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EVALUATION OF ORBITAL PATHOLOGY BY ULTRASONOGRAPHY- A HOSPITAL BASED CROSS-SECTIONAL STUDY

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ABSTRACT

BACKGROUND : The orbit is 'the cavity in the skull of a vertebrate that contains the eye; the eye socket . The superficial location of the eye and its cystic composition make ultrasound ideal for imaging the eye. Ultrasonography is a powerful non-invasive tool for the accurate diagnosis and effective management of intra ocular tumors. So the aim of the study was to evaluate orbital lesions with high frequency ultrasonography.

MATERIALS & METHODS: The study included 100 patients with clinically suspected orbital disease. A structure proforma (appendix 2) was used to note the detailed clinical history, physical examination findings, systemic examination findings and investigation findings. Ultrasonography of the orbits was done in each patients. Data analysis was done with the help of appropriate tools.

RESULTS: The most common diagnosis in the preset study was cataract (38%) and was followed by Retinal detachment (11%), Pseudophakic Lens (10%) and Vitreous detachment (10%). Vitreous hemorrhage was seen in 5% patients while Vitreous degeneration, Optic drusen and Persistent hyperplastic primary vitreous was diagnosed in 3% patients each.

CONCLUSION: Ultrasonography because of its easy accessibility, rapid examination and low cost is preferred for follow up of lesions that may previously have been investigated by other modalities when serial examinations are required.

KEYWORDS :

INTRODUCTION

The orbit is 'the cavity in the skull of a vertebrate that contains the eye; the eye socket'.[1] The volume of the adult human orbit is about 30cc, of which the eye occupies just 6.5cc.[2] The orbits are conical or four-sided pyramidal structures. Although the eyes represent only 0.1% of the total body surface and only 0.27% of the anterior body surface which significance to individual and society is disproportionately higher. The superficial location of the eye and its cystic composition make ultrasound ideal for imaging the eye.

Many imaging modalities are now available for the evaluation of the orbit which includes radiography, ultrasonography (USG), computed tomography (CT) and magnetic resonance imaging (MRI). Ultrasonography is a very simple and cost effective tool for investigating eye symptoms. USG provides a detailed cross sectional anatomy of entire globe.[3] USG is a rapid, cost effective and non-ionizing imaging modality and also provides real time display of the moving organ. It can be performed in outdoor patient without any use of anaesthetics or sedative therapy.[4,5,6]

The Sonography examination can be performed without any contraindications, which Magnetic Resonance Imaging has such as pacemakers. Sonography avoids the irradiation associated with Computed Tomography and the need for sedation in children. Therefore it can be repeatedly used during treatment of tumors to assess response to therapy.[7,8]Ultrasonography is a powerful non-invasive tool for the accurate diagnosis and effective management of intra ocular tumors. It readily demonstrates intra ocular tumor morphology, location, extent and relationship to adjacent structures.[10,11] Recent studies have shown Ultrasonography has a specificity of 99% and a sensitivity of 93%. In experienced hands there is a high correlation of findings on Ultrasound and clinico- pathological diagnosis even in the absence of a dedicated eye scanner.[5]Ultrasonography provides information regarding location, shape and acoustic characteristics of intraocular tumors. Determination of size progression and extension is critical in selecting and monitoring management.[12]

B- mode real time ultrasonography is a non-hazardous, non-traumatic 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.[5] It provides a dynamic display in real time which helps in precise localization of the pathology.[4,5]

The most common indication for ultrasonographic imaging of the posterior segment is vitreoretinal diseases. Although most conditions of the posterior segment can be viewed directly, in situations where there is media opacity (eg, because of vitreous hemorrhage), echography allows for evaluation of the vitreous, retina, and choroid that otherwise would be impossible. Ultrasound makes it possible to identify, evaluate, and follow numerous posterior segment conditions such as retinal tears, vitreous and retinal detachments, retinoschisis, retinal pigment epithelium (RPE) detachment, sub retinal hemorrhage, and eccentric disciform lesions.[13,14]

Ultrasound is the best method for the exploration of the eyeball. Pre extra ocular lens work up, intraocular foreign body localization, evaluation of Vitreoretinal disorders, and diagnosis and follow up of ocular tumors, are best achieved by Ultrasound. Ultrasound is also of great help in the assessment of the orbit, outside the globe.[15] Ultrasound is the only practical method of obtaining images of the posterior segment of eye when light conducting media is opaque. So the aim of the study was to evaluate orbital lesions with high frequency ultrasonography.

