Role of Ultrasonography in Evaluation of Pathologies of Posterior Segment of the Orbit

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Abstract: In the diagnosis and treatment of intraocular diseases, imaging plays a crucial role . It makes it easier to determine if the lesion is in the anterior or posterior segment. USG is widely used as the first radiological modality since it is safe, noninvasive, portable, and economical. A strong anatomical base is provided by B-mode ultrasonography, which also aids in ruling out a number of pathologic diseases that might damage the posterior portion of the eye. It can help the ophthalmologist in evaluating diagnoses and treatment choices.

Index Terms: B scan ultrasonography, Vitreous hemorrhage, Vitreous detachment, Retinal detachment.

I. INTRODUCTION

A wide range of medical diseases that affect the eye can affect people of all ages, from newborns to the elderly. Although clinical and ophthalmoscopy are less helpful, high resolution sonography can accurately assess many posterior segment lesions that occur in the eye[1]

Most patients with eye disease are diagnosed on the basis of a slit-lamp exam and a fundoscopy. Ultrasound (US) aids in the assessment of a number of ocular illnesses in situations where the media is opaque or cataractous alteration prevents the vision of the posterior region[2]. It can assist radiologists and ophthalmologists in making diagnoses and selecting appropriate treatments. High frequency sound waves are used in B-scan (Brightness Modulation Scan). Without the use of anaesthetics or sedative medication, it can be done successfully on out-patients[3]. It helps to better illustrate the topographic relationship and morphology of lesions in the posterior region. A clear anatomical background is provided by B-scan, which also helps to exclude out pathologic conditions of posterior segment of eye.

B-scan can be repeatedly performed to assess the various responses to therapy since ocular sonography has no adverse effects and is cost effective[4]. Colour Doppler imaging has role in evaluation of intraocular tumors and also to differentiate vitreous haemorrhage from retinal detachment. The purpose of this study was to visualize the status of posterior segment of eye with B-scan ultrasound and to find out any posterior segment lesion in such cases.

II. AIM: To study the role of B-scan ultrasound in posterior segment pathology of eye.

III. MATERIALS & METHODS

In this cross-sectional study undertaken in a tertiary health care center, patients with significant ophthalmic complaints were evaluated from April 2021 to November 2022 (7 months). The study included patients referred for high resolution ultrasonography from Department of Ophthalmology.42 patients were subjected to clinical Ophthalmological examination and B scan USG.

High resolution USG was done with gray scale real time scanner Phillips Affiniti 70G with transducer L-10-5, and colour Doppler was used when required for further evaluation. The probe is placed over the closed eyelid after application of coupling gel

Inclusion criteria:- Patient's were selected on the basis of having opaque media e.g. hypheama, cataract, corneal opacity ,vitreous hemorrhage and suspected cases of intraocular tumour,vitreous hemorrhage, retinal detachment etc and first the clinical diagnosis is made then the radiological diagnosis is made.

Exclusion criteria: - Patient who had active painful ocular surface infection with extrusion of intraocular contents, or patients who recently underwent surgery were excluded from the study.

IV. RESULTS & DISCUSSION

There were 30 males and 12 females in the study, ranging from 0-60 years. Out of 42 cases, 15(35.7%) revealed features suggestive of vitreous abnormalities. 13 (30.9%) cases showed features suggestive of retinal abnormalities, 8 (19%) cases revealed features suggestive of lens abnormalities. Follow-up confirmed the radiologic diagnosis.

Table-1: Age / Sex wise distribution in patients with ocular abnormalities

Age in years	Males		Females		Total	
	No. of Cases	%	No. of Cases	%	No. of Cases	%
0-10	2	6.6	3	25	5	11.9
11-20	5	16.6	2	16.6	7	16.6
21-30	5	16.6	1	8.3	6	14.2
31-40	5	16.6	2	16.6	7	16.6
41-50	8	26.6	3	25	11	26.1
51-60	5	16.6	1	8.3	6	14.2
Total -	**30**	**100**	**12**	**100**	**42**	**100**

Ocular anomalies are thought to affect men more frequently than women. 71% of patients in the current study were men, compared to 28% who were women. In the current study, the majority of patients (26.1%) were between the ages of 41 and 50.

