



STUDY OF ROLE OF HIGH FREQUENCY SONOGRAPHY (B-SCAN) IN EVALUATION OF OCULAR LESIONS

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ABSTRACT

Introduction: Patients with symptoms related to eye and orbit form an important share of the general outpatient department. Early diagnosis and treatment of these conditions remains the mainstay of management. **Aims and Objectives:** To study the role of B- scan Ultrasonography in ocular diseases, in differentiating intraocular and extraocular diseases. **2.**To correlate the final diagnosis with ultrasonography diagnosis. **Materials and Methods:** 50 patients were examined with B- scan ultrasonography and colour Doppler flow imaging using linear high frequency probe (7.5 to 12 MHz). Sonological diagnosis was made based on location, acoustic characteristics, kinetic properties and colour Doppler flow dynamics. **Results:** The distinction between ocular and extraocular pathologies was made in 100% of cases. The overall sensitivity, specificity, PPV, NPV and accuracy of ultrasonography for the diagnosis of ocular pathologies were 96.67%, 100 %, 100 %, 95.24 % and 98 % (p- value = 0.0165) Commonest ocular pathology was vitreous haemorrhage followed by retinal detachment. Commonest extraocular pathology was hemangioma followed by gravein our study. **Conclusion:** Sonological diagnosis correlated very well with the final diagnosis established by higher modalities, follow up and histopathology (as applicable). Sonological diagnosis formed a major basis for management decisions in significant number of cases

KEYWORDS : Sonological; B- scan; orbit; Colour Doppler flow imaging; CT; MRI.

INTRODUCTION:

The superficial location of the eye, its cystic composition, and the advent of high- frequency ultrasound make ultrasonography ideal for imaging the eye. Ultrasonography is a simple and cost effective tool in investigating eye symptoms.

It provides a detailed cross sectional anatomy of the entire globe¹. Vitreoretinal diseases are the most common indication for ultrasonographic imaging of the posterior segment. Ultrasonography helps us to establish kinetic properties of the tumours such as its consistency and vascularity (mainly with the help of colour Doppler). Colour Doppler flow imaging (CDFI) is a new modality with its ability to detect and analyze low flows. Its main indications are the diagnosis of intraocular tumours, the follow up of malignant melanoma after conservative treatment and the study of space occupying lesions of the orbit⁷.

MATERIALS AND METHODS

Data for the study were collected from patients undergoing B- scan for ocular lesions referred to the department of Radio- diagnosis, Vilasrao Deshmukh Gov Medical College Latur.

Study design: Prospective cross sectional study.

Study setting: Department of Radio- diagnosis, VDGMC Latur

Sample size: 50 patients.

Inclusion criteria:

Patients with clinically suspected ocular lesions i.e. patients presenting with proptosis, suspected orbital mass, complete loss/diminution of vision, leucokoria, pain, redness and discharge were included in the study.

Patients with ocular trauma were excluded from the study.

With the patient in supine position, Ultrasound was performed with closed eyelid after application of coupling gel utilizing contact method. Linear high frequency probe (7.5 to 12 MHz) of GE LOGIQ P9 ultrasound system was used for the study.

RESULTS

In our study, the maximum percentage of patients were in the 5th decade (30%) . The age range was between 1 year and 70 years. There was nearly equal gender distribution of cases in our study with a male to female ratio of 1: 1.14. Out of 50 patients, 09 had bilateral involvement, 25 had right eye and 16 had left eye involvement. Ultrasound was 100 % effective in differentiating ocular and extraocular pathologies.

There were a total of 30 cases in the ocular space, with 4 in anterior segment and 26 in posterior segment of the globe. Of the 06 vitreous haemorrhage cases, 1 was missed on ultrasound. Totally 29 out of 30 cases were correctly diagnosed by ultrasound. Out of 30 cases, only 18 were correctly diagnosed on ophthalmoscopic examination.

The overall sensitivity, specificity, PPV, NPV and accuracy of ultrasound for the diagnosis of ocular pathologies were 96.67 %, 100%, 100 %, 95.24% and 98% (p- value = 0.0165) respectively compared to 56.25 %, 100 %, 100%, 56.25 % and 72 % for ophthalmoscopic examination.

