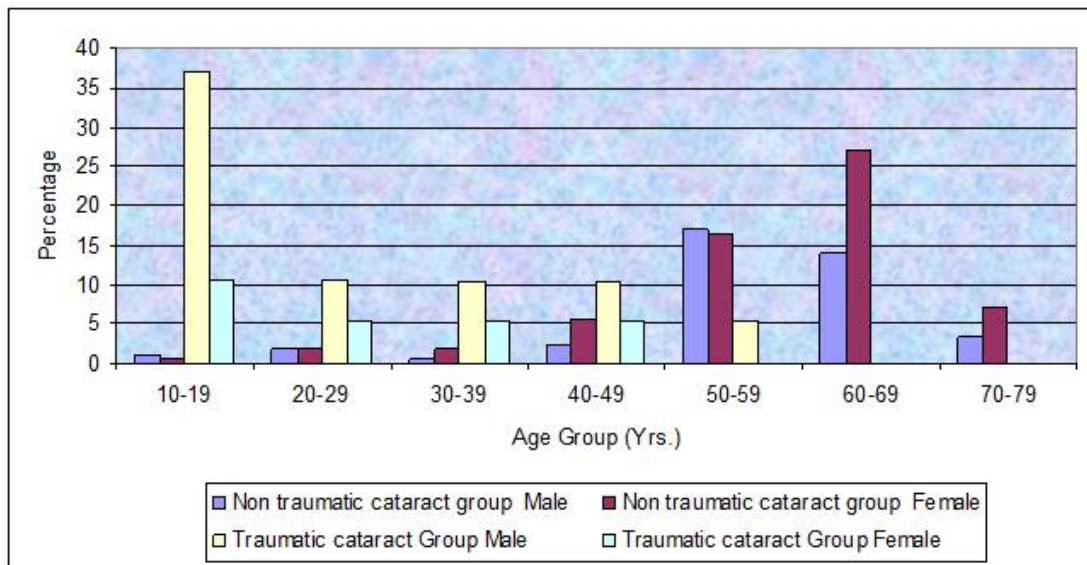
In the traumatic cataract group, most of the patients (47.36%) were in the age range of 10-19 years, the mean age was 13.7 years, the age group where trauma is more common 7 patients (36.84%) was males, 2 patients (10.52%) were females.

In non-traumatic cataract group, male cataract patients were 7.2(39.77%), female 109(60.2%) in traumatic group male patient were 14(73.6%) and female were 5(26.3%).

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Age (years)	Non traumatic cataract group (181 pts)		Traumatic cataract Group (19 pts)	
	Male	Female	Male	Female
10-19	2 (1.1%)	1 (0.5%)	7 (36.84%)	2 (10.52%)
20-29	3 (1.65%)	3 (1.65%)	2 (10.52%)	1 (5.26%)
30-39	1 (0.5%)	3 (1.65%)	2 (10.5%)	1 (5.26%)
40-49	4 (2.2%)	10 (5.52%)	2 (10.5%)	1 (5.26%)
50-59	31 (17%)	30 (16.5%)	1 (5.2%)	0
60-69	25 (13.8%)	49 (27.07%)	0	0
70-79	6 (3.31%)	13 (7.18%)	0	0

Table 2: Age & Gender wise distribution



DISCUSSION: Over the last 30 years ultrasonography has greatly advanced which has enable us to study posterior segment of eye even in presence of opaque media like dense cataract.

Posterior globe of a total of 200 patients were examined under B- SCAN ultrasound in 10-80 years old patients. Majority of patients 181(90.5%) belonged to non- traumatic group and 19(9.5%) to traumatic cataract group. Similar groups in different age ranges have also been studied in different studies.^[13-9]

Blunt trauma, or Penetrating injury, not only damages the anterior segment but also can damage the posterior segment. In traumatic cataract group, almost half (47.36%) of patients were 10-19 years old, the range when children are more active and involved in outdoor games and other activities.^[14-15]

Posterior segment lesions 23(11.5%) in the study were similar to other published studies.^[16-17] Out of 11.5% & 47.3% patient were in traumatic cataract group of patients, 7.73% patients were in non-traumatic cataract group. Ali and Rehman reported posterior segment lesion in 11% non-traumatic cataract patients and in 65.85% patients with traumatic cataract.^[13]

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Retinal detachment (RD) in non- traumatic cataract patients was 1.1% and 15.7% in traumatic cataract patients was similar to reported by Ali & Rehman^[13] who found retinal detachment 3.3% in non-traumatic cataract and 29.26% in traumatic cataract patients in another study, 22.5% was noted in traumatic group.^[18,16,17]

Vitreous haemorrhage (VH) was present in 15.78% traumatic cataract and 1.65% in non-traumatic cataract patients. Other investigators reported vitreous haemorrhage in traumatic cataract group as 18.3% and 13%^[18-15] where as in non- traumatic cases vitreous haemorrhage was present in 2.5% cases.

There were certain patients in both groups who had both retinal detachment and vitreous haemorrhage. Such patients were 0.5% in non- traumatic group and 5.2% in traumatic group.

Posterior vitreous detachment (PVD) in traumatic cataract patients was 5-2% and in non-traumatic cataract patients was 2.2% closer to earlier report of 1.46% in non-traumatic cataract patients.^[13]

Incidence of asteroid hyalosis (1.10%) was noted in non-traumatic cataract patients, which was lower than reported by Ali & Rehman (2.93%) in their study.^[13]

Intra ocular foreign body was found in traumatic cataract patients (5.2%) same as earlier reported (4%).

Posterior staphyloma was found in (1.10%) nontraumatic cataract patients, it was more than reported in other studies (0.73%).^[13]

CONCLUSION: It was concluded that two dimensional B-SCAN ultrasound could be one of the diagnostic tools for detection of hidden posterior segment lesions and can be performed routinely in pre- operative cataract patients, which could help in planning for surgical interventions.

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