



ROLE OF B-SCAN ULTRASONOGRAPHY IN EVALUATING POSTERIOR SEGMENT OF THE EYE IN THE EVENT OF NON VISUALIZATION OF FUNDUS

Ophthalmology

Dr. Vaibhav Kumar

P.G. Resident Doctor, Department of Ophthalmology, RNT Medical College, Udaipur

Dr. Dhan Singh Meena*

Associate Professor, Department of Ophthalmology, RNT Medical College, Udaipur
*Corresponding Author

Dr. Ashok Kumar Bairwa

Sr. Professor, Department of Ophthalmology, RNT Medical College, Udaipur

ABSTRACT

BACKGROUND: B scan is a pulse-echo two dimensional imaging system used to visualize posterior segment in opaque media.

AIMS AND OBJECTIVE: Role of B-Scan Ultrasonography in Evaluating Posterior Segment of the Eye in the Event of Non Visualization of Fundus.

MATERIALS & METHODS: The source of data for the study are patients attending the outpatient Department of Ophthalmology in RNT Medical College, Udaipur from November 2017 onwards. Each patient was subjected to detailed history taking.

RESULTS: In this study majority of case (35%) were above 60 years of age. Out of 200 patient 122 were male 78 were female patient. Diminution of vision & trauma of eye were leading symptom. Most common observed indication for B-scan in our study was opaque media due to lenticular & corneal pathology. Most common posterior segment pathology observed in opaque media was vitreous haemorrhage PVD followed by retinal detachment and choroid detachment. Other miscellaneous B-scan findings were vinitis, PHPV, retained IOFO/ optic disc cupping.

CONCLUSION: Ultrasonography has helped us immensely in diagnosis and proper evaluation of patients having opaque media and for planning a surgery. We can assess the visual prognosis in these patients. This may influence the surgical strategy and also the postoperative visual outcome.

KEYWORDS

B-Scan; Posterior Segment; Fundus; Ultrasonography

INTRODUCTION

B scan (brightness scan) is a two dimensional imaging system. It was first introduced by Baum and Greenwood in 1958. Importance of the instrument and technique is emphasised by Karl Ossoining. It is only practical method for obtaining image of posterior segment of the eye in opaque media. It also provides adequate information about ocular and orbital diseases which is not assessed clinically.

Ultrasound is a safe technique, cheaper and more affordable compared to other techniques that would also provide good data (such as OCT, CT, MRI)¹. Dynamic examination is important and with B scan ultrasound it's possible to study characteristics of the motion and topography of pathological intra ocular conditions, enabling identification of detachment of vitreous membranes and vitreous retinal adhesions⁽²⁾. B (Brightness) scan along with A scan are important for the diagnosis of posterior segment pathology and better demonstration of topographic relationship. (2) Bscan is a non-invasive, quick, reliable and cheap diagnostic technique for evaluation of posterior segment pathology. It provides cross sectional image of pathology and is valuable in detecting unsuspected posterior segment pathology.²

Method of Performing B-SCAN INSTRUMENTATION

It produces two dimensional section using both horizontal and vertical dimensions of screen to indicate configuration and location. B scan probe contains transducer that oscillates back and forth near the tip of probe. It is placed opposite to the area of interest. A section of tissue is examined by oscillating transducer eg to assess pathology at 3 o'clock probe is placed at 9 o'clock.

PRINCIPAL

Pulse echo system. The piezoelectric material in transducer undergoes mechanical vibration in response to electric signal. This vibration causes ultrasound waves to pass through ocular and orbital tissue. Some waves are absorbed by tissue and remaining wave received by probe as echo. This echo is then received by receiver and displayed on screen. Echo is represented as dots. Weaker echoes are detected by increasing gain.

