ORIGINAL RESEARCH PAPER

Radiodiagnosis

EVALUATION OF INTRA-OCULAR LESIONS BY B-SCAN ULTRASONOGRAPHY

KEY WORDS: B-Mode, Retinal detachment, Ocular lesions.

Dr Sonali Mhaske Kadam Associate Professor, Department of Radio-diagnosis, MGM Medical College and Hospital, Kamothe, Navi Mumbai.

Dr Shivrudra Gangshetty* Junior Resident, Department of Radio-diagnosis, MGM Medical College and Hospital, Kamothe, Navi Mumbai. *Corresponding Author

ABSTRACT

INTRODUCTION: B-mode, a real time scan, provides excellent details of various ocular structures. It gives the exact site, extent and characteristics of ocular lesions. Use of ultrasonic waves in diagnostic radiology has radically transformed the approach towards the imaging of the orbit.

MATERIALS AND METHODS: The study was carried out in the Department of Radiodiagnosis and Imaging in MGM Medical College and Hospital, Kamothe, Navi Mumbai. In the present study,50 patients irrespective of age and sex suspected to have ocular pathologies were selected.

RESULTS: In the present study out of 50 patients,42 had intraocular pathologies (84%)-common observed abnormality was retinal detachment(16%) followed by cataract(10%),posterior vitreous detachment(8%),vitreous hemorrhage(8%) & 8 had Extraocular pathologies(16%),which were not included in the study.

CONCLUSION: B-scan could diagnose the intra ocular lesions accurately and act as definitive diagnostic modality without confirmation required by CT and MR.

INTRODUCTION:

Eyes constitute one of the most dynamic organs bestowed by nature on man. Nature has played its role in placing the eyes securely in the bony pyramids called orbits.

In the past orbital imaging was limited to plain radiographs with a number of oblique projections to straighten out the anatomy of the complex bony pyramid and its perforations. Though a good baseline investigation it had its flaws like poor three dimensional correlations and radiation exposure. Use of ultrasonic waves in diagnostic radiology has radically transformed the approach towards the imaging of the orbit. It permits an instantaneous glimpse into the orbit. Ultrasonography of orbit was first used in 1956 with A-mode for examination of ocular tumors. A-mode, however, provided only one dimensional images. Introduction of B-mode scanning technique by Baum and Greenwood in 1958 opened a new era in orbital imaging.

B-mode, a real time scan, provides excellent details of various ocular structures. It gives the exact site, extent and characteristics of ocular lesions. It has become the ideal method for screening, diagnosing, follow up and to evaluate ocular lesions. Routine ocular scanning is performed using 7.5 MHZ probe to 10 MHZ transducer and examination can be performed at frequencies up to 100 MHZ permitting the visualization of the anterior chamber in near microscopic detail.

MATERIAL AND METHODS:

The study was carried out in the Department of Radio-diagnosis and Imaging in MGM Medical College and Hospital, Kamothe, Navi Mumbai over a period of 3 months from September 2019 to November 2019.In the present study, 50 patients irrespective of age and sex suspected to have ocular pathologies were selected.

Specification of the ultra-sonography equipment
Model – PHILIPS HD-15 with 12MHz
linear array electronic transducer.

METHOD:

Protocol to be followed is as follows:

- Detailed clinical history of the patients were elicited.
- Clinical examination of the patient.
- B-mode examination was done with patient supine using a coupling jelly and 12 MHz linear array transducer held over closed eyelids.
- Serial scanning of both eyes was done after giving detailed instructions to the patient to gain maximum cooperation. Anatomy delineated by allowing a set pattern of superior, inferior, nasal and temporal eye movements.

RESULTS AND OBSERVATIONS:

In the present study, the B scan of 50 patients with ages ranging from one month to 70 years with suspected intraocular lesions were done with 12 MHz linear array transducer coupled to PHILIPS HD-15 ultrasound scanner.

The maximum numbers of patients were between 51 to 60 years of age (24%). The males and females ratio (M: F) of 62:38.

In all patients, the common observed abnormality was retinal detachment(16%) followed by cataract(10%),posterior vitreous detachment(8%),vitreous hemorrhage(8%),lens dislocation(4%), foreign body (4%),persistent hyperplastic primary vitreous(4%) & extraocular pathologies(16%).

