

THE ROLE OF B-SCAN ULTRASONOGRAPHY IN THE DIAGNOSIS OF OCULAR AND ORBITAL DISEASES

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Abstract

Background: To know the importance of b-scan in the diagnosis of various ocular and orbital diseases. **Materials and Methods:** This study was conducted in the patients who attended the department of ophthalmology, the patients with posterior segment lesions with opaque media and non opaque media, patients with trauma, Patients with clear media for retino choroidal lesions Patients with intra ocular foreign bodies. **Result:** Cataract was the leading cause of opaque media in 92 of 250 eyes Retinal detachment seen 55 eyes, vitreous hemorrhage in 47 cases PVD in 44 cases, retinoblastoma in 2 cases, posterior staphyloma in 4 cases etc. **Conclusion:** Non traumatic cases are more common in that common indication is cataract Followed by vitreous pathologies Most common indication in trauma group is vitreous hemorrhage.

INTRODUCTION

Aim of the Study

To assess the importance of B-scan ultrasonography in the diagnosis of ocular and orbital diseases.

Objectives

- Evaluation of posterior segment lesions in eyes with opaque and non-opaque media
- Evaluation of retinochoroidal lesions with clear media
- To evaluate orbital disorders
- Identification & localisation of intraocular foreign bodies
- Correlation of ultrasonography findings with clinical diagnosis.

MATERIALS AND METHODS

Inclusion Criteria

- Patients with posterior segment lesions in eyes with opaque and non-opaque media
- Patients with clear media for evaluation of retinochoroidal lesions especially tumors
- Patients with orbital and optic nerve lesions
- Patients with trauma for identification & localisation of intraocular foreign bodies

Exclusion Criteria

- Patients with rupture globe
- Patients with chemical injuries
- Patients with head trauma and unconscious patients

Methodology

- Type of study: Population based Observational Cross sectional study
- Place of study: Out patients Department of ophthalmology, Rangaraya Medical College, Government General Hospital, Kakinada.
- Period of study November 2021 to feb 2023
Sample size 250
The subjects for the study were selected from the following sources:
 - Patients attended to ophthalmic OPD
 - Patients diagnosed with some posterior segment pathology and those who are advised to undergo B-scan
 - In-patients of Department of Ophthalmology, Government General Hospital, Kakinada
 - Out-patients and in-patients of various other departments of Government General Hospital, who were referred to the Department of Ophthalmology.

First the patients are explained about this procedure to relieve apprehension. An informed verbal consent was obtained. A detailed relevant clinical history was taken. The best corrected visual acuity and refractive status were recorded. Anterior segment biomicroscopic examination was performed. The intraocular pressure was recorded with the Goldmann applanation tonometer. Examination of the posterior segment was carried out using the direct ophthalmoscope, indirect ophthalmoscope and slit lamp biomicroscopy in patients with orbital diseases. Exophthalmometry was carried out in patients with orbital diseases. A provisional clinical diagnosis was

made. Then the patient is seated comfortably. In case of infants the procedure is done with the child in mother's lap. Scanning is done with B-SCAN probe coated with coupling gel. The patient is asked to open the other eye and look in the required direction. This is done to be sure of the section of the eye being scanned. The globe is scanned thoroughly using longitudinal, transverse, oblique and axial scans. Necessary care is taken to avoid artifacts. When sound attenuation due to lens interfered with imaging the pathology axial scans are avoided and paraxial scans are taken. Dynamic study is made by asking the patient to the eye side to side rapidly and suddenly stopping the eye motion. The required images are frozen and a thermal printout is taken. Then the patient's eye are cleaned using cotton pads. Analysis of the image is done both in real time and after freezing the image. Whenever possible the results of B-SCAN are confirmed using other modalities like indirect ophthalmoscopy, X-ray, CT- scan, histopathological techniques.

RESULTS

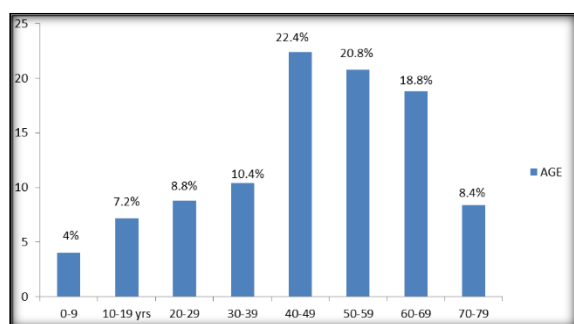


Figure 1: Distribution of Cases According To Age

Maximum number of cases belongs to 40-49 age group, followed by 50-59 years.