PROBE ORIENTATION

B-scan probe has marker, either dot/line

Macula is considered centre of posterior fundus hence it is used as a

reference point for the three primary probe orientations

- 1) Transverse: lateral extent of the lesion and encompass around 6 clock hours. The probe should be parallel to limbus with gaze toward area of interest
- 2) Axial: the probe centre on corneal vertex with patient in primary gaze.
- 3) Longitudinal: Anteroposterior extent of lesion. The probe should be perpendicular to limbus

Intraocular pathology findings on B scan

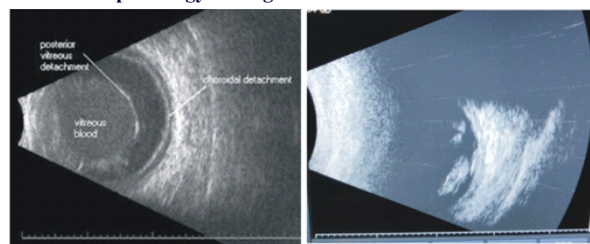


Fig. A

Fig. B

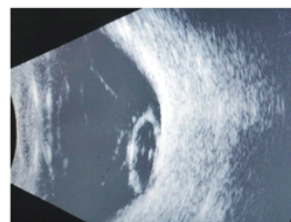


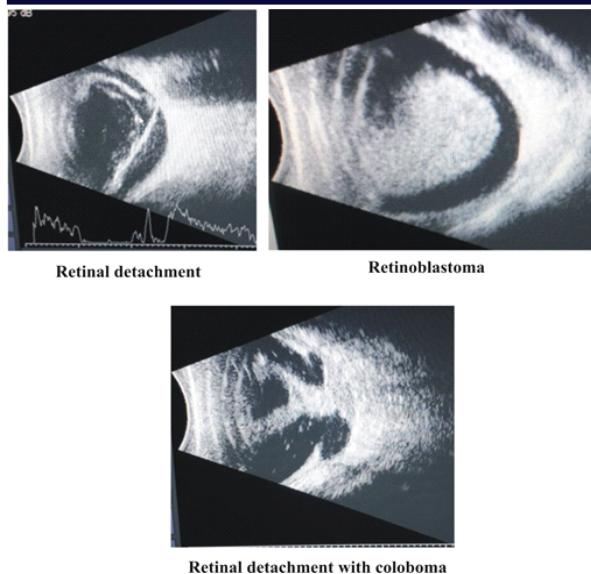
Fig. C

Fig1: A: Vitreous haemorrhage with PVD; B: IOFB; C: DISLOCATED LENS

RETINAL DETACHMENT shows high reflectivity. In total retinal detachments, it is funnel shaped.

RETINOSCHISIS is seen as a focal, smooth, thin, dome-shaped abnormality.

RETINOBLASTOMA, areas of calcification are present as multiple highly reflective foci (Fig 2).

**Fig. 2**

Choroid Detachment shows Double spike/M shaped spike. When extensive, multiple detachments known as kissing choroids.

MALIGNANT MELANOMA shows acoustic hollowing (Fig. 3).

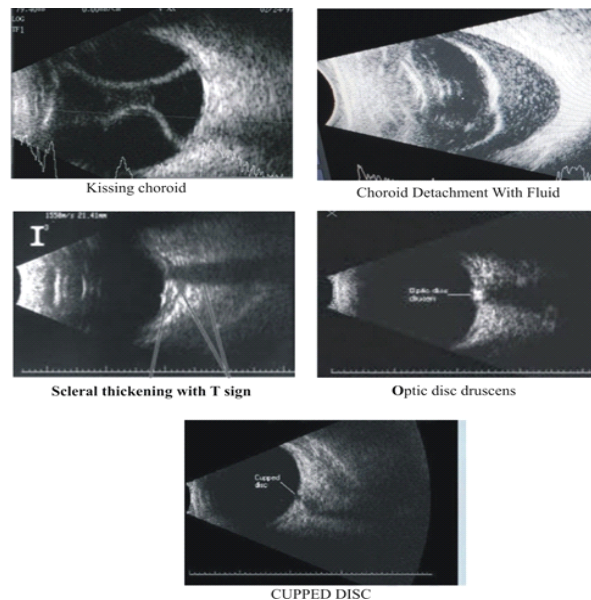
Ciliary body

The ciliary body is visualized with high-resolution scanning. A ciliary body detachment has a low-to-medium reflective (Fig. 3).

Scleritis

Scleral thickening present in nanophthalmos, phthisis bulbi, and in cases of scleritis. It presents as a T-sign when posterior and adjacent to the optic nerve.

In Myopes becus of very thin sclera form posterior staphylomas, it appear as posterior hump on b scan (Fig. 3).



Optic nerve

Optic nerve coloboma shows excavation.

Optic disc drusens is highly reflective nodules with calcification.

Papilledema shows crescent sign -echolucent area around optic nerve (Fig. 3).