The high degree of precision in interpretation of B-scan and various maneuvers like imaging in various planes and dynamic imaging during eye movements aided in delineating the site and the full extent of the lesions.

The results obtained correlated well with the clinical and surgical diagnosis, thus, establishing that B-scan of the orbit as an effective modality of investigation for the diagnosis of intraocular lesions.

Table No 1: Result Of B Scan Examination

Sr. No.	Abnormality	No. Of Cases	Percentage (%)
	Intraocular pathologies	42	84%
1	Cataract	5	10 %
2	Aphakia	1	2 %
3	Lens dislocation	2	4 %
4	Foreign body	2	4 %
5	Retinal detachment	8	16 %
6	Posterior vitreous detachment	4	8%
7	Choroidal detachment	2	4 %

8	Vitreous hemorrhage	4	8 %
9	High Myopia	2	4 %
10	Micropthalmus	1	2 %
11	Optic nerve drusen	2	4 %
12	Posterior staphyloma	1	2 %
13	Endopthalmitis	2	4 %
14	Phthisis bulbi	2	4 %
15	Melanoma	1	2 %
16	Asteroid hyalosis	1	2 %
17	PHPV	2	4 %
	Extraocular pathologies	8	16%

ILLUSTRATIVE CASES:

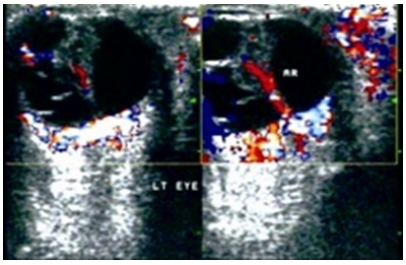

Fig 1: Persistent Hyperplastic Primary Vitreous

Fig 2: Vitreous Hemorrhage

Fig 3: Retinal Detachment

DISCUSSION:

The chief indication of ocular ultrasound are in opaque ocular media besides other conditions. A high resolution small part transducer (12MHz) coupled to routine conventional ultrasound equipment provides excellent quality real time imaging for a variety of ocular abnormalities.

PERSISTENT HYPERPLASTIC PRIMARY VITREOUS (PHPV): In the present study 2 cases were seen 2 children of 10mths and 1 year were referred presenting with leukocoria. A retrolental mass was noted in absence of any retinal tumor. A thin linear structure is seen connecting the retrolental mass & optic nerve representing persistent hyaloid vasculature (Fig 1).

VITREOUS HEMMORHAGE: In the present study 4 patients showed vitreous hemorrhage. 3 patients had VH due to trauma. 2 of the patient had acute and 1 had old hemorrhage. 1 patient had postoperative vitreous hemorrhage (Fig 2). B-scan showed fine mobile internal echoes in acute cases and thin undulating membrane with after movement in old cases. Remaining 1 patient showed VH after cataract surgery. Estimation of the extent of VH is essential for follow up with the possibility for preoperative planning for vitrectomy.

ASTEROID HYALOSIS: Senile degeneration process of unknown origin. It is unilocular in 75 % of cases. On B-scan it showed multiple echogenic specks with significant after movements on dynamic scanning creating a shimming effect.

POSTERIOR VITREOUS DETACHMENT: Any derangement in the vitreal cavity leads to detachment of posterior vitreous from retina. On B-scan it was seen as thin irregular membrane with distinct after movement. After movements are hallmark of posterior vitreal detachment.

APHAKIA: appeared as no lens posterior to the iris. 1 case of aphakia was seen in our study with B-scan showing no lens in posterior chamber.

PTHISIS BULBI: In the present study,2 cases of Phthisis bulbi were detected, B-scan showed small grossly disorganized eyes with thickening of ocular coats & calcification in posterior part of globe.

RETINAL DETACHMENT: Retinal detachment may be rhegmatogenous (caused by tear or break due to degeneration with entry of subretinal fluid) or non-rhegmatogenous (caused by vitreoretinal traction). In a classical case of complete retinal detachment (V shaped extending from ora serrata to optic disc) the diagnosis is made within few seconds of placing the probe over a closed eyelid. Both rhegmatogenous and non-rhegmatogenous types (exudative and tractional) were noted by fielding. Extent-wise focal, partial and complete RD was demonstrated. Morphologically, the classical V and Y shape of RD were also noted.

