

Ultrasonography and Computed Tomography as an Diagnostic Adjunt in The Management of Orbital Space Occupying Lesions



Medical Science

KEYWORDS : Ultrasonography, CT scan, Intraorbital space occupying lesions

Chaudhari Nilam G

MBBS, M.S.Ophthal, Senior Resident, M & J Western Regional Institute of Ophthalmology, B.J. Medical College, Civil hospital, Ahmedabad, Gujarat

Hansa H.Thakkar

Professor & Head of unit of Ophthalmology, M & J Western Regional Institute of Ophthalmology, B.J. Medical College, Civil hospital, Ahmedabad, Gujarat

ABSTRACT

The purpose of this study was to compare the diagnostic utility of the Ultrasonography(USG) and computed tomography(CT scan) in orbital space occupying lesions and to determine value of USG as a valuable diagnostic tool and for follow up while. CT scanning in the assessment of lesions against bony structures at the apex of the orbit. Fifty eyes of 50 patients of proptosis were enrolled in our prospective non-randomized study and subjected to clinical, USG and CT scan examination. With help of 10 MHz frequency ultrasound about 20(40%) and with CT scan 30(60%) masses were diagnosed. On USG around 37(74%) lesions are illdefined, 20(40%) hypo and 20(40%) hyperechoic. About 24(48%) masses shows well enhancement on CT scan. So Both the techniques are noninvasive valuable and reliable. CT scan is superior to USG for deep orbital mass for better surgical management and monitoring the recurrence.

Introduction

Ultrasonography(USG) is a noninvasive, efficient and inexpensive imaging technique to detect and differentiate various ocular and orbital pathologies. Ophthalmic USG employs high frequency sound waves that provide the high resolution required for ocular diagnosis.

USG is indicated for evaluation of the posterior segment of the eye in the presence of complete or partial opacification of the anterior or posterior segment. It is also used to localize, measure and differentiate tumor and evaluate growth during follow up of patients as well as to detect intraocular foreign bodies and assess extent of intraocular damage in case of trauma.

CT scanning is a recent and valuable, noninvasive method employed in the diagnosis of orbital and related lesions. It uses thin X-ray beam to obtain tissue density values. These values are processed by a computer to provide detailed cross-sectional images. CT scan with contrast medium may further enhance the radiographic shadow of some orbital tumors.

In our study we aim to assess and describe in a prospective manner the high frequency ultrasonographic and CT scan features of intraorbital lesions with their location, extent, configuration and invasion of surrounding tissues.

MATERIALS AND METHODS

In the prospective study, 50 eyes of 50 patients of proptosis presented our oculoplasty clinic were enrolled in our prospective study at our institute.

Detailed history was elicited from all patients, visual acuity was recorded using Snellen's chart, slit lamp biomicroscopy was done, intraocular pressure was taken using Perkins' hand held applanation tonometer, exophthalmometry, fundus examination was done by both direct and indirect ophthalmoscopy with full dilatation when possible.

As USG is opd based procedure patients of all age and sex were included in the study.

No specific exclusion criterion was predetermined for study.

All the patients with proptosis after recording of visual acuity and a thorough workup as describe above were

subjected to USG imaging at the very first visit to our institute. All the patients were described about procedure and consent for examination, imaging and photography were done as per the routine demographic data including patient age(in years), gender and address were recorded. Tumor features based on palpation, slit lamp examination regarding location (anterior, lateral, medial, posterior), shape (diffuse, flat, nodular, mixed), size, extent, consistency (solid, cystic, mixed), pulsatile, free or fixed to the skin were noted.

After complete work up all patients underwent for USG examination (OTI 2000) model. The frequency of the transducer was set to 10MHz so the images hence acquired were 10 micron resolution. All patients were examined in supine position with lignocaine jelly application on closed lid. Rapidly repeating short bursts of ultrasonic energy are beamed into ocular and orbital tissues. Areas of reflectivity cause a portion of this signal to return to examining probe. These signals are detected, amplified and converted into display forms that permit interpretation.

A-SCAN is a one dimensional acoustic display in which echoes are represented as vertical spikes from baseline and spacing between the spikes is dependent on the time required for the beam to reach an interface and for its echo to return to the probe. Scan plane directed through optic nerve.