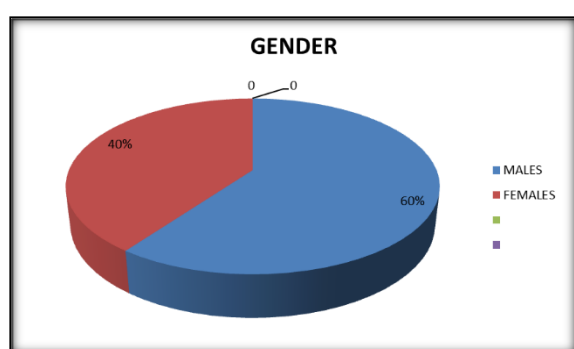


Figure 2: Distribution of Cases According To Gender

Out of 250 cases 150 cases (60%) are males and 100 cases (40%) are females.

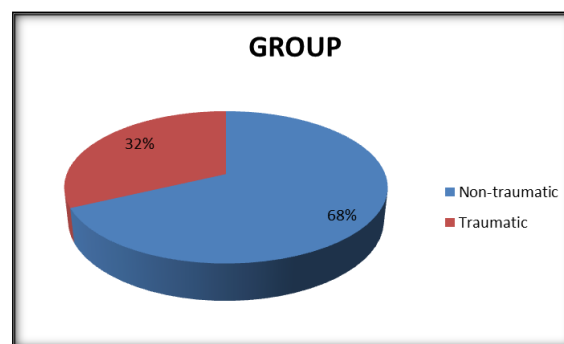


Figure 3: Distribution of Cases According To Trauma

Out of 250 cases 170 cases (68%) belongs to Non-Traumatic group and 80 cases (32%) belong to Traumatic group

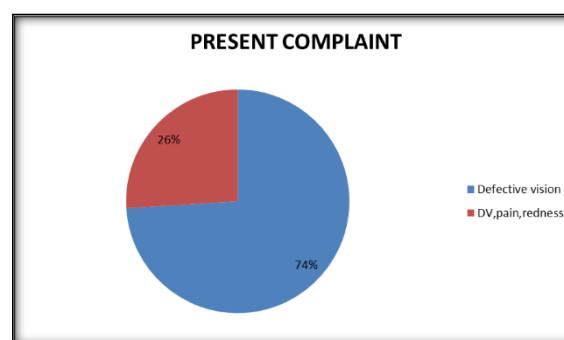


Figure 4: Comparison of Group According To Present Complaint

Defective vision is the most common complaint which is seen in 185 cases(74%).Defective vision associated with pain, redness is seen in traumatic cases and in post-operative cases which constitute about 26%.

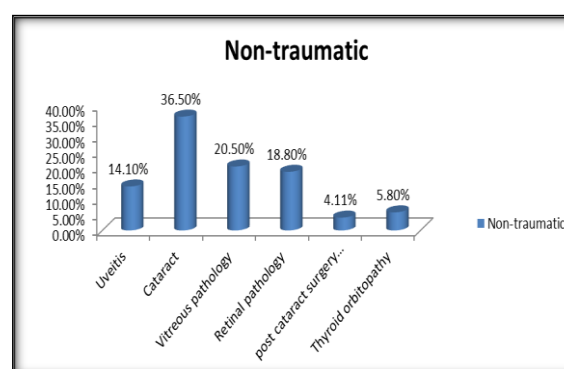


Figure 5: Distribution of Cases According To Indications for B-Scan in Non-Traumatic Group

Out of 170 cases with Non-traumatic group, most common indications are cataract in 65 cases, vitreous pathology in 38 cases, retinal pathology in 32 eyes, uveitis in 24 cases, thyroid orbitopathy and post op cases with hazy media are other indications.

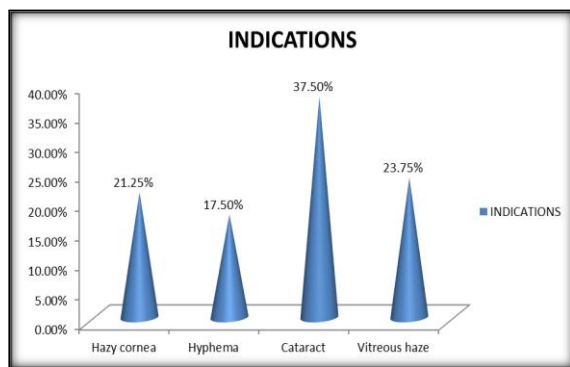


Figure 6: Distribution of Cases According To Indications for B-Scan in Traumatic Group

Common indication for B-SCAN in traumatic group are cataract in 30 cases (37.50%) followed by vitreous haze 19 cases (23.75%), hazy cornea in 17 cases (21.25%) and hyphema in 14 cases (17.50%).