OPTIC NERVE DRUSEN: The optic nerve drusen occurs as echogenic foci in the optic nerve head with posterior acoustic shadowing on B-scan. In the present study,2 cases of optic nerve drusen were detected.

CHOROIDAL DETACHMENT: Choroidal detachment can occur spontaneously or more often a sequelae of surgical procedure or trauma. On B-scan it typically presented as a smooth, thick dome shaped membrane in the periphery without any after movements. When choroidal detachment is partial its configuration may be more flat. When it is complete, it displays multiple bullae producing scalloped appearance which is virtually pathognomic of choroidal detachment.

LENS DISLOCATION: Usually occurs following trauma or previous surgery with most often mobile lens lying in the vitreal cavity. In the present study , the lens was evaluated in all cases of eye trauma with regard to morphology , position and cataractous change , breach of capsule and partial extrusion of lens material. In 2 trauma cases dislocated lens was seen.

MELANOMA: B-scan in choroid melanoma showed lenticular shaped, moderately echogenic lesion arising from choroid with homogenous echotexture.

ENDOPTHALMITIS: On B-scan, Dense echogenic collection with multiple calcified specks were seen in the posterior segment. Antero-posterior axis of eye was small.

MICROPHTHALMOS: Congenital microphthalmos showed axial shortening.

POSTERIOR STAPHYLOMA: In the high degree of degenerative axial myopia, the sclera bulges out at posterior pole and this was seen sonographically as concave dip of vitreous posteriorly resulting in posterior staphyloma.

CATARACT: The cataractous lens is usually noted while scanning the posterior segment of the opaque eye. The outline of the lens is better seen especially if there is senile sub capsular cataract that leaves an outline of reflective material below the lens capsule. An immature cataract is one in which scattered opacities are separated by clear zones while a mature cataract forms a totally opaque cortex resulting in a highly reflective lens on scanning.

INTRAOCULAR FOREIGN BODY: Ultrasound can easily evaluate intraocular foreign body greater than 0.5 mm in size, Varying shapes and sizes of hyperechoic areas were noted on B-scan. The most important rule in treating patients with an intraocular foreign body is that the primary goal of the intervention, which typically including foreign body removal is comprehensive anatomical reconstruction of the injured eye so that the best possible visual outcome can be achieved .

CONCLUSION:

The high diagnostic accuracy using 12 MHz linear array transducer makes B-mode US the investigation of choice in detecting various intra ocular lesions.The Superficial location and cystic composition of eye advent of high frequency probe with spatial, easy accessibility, cost effectiveness, painless, well tolerated by patients , no risk of radiations , safe reliable and relatively easy to perform sonography which is ideal for evaluation of intra-ocular lesions.

REFERENCES:

1) Baum G, Greenwood E. The application of ultrasonic location techniques to ophthalmology 1858;60:263-279.
2) Fielding JA. The eye and orbit.In: David Cosgrove, Hylton Meire, Keith Dewbury, ed: Abdominal and General ultrasound, Vol.2, Second ed; London. Churchill Livingston 2001:661-694.
3) V D Aironi and S G Gandage . B scan Ultrassonography in ocular abnormalities .Indian Journal Radiol imaging 2009 May;19 (2) :109-115.
4) Taneja K, Bhose S, Shiv VK, Rohatgi J, Bargav SK.Use of non-dedicated US equipment in evaluation of the posterior segment of the eyes having opaque ocular media. Indian J Radiol Imag 1991;1:11-14
5) OP Sharma. Orbital sonography with its clinic- surgical co-relation(Indian Journal of Radiology 2005)15:4:537 – 554.
6) Rabinowtz R , Lagev R . Comparision between clinical and ultrasound findings in patients with vitreous haemorrhage . Eye (London) 2004 ;18(3)253 -6.
7) Deepak G. Bedi 1 , Daniel S , Gombos , Chaans and Sanjay singh. Sonography of eye (AJR AMJ , Roentgenol 2006 ;187 (4) : 1061- 1072.
8) Shinar Z , Chan I J , Orlin Sky M . Use of ocular ultrasound for evaluation of retinal detachment . Emergency Med 201 ;40(1) :53-7 E Pub 2009 July 21.