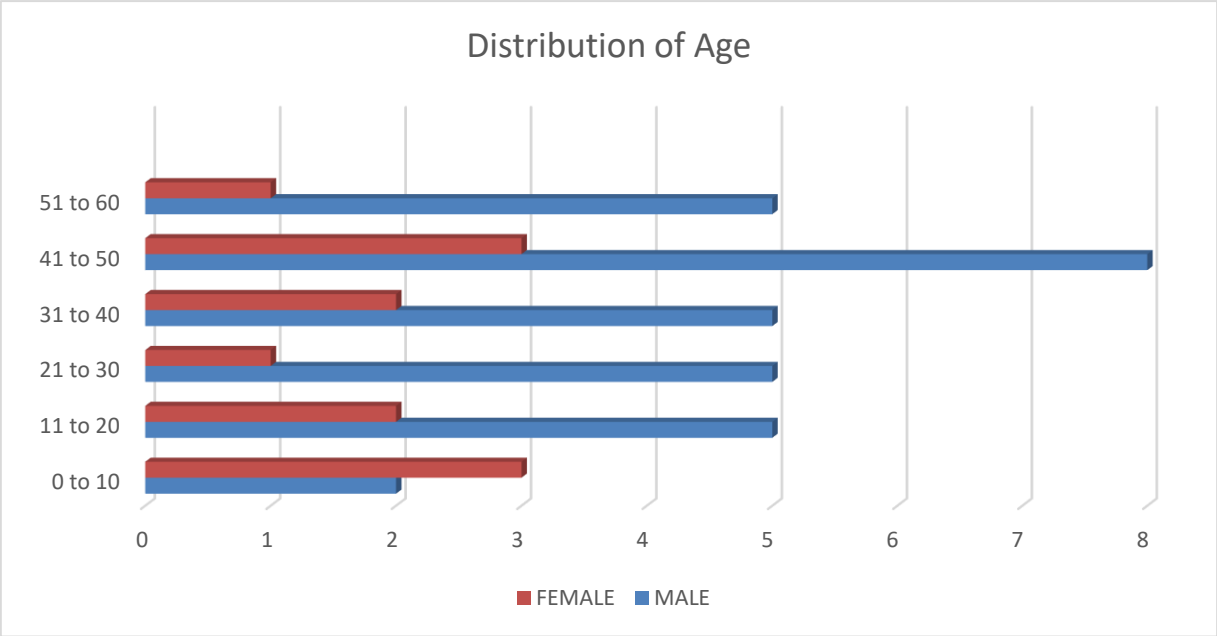
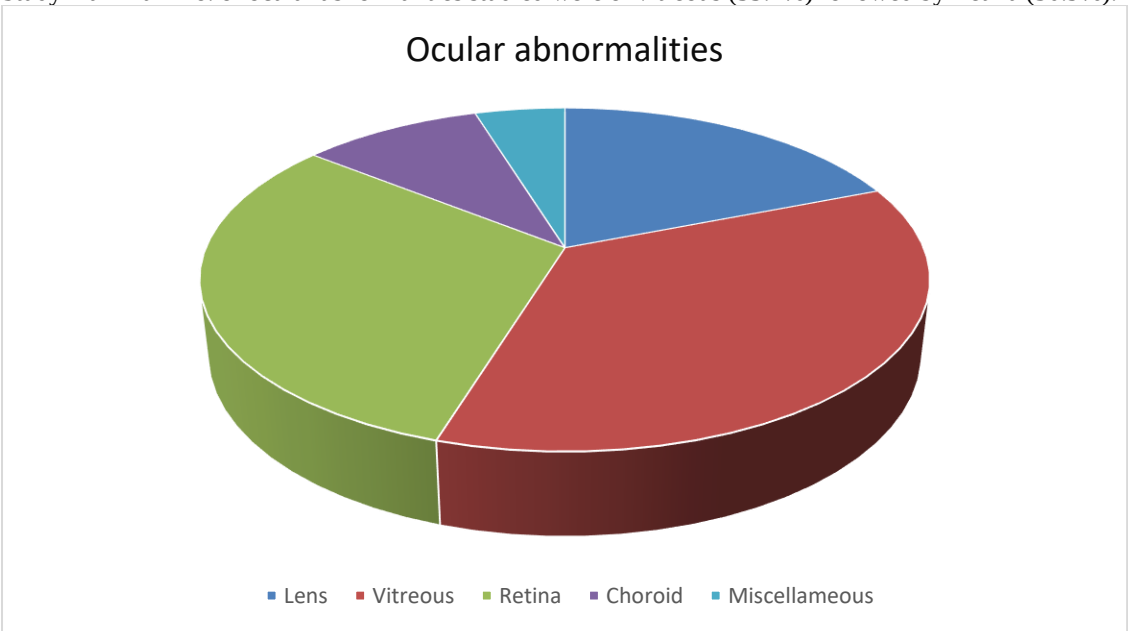


Table -2: Distribution of various ocular abnormalities

Ocular Abnormalities	**No. of Abnormalities**	**%**
Lens	08	19
Vitreous	15	35.7
Retina	13	30.9
Choroid	4	9.5
Miscellaneous	2	4.7
Total	42	100

In Present Study maximum no. of ocular abnormalities studied were of vitreous (35.7%) followed by Retina (30.9%).