AIMS AND OBJECTIVE

Role of B-Scan Ultrasonography in Evaluating Posterior Segment of the Eye in the Event of Non Visualization of Fundus.

MATERIALS & METHODS

The source of data for the study are patients attending the

Ophthalmology OPD in RNT Medical College, Udaipur from November 2017 onwards. Each patient was subjected to detailed history taking, followed by-

- External ocular examination
- Visual acuity for near and distance using snellens chart
- Refraction and correction
- Slit lamp examination
- NCT/Tonometry
- Fundoscopy
- B-scan

Methods of collection of data (including sampling procedure):

A descriptive study of patients fulfilling the mentioned inclusion criteria was a part of this study. They were evaluated using a standard B scan machine with the contact method.

The study includes

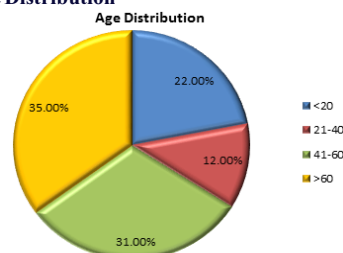
- All patients, of all age groups, in the event of non visualization of fundus.

The study excludes

- All cases suspected to have isolated anterior segmental and orbital lesions.
- Patient with high risk of / with extrusion of intraocular contents.

RESULTS

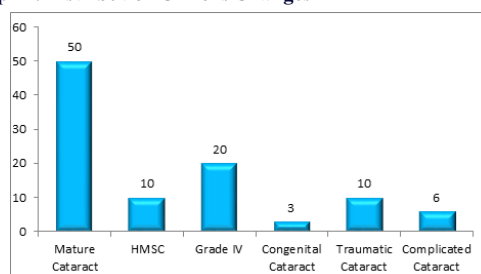
Graph 1: Age Distribution



Majority of the patient (35%) requiring ophthalmic B-scan as an important diagnostic tool were above 60 years of age. 31% patient were between 41 to 60 years of age. 12% cases were between 21 to 40 yrs of age young age. 22% of cases were less than 20 yrs of age (Graph 1). 122 (61%) were male patients and 78 (39%) were female patients.

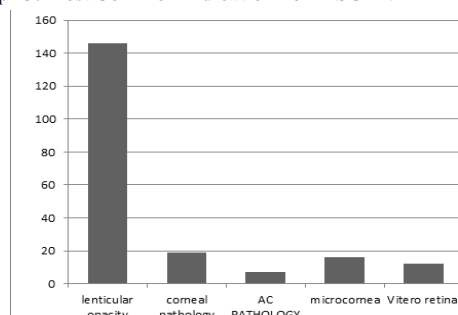
79% of patients had unilateral involvement and 21% had bilateral involvement.

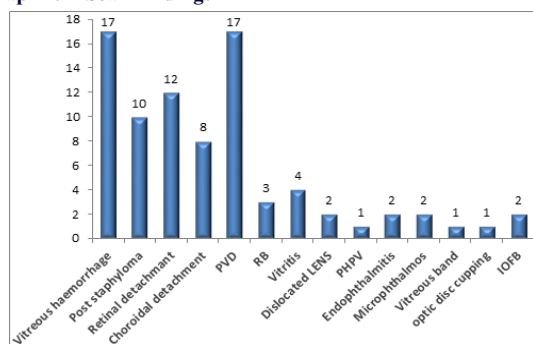
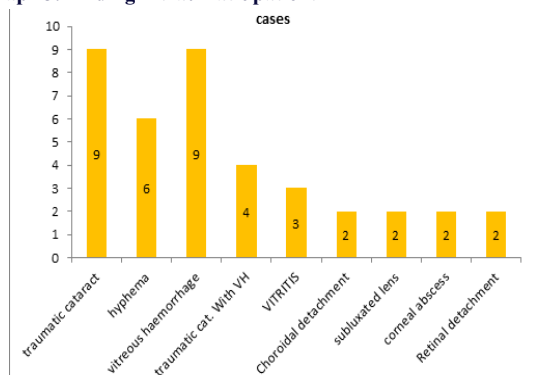
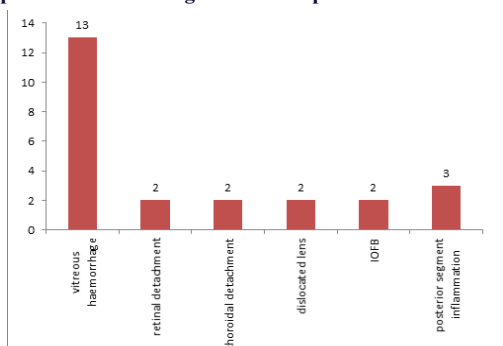
Graph 2: Distribution Of Lens Changes