MATERIALS & METHODS:

The present study was conducted with the aim to evaluate the orbital pathology by ultrasonography in the department of Radio-diagnosis of Dr. D. Y. Patil Medical College and Hospital and Research Center, Pimpri, Pune for the period of two years (September 2016 to August 2018).

The present study includes patients clinically suspected to be suffering from orbital pathologies with any inclusion criteria and without any exclusion criteria. The present study was a hospital based cross-sectional descriptive study.

All patients with clinically suspected orbital pathologies of all the age group patient were included in the study.

All the post-operative patient, patients having cardiac pacemakers, prosthetic heart valves, cochlear implants, any metallic implants or suspected metallic foreign body in the orbitwere excluded from study
The study included 100 patients with clinically suspected orbital disease. A structure proforma (appendix 2) was used to note the detailed clinical history, physical examination findings, systemic examination findings and investigation findings. Ultrasonography of the orbits was done in each patients. Ultrasound machines ALOKA

ARIETTA S60 (HITACHI co. ltd, Tokyo, Japan) was used.

Data analysis was done using the SPSS (Statistical Package for the Social Science) Version 17 for window. The demographic variables, compartment, chamber, complaints, USG finding, diagnosis. A probability value of 0.05 was accepted as the level of statistical significance.

OBSERVATIONS AND RESULTS:

It was seen that majority of the patients with orbital pathology were in the age group of 41-60yeras of age. There were total 53 female and 47 male patients suffering from orbital pathology with male : female ratio of 0.89: 1. Intraocular compartment was involved in 98% patients while extraocular compartment was involved in only 2% patients. Among the intraocular compartment involved patients, anterior chamber involvement was seen in 53.06% patients and posterior chamber involvement was seen in 46.94% patients.

The most common presenting complaint was Blurring of vision and was reported by 70% patients. It was followed by Redness of eye (27%) and Pain in eye (16%). Gradual diminision of vision (8%), Sudden loss of vision (6%), trauma (6%), white eye reflex (5%), proptosis (3%), swelling beneath the eyelid (2%) and diplopia (1%) were also observed.

Table 1: USG finding wise distribution of cases in study group

USG finding	No of cases	Percentage
Opacification of the lens with posterior shadowing.	42	42
Thick funnel shaped retinal detachment.	11	11
Dense lens artefact in anterior segment	10	10
Irregular membrane with distinct after movement	10	10
Fine mobile internal echoes in vitreous chamber	5	5
Echogenic band seen in posterior segment of the globe extending from posterior surface of the lens to the optic nerve head.	3	3
Multiple fine mobile echoes in posterior chamber	3	3
Posterior staphyloma	3	3
Hyperechoic foci noted at bilateral optic nerve head and shows posterior acoustic shadowing	2	2
Vitreous hemorrhagic with lens dislocation	2	2
Echogenic, spherical opacities in the vitreous chamber	1	1
Enlargement of all muscles.	1	1
Heterogeneous solid intraocular mass is seen in posterior chamber	1	1
Lens dislocation	1	1
A thin echogenic line anterior to ora serrata.	1	1
Smooth, thick dome shaped membrane in periphery seen	1	1
A well outlined mass in lacrimal gland with multiple foci of calcification within it.	1	1
Heterogeneous solid intraocular mass is seen in posterior chamber	1	1
A small well-defined rounded sonolucent mobile ring with high reflective eccentric dot in between retina and vitreous	1	1
Total	100	100

Opacification of the lens with posterior shadowing was the most common USG finding and was observed in 42% patients. Thick funnel shaped retinal detachment was seen in 11% patients and Dense lens artefact in anterior segment and Irregular membrane with distinct after movement was seen in 10% patients each. Fine mobile internal echoes in vitreous chamber were observed in 5% patients.