There were overall 20 cases in extraocular space, of which 40 % were in extraconal, 20 % in intraconal, 20 % in conal, 10% in both intra and extra conal and 10% in preseptal compartments respectively. One case of hemangioma was falsely diagnosed as optic nerve tumour on ultrasound. Out of 20 cases, 19 were correctly diagnosed by ultrasound. The overall sensitivity, specificity, PPV, NPV and accuracy of ultrasound for the diagnosis of extraocular pathologies were 95 %, 100 %, 100%, 96.77 % and 98% respectively.

In 33 cases, clinical and laboratory investigations formed the basis for confirmation of sonological diagnosis. Surgery followed by histopathological examination formed the gold standard for diagnosis in 14 cases.

Table 1: Age distribution of patients

Age (Years)	No. of Patients	Percentage
<10	08	16.0
11 to 20	02	04.0
21 to 30	02	04.0

31 to 40	08	16.0
41 to 50	15	30.0
51 to 60	12	24.0
>60	03	06.0
Total	50	100.0

Table 2: Laterality of orbital lesions

Laterality	Number of cases	percentage
Bilateral	09	18
Right	25	50
Left	16	32
Total	50	100

Table 3: Extraocular pathologies- Ultrasound diagnosis

Pathology	Number of cases	Ultrasonographic diagnosis
Optic Glioma	2	2
Optic Meningioma	1	1
Hemangioma	4	3
Pseudotumor	1	1
Graves	3	3
Myositis	1	1
Dermoid	1	1
Dacryocystocele	1	1
Mucocele	1	1
Lymphoma	1	1
Lacrimal Gland Pleomorphic Adenoma	1	1
Mucor mycosis	2	1
Lid abscess	1	1
Total	20	19

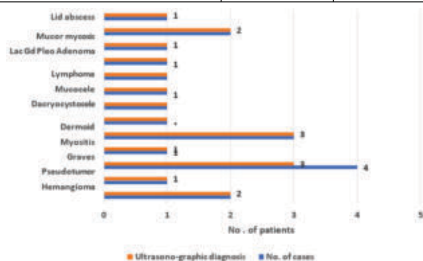


Fig. 1: Extraocular pathologies - Ultrasound diagnosis

Table 4: Etiological distribution of orbital pathologies

Pathology	Congenital	Inflammatory/ Infective	Degenerative	Neoplastic	Idiopathic
Ocular	3	6	13	4	4
Extraocular	1	10	0	9	0
Total	4	16	13	13	4

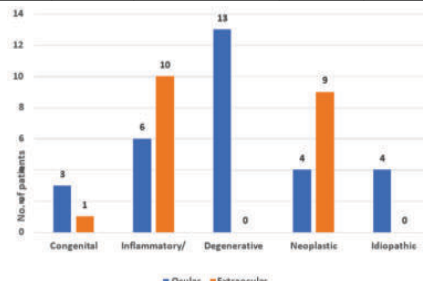


Fig 2: Etiological distribution of orbital pathologies

DISCUSSION

Ocular Pathologies:^{5,6,7,8}

Vitreous Haemorrhage:

Fresh VH is very low reflective, may need higher gain settings for optimal detection. In old vitreous haemorrhage, the dot-like echoes organize to form membranes of varying reflectivity across their extent. These are most dense inferiorly due to gravity



Fig 3: Vitreous Hemorrhage: Low level echoes in the vitreous cavity, predominantly in the dependent portions of the globe.

Retinal Breaks And Detachment

Rhegmatogenous, tractional, combined traction-rhegmatogenous or exudative.

Rhegmatogenous Retinal Detachment:

Thin, continuous, membrane separated from and located anterior to the echoes from the globe wall appearing as convex bullae extending far into the vitreous from attachment points at the nasal and temporal ora serrata and at the optic nerve. Restricted after movements are seen.

Tractional Retinal Detachment:

Traction may present as mild elevation of retina, a shallow or highly elevated detachment or as a complete funnel shaped detachment.

Exudative Retinal Detachment:

Typical features include the presence of smooth bullae, and shifting fluid.



Fig 4 : Retinal Detachment: Well defined thick echogenic V-shaped retinal folds attached at the optic disc and ora serrata.

Posterior Vitreous Detachment:

It can be complete or partial. It is seen as a freely mobile membranous echo with variable attachments to the optic nerve head or retina. The mobility of the PVD is more than that of RD.