50 patient of mature cataract, 20 patient of brown cataract, 12 patient of hypermature cataract, 6 pt. of complicated cataract, 10 pt. of traumatic cataract and 3 pt. of Congenital Cataract (Graph 2).

Graph 3: Most Common Indication For B-SCAN



Graph 4: B-Scan Findings**Graph 5: Finding in traumatic patient****Graph 6: B-SCAN finding in traumatic patients**

DISCUSSION

B scan is of great value in planning, assessment and management of posterior segment pathology in patient having dense cataract and patient with ocular trauma. There is a risk of poor visual prognosis in patients with cataract and posterior segment abnormalities. In these Situations, B-Scan provides a method of assessing the structural changes in the posterior segment in these patients. In the 200 patients we studied, we were able to demonstrate topographic relationship of pathology like Retinal detachment, vitreous haemorrhage, coloboma, IOFB, vitreous degeneration, posterior vitreous detachment, dislocated lens/cortical matter and posterior staphyloma. In this study maximum patient 70(35%) were in >60 year of age. Out of 200 patient 122 were male and 78 female.

In this study 50 patients has mature cataract, 20 pt. of brown cataract, 12 pt. of hypermature cataract, 6 pt. of complicated cataract, 10 pt. of traumatic cataract and 3 pt. of Congenital Cataract. This was Comparable to the study done by Qureshi.

30 patient had history of trauma (Graph 6). Most common finding in traumatic patients were traumatic cataract, vitreous haemorrhages accounting to 9 cases each followed by hyphema accounting to 6 cases followed by traumatic cataract with vitreous haemorrhages accounting to 4 cases followed by retinal detachment, choroidal detachment, subluxated lens, corneal abscess accounting to 2 cases each.

The guarded visual prognosis was explained to patient prior to surgery. Vitreous haemorrhages and posterior vitreous detachment observed in 17 patients each, retinal detachment in 12 patients. Posterior

staphyloma in 10 patient, choroidal detachment in 8, vitritis observed in 4 patients, retinoblastoma was observed in 3 patients, microphthalmos in 2 patients, Dislocated lens/cortical matter in 2 patients, IOFB in 2 patients, vitreous band was found in 1 patient, PHPV was found in 1 patient, Optic disc cupping was found in 1 patient.

In this study 120 patients have Normal B-scan which constitutes to 60% of the study group.

In our study 12 patients had Retinal detachment. Long standing RD appeared as funnel shaped highly reflective membranes with minimal after movements. This was helpful in pre operative assessment and planning the surgery and to explain the visual prognosis in these patients before surgery.

In the patients with PVD shows highly reflective membrane with after movements. In 17 patients who had vitreous hemorrhage, the density and location of the hemorrhage was recorded and followed up. IOFB was found in a patient who also had an associated vitreous hemorrhage.

A study showed that retinal detachment was present in 25 patients (3%)⁴ in other studies, 3 patients (2.59%)⁵ and 4.5% patients had RD⁶. These observations are comparable to our study which showed 12 patients with RD (6%).

In our study there were 17 patients (8.5%) had PVD and vitreous hemorrhage comparable with other study² and 2 patients (1.7%)⁵.

In a study by Qureshi et al² posterior staphyloma was seen in 5 patients (0.6%) and 7.2% patients in the Blumenthal EZ[®] study. Our study is showed posterior staphyloma in 10 patients (5%). Intra ocular foreign body was found in 6 patients (1%) in the Qureshi study. Our study showed intra ocular foreign body in 2(1%) patients. Other finding in our study were dislocated lens/cortical matter, retinoblastoma, PHPV, vitreous band.

CONCLUSION

Ultrasonography has helped us immensely in diagnosis and proper evaluation of patients having opaque media and for planning a surgery. We can assess the visual prognosis in these patients. This may influence the surgical strategy and also the postoperative visual outcome.

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