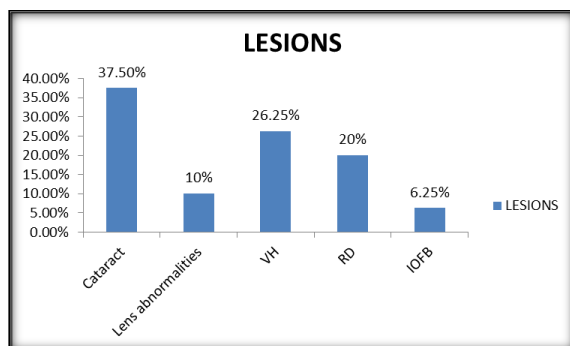


Figure 7: Distribution of Cases According To Lesions in Trauma Group

Most common lesions in traumatic group are 30 cases of traumatic cataract, 21 cases of vitreous haemorrhage and 16 cases of retinal detachment, IOFB and dislocated/subluxated lens are other lesions.

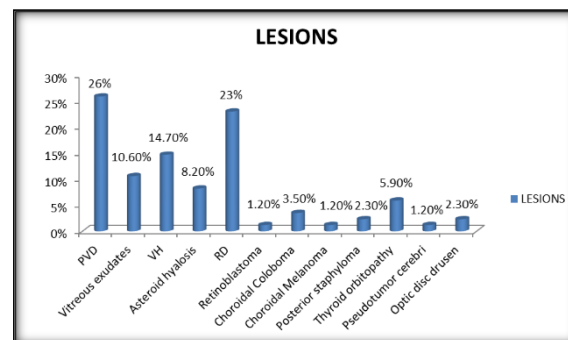


Figure 8: Distribution of Cases According To Lesions in Non-Traumatic Group

Most common lesions seen in Non-Traumatic group are PVD which is seen in 46 eyes (27%), vitreous haemorrhage seen in 26 eyes (15.3%) and RD was seen in 39 eyes (23%). Thyroid orbitopathy was seen in 10 cases (5.9%) shows enlargement of muscle bellies and posterior staphyloma in 4 eyes (2.3%) due to high myopia of axial length 28-32mm.

Table 1: Distribution of Cases According To Age

Age	Frequency	%
0-9 Yrs	10	4.0%
10-19 Yrs	18	7.2%
20-29 Yrs	22	8.8%
30-39 Yrs	26	10.4%
40-49 Yrs	56	22.4%
50-59 Yrs	52	20.8%
60-69 Yrs	45	18.0%
70-79 Yrs	21	8.4%
Total	250	100%

Table 2: Distribution of Cases According To Gender

Group	No. Of Cases	%
Males	150	60%
Females	100	40%
TOTAL	250	100%

Table 3: Distribution of Cases According To Trauma

Group	Frequency	%
Non-Traumatic	170	68%
Traumatic	80	32%
Total	250	100%

Table 4: Comparison of Group According To Present Complaint

Complaint	Frequency	%
Defective Vision	185	74%
Defective Vision, Pain Redness	65	26%
Total	250	100%

Table 5: Distribution of Cases According To Indications for B-Scan in Non-Traumatic Group

Indications	Frequency	%
Uveitis	24	14.1%
Cataract	62	36.5%
Vitreous Pathology	35	20.5%
Retinal Pathology	32	18.8%
Post Cataract Surgery With Hazy Media	7	4.11%
Thyroid Orbitopathy	10	5.8%
Total	170	100%

Table 6: Distribution of Cases According To Indications for B-Scan in Traumatic Group

Indications	Frequency	%
Hazy Cornea	17	21.25%
Hyphema	14	17.50%
Cataract	30	37.50%
Vitreous Haze	19	23.75%
Total	80	100%

Table 7: Distribution of Cases According To Lesions in Trauma Group

Lesions	Frequency	%
Cataract	30	37.5%
Dislocated/ Subluxated lens	8	10.00%
VH	21	26.25%
RD	16	20.00%
IOFB	5	6.25%
TOTAL	80	100%