In this study total 42 patients were evaluated in which 19% are with lens pathologies,35.7% with vitreous abnormalities,30.9% with retinal pathologies and 9.5% with choroidal pathologies and 4.7% cases are with miscellaneous causes.

Table – 3: Spectrum of vitreous abnormalities in total patients

Vitreous Abnormalities	**No. of eyes having Vitreous Abnormalities**	**Percentages (n=39)**
Vitreous Detachment	06	40
Vitreous hemorrhage	09	60

Total	**15**	**100**

In present study among Vitreous Abnormalities,Vitreous hemorrhage (60%) followed by Vitreous detachment (40%).

Table – 4: Spectrum of retinal abnormalities in total patients

Various Abnormalities	**No. of eyes having retinal abnormalities**	**Percentage % (n=25)**
Retinal Detachment	10	76.9
Retinal hemorrhage	02	15.3
Retinoblastoma	01	7.6
Total	**13**	**100**

In present study among retinal abnormalities, retinal detachment (76.9%) followed by retinal hemorhhage (15.3%) and retinoblastoma in 7.6%.

Table – 5: Spectrum of choroidal abnormalities in total patients

Choroidal Abnormalities	**No. of eyes having Choroidal abnormalities (n = 5)**	**Percentage %**
Choroidal Detachment	3	75
Other lesions :		
Choroidal Hemorrhage	1	25
Total	**4**	**100**

Choroidal abnormalities include maximum cases of choroidal detachment (75%), choroidal hemorrhage was seen in 25%.

Table – 6: Spectrum of lens abnormalities in total patients

Various Abnormalities	**No. of eyes having Lens Abnormalities**	**Percentage (n=22)**
Cataract	08	100
Other	0	0
Total	**22**	**100**

wo cases among miscellaneous abnormalities seen were of foreign body in posterior chamber & posterior staphyloma .

There are many common ocular disorders including the lens, vitreous, choroid, and retina. It is difficult to make a clinical diagnosis when the light-conducting medium are opaque. The B-scan has shown to be a very useful technique for accurately diagnosing a wide range of ocular disorders. Some of the added benefits include its non-invasiveness, cost-effectiveness, and lack of exposure to ionising radiation. Ocular abnormalities were more frequently seen in individuals in their fourth to fifth decades in the current investigation than in female patients. Males are thought to be more likely than females to have ocular defects. Out of 100 patients, Chaudhari H et alstudy .'s on the use of ultrasonography in the evaluation of ocular lesions found that 58 patients were men and 42 patients were women[5].

In this study total 42 patients were evaluated in which 19% are with lens pathologies,35.7% with vitreous abnormalities,30.9% with retinal pathologies and 9.5% with choroidal pathologies and 4.7% cases are with miscellaneous causes.

The majority of patients in the current study had vitreous haemorrhage (60%) and vitreous detachment (40%) in cases of vitreous abnormalities. Patients with retinal anomalies (76.9%) experienced retinal detachment. The most frequent intraocular disease, according to a study by Sharma OP et al., was vitreous haemorrhage (41.17%), followed by retinal detachment (26.4%), in 122 patients[6]. However, the majority of cases in the study by Ahmed J. et al. were vitreous haemorrhage (29%) and retinal detachment (25%)[7]. Retinal detachment (39%) and vitreous opacities (31%) were the two most frequent abnormalities in a research by Haile M et al., while Coleman DJ found a 25% frequency of RD[8].

Choroid detachment was the most common type of choroidal abnormality (75%) and the rest were 25%.

Vitreous Haemorrhage is a major cause of diminution of vision and may also lead to blindness.On USG, it presents as echogenic material in the posterior chamber. This appearance depends on the age and severity of the haemorrhage. Fresh haemorrhages are seen as small dots or linear areas of low reflective mobile opacities in the vitreous, whereas in older haemorrhages, blood organizes to form membranes of low to medium level reflectivity[9].