Choroidal Detachment:

Smooth, thick, dome shaped membrane in the periphery with little or no after movement.

Endophthalmitis:

Low reflective vitreous echoes—dot like or cobweb shaped membranes are suggestive of vitreous inflammation.

Persistence Of Fetal Vasculature (Pfv):

Also known as persistent hyperplastic primary vitreous (PHPV). Present at birth, predominantly unilateral (90%). Vitreous band of variable reflectivity extends from the lens to the optic disc. Doppler signal from posterior hyaloid artery within.

Ocular Tumours:

Choroidal Melanoma:

Solid mass, Dome shaped or mushroom collar button configuration due to tumour growth through a ruptured Bruch's membrane. Regular internal structure on B scan.

Retinoblastoma:

It could be either endophytic (growing towards the vitreous cavity) or exophytic (growing within the subretinal space). Single or multiple mass lesions in the vitreous cavity arising from the retina. Irregular high internal reflectivity. Presence of calcium, seen as high reflectispecks or clumps within the lesion, causing orbital shadowing.

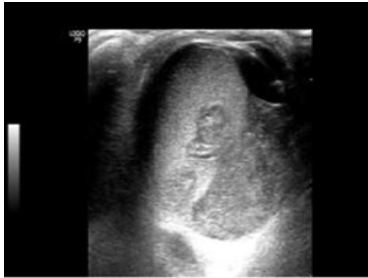


Fig 5: Retinoblastoma: Well defined heterogeneous predominantly hyperechoic lesion within the globe showing internal vascularity and calcific foci within.

Orbital Pathologies:

Mucocele:

Cysts lined by paranasal sinus mucous membranes. Slowly enlarge due to continued secretion and desquamation of lining cells and expand in the direction of least resistance, often into the orbit, causing proptosis.]

Dermoid Cysts:

Tumours of aberrant ectodermal tissue, usually in children. When bony orbit is involved imaging with CT/ MRI is considered for evaluation of its extent. Typically located at the lateral orbital margin..

Cavernous Hemangioma:

Cavernous hemangiomas of adults are by far the most common orbital intraconal tumour. Usually intraconal, may have extraconal component. Rounded regular outline. Sharply defined and rounded anterior acoustic border.

Tumours Of The Optic Nerve:

Intraconal mass lesion with rounded configuration. Sharply defined anterior borders. The posterior extent of the tumour may extend to orbital apex and beyond.



fig 6: Optic Nerve Glioma: Well defined hypoechoic fusiform lesion in the intraconal compartment. Optic nerve not separately delineable.

Lacrimal Gland Tumours:

May be benign or malignant. Solid tumours with well demonstrated contours, poor sound transmission and few internal echoes. Size and shape are highly variable. Most useful aspect is in determining the posterior extension of the tumour and the lateral enlargement of invading orbital tissue.

Orbital Inflammation:

Myositis:

Bulbous or globular enlargement of the muscle in its posterior portion, with less involvement of the more anterior portion of the muscle. Indentation of the apical orbital fat pattern.

Grave's Disease (thyroid Orbitopathy)

Most frequent cause of unilateral exophthalmos and by far the most common cause of bilateral exophthalmos. Changes in both orbital fat and extraocular muscles.

Pseudotumor (idiopathic Orbital Inflammation):

One of the frequent causes of unilateral exophthalmos. May be specific or non Specific.

Two characteristic features: Inflammatory mass lesions of the orbit and inflammatory edema of normally present orbital structures. Acoustic features of an infiltrative mass with high sound absorption and irregular outline. Dark area encroaching on the normal retrobulbar fat pattern from its periphery.

CONCLUSION

- B-mode real time ultrasonography is non-hazardous, atraumatic and invaluable in the evaluation of orbito-ocular lesions, especially in the presence of opaque media when there is a suspicion of an intraocular mass.
- Ultrasound is the only practical method of obtaining images of the posterior segment of eye when light conducting media is opaque. Ultrasound contributes more to tissue diagnosis than do CT or MRI as they cannot scan in real time and are not comparable with ultrasound for spatial resolution.

Sonological diagnosis correlated very well with the final diagnosis established by higher modalities, follow up and histopathology (as applicable). Sonological diagnosis formed a major basis for management decisions in significant number of cases. It was a major tool for the follow up of cases.

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