Table 8: Distribution of Cases According To Lesions in Non-Traumatic Group

Lesions	Frequency	%
Pvd	44	25.9%
Vitreous Exudates	18	10.6%
Vh	25	15.3%
Asteroid Hyalosis	14	8.2%
Rd	39	23%
Retinoblastoma	2	1.2%
Choroidal Coloboma	6	3.5%
Choroidal Melanoma	2	1.2%
Posterior Staphyloma	4	2.3%
Thyroid Orbitopathy	10	5.9%
Pseudotumor cerebri	2	1.2%
Optic Disc Drusen	4	2.3%
Total	170	100%

DISCUSSION

Ultrasonic imaging of ocular structures with its acoustical advantages and tissue signature characterisation is of great value to the eye surgeon for the assessment of posterior segment when funduscopy is not possible due to opaque ocular media from various causes and also to identify subtle changes in soft tissues of orbit. The results and ultrasonic observations of various lesions with both opaque and clear media of the present study are discussed as under Age range of patients in this study was from 2 months to 79 years and most of the patients were above 40 years of age group. In present study out of 250 eyes Non-Traumatic group constitutes about 170 cases (68%) and traumatic group about 80 eyes (32%). In present study males constitute about 60% and females were 40%. This is because males are prone to ocular injuries as they are involved in outdoor occupational activities.

Causes of opaque media

Cataract was the leading cause of opaque media being present in 92 (36.8%) of the 250 eyes included in the present study. 62 were non traumatic and 30 were traumatic cases other major causes of opaque media were retinal detachment and vitreous haemorrhage.

Retinal Detachment

In present study 55 eyes (22%) of RD are seen in 8 cases are due to trauma and 4 cases are due to high myopia. Tractional RD are seen in 16 cases of which 8 cases are due to trauma and 6 cases are due to proliferative diabetic retinopathy, 2 cases are due to retinal detachment following cataract surgery. Exudative RD is seen in 3 cases having endophthalmitis. 4 cases (16.6%) had retinal detachment with vitreous hemorrhage

Vitreous Hemorrhage

In the present study vitreous haemorrhage is seen in 47 cases (18.8%). 16 cases of vitreous haemorrhage

are due to PDR, 21 cases are due to trauma, On follow up, there was spontaneous resolution of haemorrhage in 12 cases followed by trauma. 4 cases seen in younger age group are due to high myopia with retinal tears, 6 cases are due to post op cataract surgery with history of hypertension and diabetes In the present study most common vitreous pathology to be noted is vitreous haemorrhage Since fresh and mild vitreous haemorrhage is difficult to pick up on B scan, especially at low gain settings, it is important to increase the gain and scan the eye before the conclusion of examination.

Posterior Vitreous Detachment

In the present study higher number of cases of posterior vitreous detachment 44 cases (17.6%) of PVD are seen and 6 cases are due to trauma and remaining cases are due to vitreous degeneration as an incidental finding in pre-operative evaluation of cataract surgery patients.

Retinoblastoma

2 cases with 4 eyes studied in this series for the evaluation of leukocoria are diagnosed as retinoblastoma in the present study .The tumor projects from retina into vitreous compartment as a white or pinkish mass. Ultrasonography has advantage over fundoscopy in depicting the internal characteristics of a suspected tumor such as calcific foci in retinoblastoma and diagnosis was confirmed by CT scan. Thus B scan not only helped in the diagnosis of eyes with leukocoria, but also in determining the extent of spread of retinoblastoma, and thus its accurate staging. Considering the difficulties of examining children, the need for anaesthesia etc, the ease of repeatability of B scan was a real advantage. B scan could also be used to screen the fellow eye, to know the response to therapy and to rule out recurrences

Posterior Staphyloma

In the present study 4 (2.3%) cases of posterior staphyloma are due to high myopia with axial length 27-32 mm are observed in the present study.

Asteroid Hyalosis

One of the most common incidental posterior segment finding. Asteroid hyalosis may be due to age, previous inflammation or due to systemic causes. Present study reported more number of cases with asteroid hyalosis 14 (8.2%) compared to the other studies.