Intraocular Tumours Retinoblastoma: This is one ofthe commonest tumours of childhood. A pineal tumour (pineoblastoma) with bilateral retinoblastoma is called trilateralretinoblastoma. They can be endophytic or exophytic. Clinicallythe child has leukokoria. On ultrasound the tumour has variable echogenicity with posterior acoustic enhancement and smooth, dome or irregular shape. Calcification within the tumour is characteristic. This differentiates it from othercauses of leukokoria in childhood like PHPV[10]

V. IMAGING FINDINGS

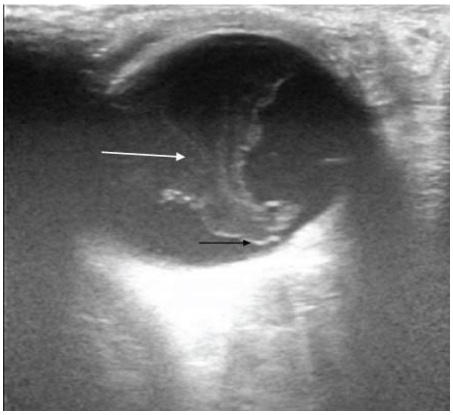


Fig-1 :B-scan usg of the orbit shows a thick undulating membrane (black arrow), which is free in its posterior end suggesting vitreous detachment associated with echoes which suggest vitreous haemorrhage

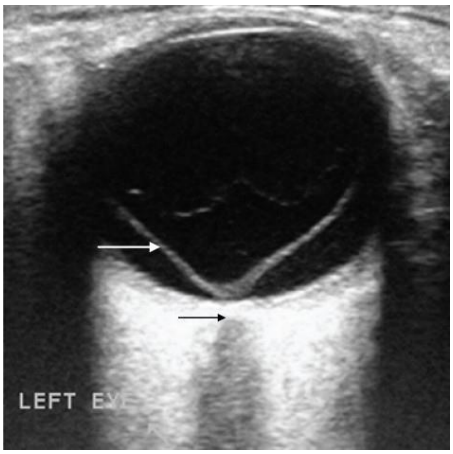


Fig-2 : B-scan USG of the orbit shows a hyperechoic V-shaped membrane (arrow), attached to the orraserrata anteriorly and to the optic nerve head posteriorly (black arrow), suggestive of retinal detachment

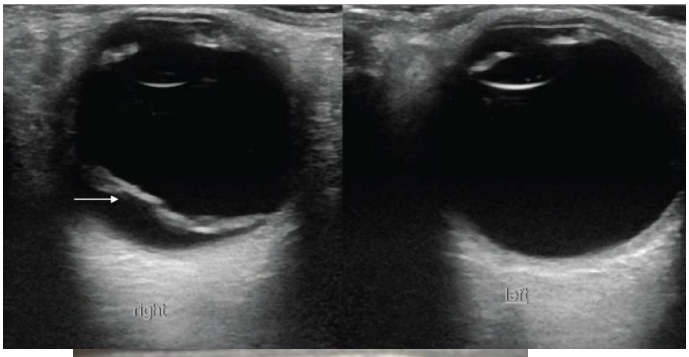


Fig-3: B-scan USG of the orbit shows (on right) a hyperechoic membrane (arrow), attached to the orraserrata on one side anteriorly suggesting unilateral retinal detachment. (On left) the posterior segment appears anechoic and normal.

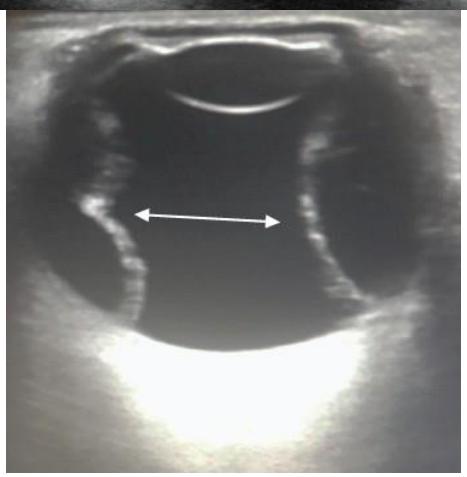


Fig-4: B-scan USG of the orbit shows hyperechoic biconvex membranes (arrow) on both walls suggesting choroidal detachment. The anterior and posterior attachments cannot be determined, which differentiates this from retinal detachment.

CONCLUSION

The B-mode ultrasonography should be the first screening modality in evaluation of posterior segment lesions. It provides best real-time imaging of several ocular diseases. The accurate diagnosis and characterization of anomalies by B-scan not only aids in preoperative instances but also alters the treatment of numerous other patients. Its non-invasiveness and lack of ionising radiation exposure are further benefits.It can be widely used for diagnosing individuals with opaque ocular media and visual loss, where a preoperative fundoscopic evaluation is nearly difficult, as well as for the evaluation of retinal illnesses such retinal detachment and retinal tumours.

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