Table 2: Diagnosis wise distribution of cases in study group

Diagnosis	No of cases	Percentage
Cataract	42	42
Retinal detachment	11	11
Pseudophakic Lens	10	10
Vitreous detachment	10	10
Vitreous haemorrhage	5	5
Vitreous degeneration	3	3
Posterior staphyloma	3	3
Persistent hyperplastic primary vitreous	3	3
Vitreous hemorrhage with lens dislocation	2	2
choroidal detachment	2	2
Retinoblastoma	2	2
Optic drusen	2	2
Lacrimal gland tumor	1	1
lens dislocation	1	1
Neurocysticercosis	1	1
Asteroid hyalosis	1	1
thyroid orbitopathy	1	1
Total	100	100

The most common diagnosis in the preset study was cataract (38%) and was followed by Retinal detachment (11%), Pseudophakic Lens (10%) and Vitreous detachment (10%). Vitreous hemorrhage was seen in 5% patients while Vitreous degeneration, Optic drusen and Persistent hyperplastic primary vitreous was diagnosed in 3% patients each.

DISCUSSION :

The superficial location, cystic composition of eye and advent of high frequency probes make ultrasonography ideal for imaging of eye. Ultrasound is the practical method of evaluating posterior segment when light conducting media are opaque. Ultrasound contributes to more tissue diagnosis than CT and MRI because these can't scan in real time and lack spatial resolution.[16]

38 cases of cataract were evaluated in our study by ultrasonography, 22 showed mature cataract, 14 showed immature cataract and 2 showed subcapular senile cataract. Mature cataract appeared totally opaque and result in dens lens on ultrasound scanning. Immature cataract appeared as scattered opacities separated by clear zones. Senile capsular cataract shows deposition of opaque material below the lens capsule.

Intraocular lens implant appeared as a dense artifact in the anterior segment during scanning. 10 cases of pseudophakia were evaluated in our study showing dense lens artefact in anterior segment. Lens dislocation usually occurs following trauma or previous surgery with most often mobile lens lying in the vitreal cavity. In our study 3 cases of lens dislocation were evaluated by ultrasonography show dislocated, mobile lens in vitreal cavity.

Munk et al[17] demonstrated lens fragmentation with individual fragments distinctly discernible on ultrasound. This finding was consistent with ultrasound finding of lens dislocation in our study.

In 1995 Vashisht et al explained the findings of vitreous hemorrhage as small granular dot like echoes in vitreous chamber. In addition the echoes show movements on moving the eye during dynamic testing [18] Thus similar findings were confirmed in our study and was observed in 5% patients.

In 1974, Browson et al [19]defined asteroid hyalosis as the accumulation of calcium soaps in vitreous which can mimic a dense central vitreous hemorrhage but can be differentiated by a rapid shift of gaze as the vitreous echoes show fast and prolonged after movements after the eye motion has stopped, otherwise the echoes of asteroid hyalosis are highly intense. This finding was consistent in our study.

Fielding in 1994 during his study of ophthalmic ultrasound explained that an echogenic thick convex membrane was seen in temporal field extending much anterior to the level of ora serrata represents a choroidal detachment.[20] Similar ultrasonographic finding of choroidal detachment was found in our study

Superficial location and cystic composition of eye, advent of high frequency probes with easy accessibility, cost effectiveness and no risk of radiations make ultrasonography ideal for orbital lesions. Main indications for ocular sonography are opaque light conducting media, intraocular pathologies suspected on fundoscopic examination, suspected ocular mass and trauma to eye. Ultrasonography has limited

role in evaluation or orbital lesions due to marked echogenic post septal fat. CT and MRI with their high resolution, multiplanar imaging capabilities and better evaluation of posterior and apical parts of orbit are better modalities for evaluation of orbital lesions than sonography. However, ultrasonography because of its easy accessibility, rapid examination and low cost is preferred for follow up of lesions that may previously have been investigated by other modalities when serial examinations are required.

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