Intraocular Foreign Body

In the present study 5 (6.25%) cases shows IOFB, 3 cases presented with a foreign body in the posterior lens capsule and the other 2 cases with metallic foreign bodies were lodged in the anterior vitreous. Transverse mode of B- scan clearly localizes the IOFB within the posterior lens, immediately in front of the posterior lens capsule Another advantage of B scan over other radiological methods was its easy repeatability owing to lack of radiation exposure. The real time nature of B scan, scored over other techniques in localization of IOFB

Choroidal Detachment

Two eyes had choroidal detachment. USG was able to differentiate serous choroidal detachment seen in one eye from the haemorrhagic detachment in the other following cataract surgery i.e, post op case with hazy media

Endophthalmitis

Endophthalmitis was diagnosed in 4 cases by USG, two cases following penetrating trauma. One case after cataract surgery and one case of endogenous endophthalmitis following systemic infections. This highlighted the role of USG as a prognostic indicator in endophthalmitis patients.

Choroidal Coloboma

In the present study 6 (3.5%) cases are presented with choroidal coloboma,

Thyroid Eye Disease (TED)

In the present study 10 (5.9%) cases presented with thyroid eye disease, 6 of our cases shows bilateral, asymmetric muscle thickening with medium to high internal reflectivity involving middle and posterior portion of muscle belly. Medial rectus is most commonly involved.

Optic Nerve Head Drusen

In the present study 4 (2.3%) cases were presented with optic nerve head drusen.

Choroidal Melanoma

In the present study 2 cases were presented with choroidal melanoma, B-scan shows Solid mass, dome shaped or mushroom collar button configuration due to tumor growth through a ruptured Bruch's membrane

CONCLUSION

This is a population based cross sectional study conducted February 2021 to February 2023 at GGH, Rangaraya Medical College, Kakinada. During the above mentioned period a total of 250 eyes were seen In the present study mean age of the patients was 44.6 years out of 250 cases. Males are 150(60%) and females are 100 cases (40%). Out of 250 cases Non-traumatic were 170 and traumatic were 80 cases. Defective vision 185 cases (74%) is the most common clinical presentation. In few cases defective vision associated with pain, redness is seen in traumatic cases, post-operative and other cases contributing 65 cases (26%). Most common indication for B- scan in Non traumatic group are cataract 36.8%, followed by vitreous pathologies like PVD in 44 cases (17.6%) and vitreous hemorrhage 47 cases (18.8%), retinal detachments 55 cases (22%). Patients with dense cataract with RAPD, complicated cataracts and cataracts in the younger age are indicated for B- scan in present study Most common indication for B-scan in Traumatic category are traumatic cataract 30 (37.50%), hazy cornea 17 cases (21.25%), hyphema 14 cases (17.50%) Common lesions in Non- Traumatic group are vitreous pathologies like PVD 25.9%, vitreous exudates 10.6%, vitreous hemorrhage 15.3%, asteroid

hyalosis 8.2%, RD 23%, choroidal coloboma, choroidal melanoma & posterior staphyloma constitute the other lesions. Common lesions seen in traumatic group are vitreous hemorrhage seen in 26.25%, 16 cases of RD are due to trauma, dislocated & subluxated lens seen in 8 cases, endophthalmitis 2 cases following penetrating trauma. Orbital pathologies like Thyroid orbitopathy constitute about 10(5.9%) of cases. 6 of our cases shows bilateral, asymmetric muscle thickening involving middle and posterior portion of muscle belly. Medial rectus is most commonly involved. Pseudotumor cerebri of 2 cases shows entire muscle involvement including muscle bellies and tendons. Optic disc drusen was seen in 4 cases.

Conclusion

1. Most of the cases who underwent B-scan were between 40 -49 years of age group
2. Non-Traumatic cases are more common than traumatic cases
3. Most common indication for B-scan in Non-Traumatic group are dense cataracts followed by vitreous pathologies
4. Most common posterior segment pathology noted in Non-Traumatic group were PVD followed by RD
5. Most common indication for B-scan in Traumatic group was traumatic cataract
6. Most common abnormality noted in traumatic group was vitreous hemorrhage followed by RD
7. Most common orbital pathology noted was thyroid orbitopathy
8. In most of the cases B-scan ultrasonography has been useful in supplementing the clinical diagnosis
9. Pre-operative evaluation of posterior segment in patients with dense cataracts with RAPD , complicated cataracts and cataracts in younger age group can be used to detect pathologies that may influence the surgical strategy and the post-operative visual prognosis
10. B-mode ultrasound is extremely useful and accurate in the detection, of intraocular tumours
11. Ocular trauma is the important cause of morbidity and visual loss , so early diagnosis helps in appropriate management
12. B-Scan ultrasonography is painless, non-invasive, safe, rapid, cost-effective, non-ionizing real time diagnostic tool that provides valuable diagnostic information of various ophthalmic disorders

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