B SCAN provides a real time, two dimensional, gray scale display of the eye and the orbit. Strong echoes are white, and weaker echoes are shades of gray. Scan plane through optic nerve. Two dimensional images were obtained and analyzed. Longitudinal and transverse scans were acquired in all cases also photographic record was kept on paper and in electrical format. The Caliper tool and the zoom tool which were already incorporated in the machine helped in detail biometric analysis of the tumors.

All USG features were recorded separately. Acoustic features (cystic/ solid), internal pattern (homogenous/heterogenous), tumor configuration (diffuse, flat/mixed), tumor dimension along with extent of anterior, posterior and lateral margins. The invasion of posterior segment and anterior segment by tumor growth was documented.

All patients were subjected to CT Scan which utilises X-ray beams that pass through thin slice of tissue at multiple angles and are then received by detectors. High resolution

CT scan affords excellent demonstration of orbit and its contents. Orbital fat provides good background for evaluation of the optic nerve and EOMs. Tumors can be classified as intraconal and extraconal. CT can demonstrate vascular lesion without contrast. A combination of axial and coronal cuts enables a space occupying lesion within the orbit to be visualized in three dimensions. And the intraorbital lesion was appreciated as well defined/ill defined, enhancing or not enhancing, optic nerve involvement, cystic mass,calcification, muscle inflammation, cavernous sinus inflammation,surrounding bony destruction and metastasis.

In short, on USG and CT Scan examination complete tumor analysis was done according to tumour visualization,resolution of the internal structures and invasion of neighbouring structure.

RESULTS & DISCUSSION

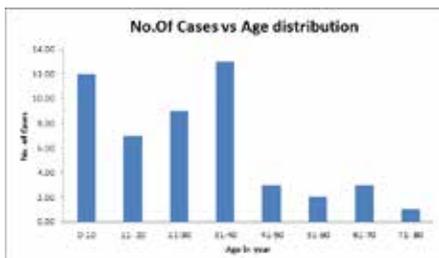
The mean age of patients with intra orbital tumors who underwent USG and CT scan at our institute was 40 year(range,1-80yr), 30(60%) were male and 20(40%) of patients were females.25(50%) had right sided involvement whereas 24(48%) had left sided involvement only in one case bilateral involvement. About 16(32%) pt had 6/18 – 6/6vision, 5(10%) pt had 6/60 – 6/24vision, 9(18%) pt had CF1m – CF6m vision. There were 7(14%) pt with HM+PL+PR+ vision while 5(10%) pt had NO PL. About 8(16%) pt were uncooperative for vision. About 22(44%) pt had lesions in peripheral space,20(40%) had in central space and 8(16%) had in subperiosteal space. The tumors diagnosed by USG 20(40%) and by CT Scan were 30(60%).

On USG around 37(74%) lesions are ill defined and 13(26%) are well defined. And 20(40%) lesions are hyperechoic, 20(40%) hypoechoic and 10(20%) mixed echoic in patients

There was optic nerve involvement in 20(40%) patients, 10(20%) had one or more muscle inflammation, 6(12%) had calcification, 6(12%) had cystic mass, 4(8%) had posterior scleritis, 2(4%) had scolex in cyst and about 1(2%) had ciliary body mass (CB) and retinal detachment (RD).

About 24(48%) lesions shows well enhancement on CT scan while 26(52%) were not enhancing. On CT scan we found 14(28%) optic nerve involvement and 14(28%)one or two muscle inflammation, 6(12%) had cavernous sinus inflammation and surrounding bony destruction6(12%) and in 5(10%) had metastasis mass and 5(10%)cystic mass as intra orbital space occupying lesion.

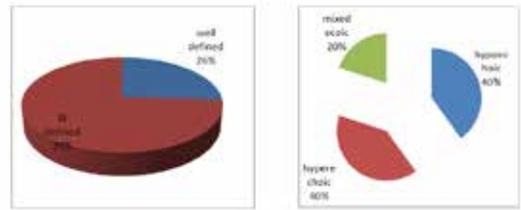
High quality high frequency ultrasonographic biomicroscopic imaging allowed preoperative imaging of intraorbital space occupying lesions. Deep lesions with bony destruction other soft tissue extension were well dignosed by CT scanning. This in detail analysis indirectly hepled to overcome the obvious limitation of clinical and slit lamp examination in assessing the tumor characteristics in toto and hence proved to be very valuable in preoperative surgical planning of tumor management.



ACCORDING TO SPACES IN WHICH LESIONS SEEN :

SUBPERIOSTAL SPACE	PERIPHERAL SPACE	CENTRAL SPACE
16%	44%	40%

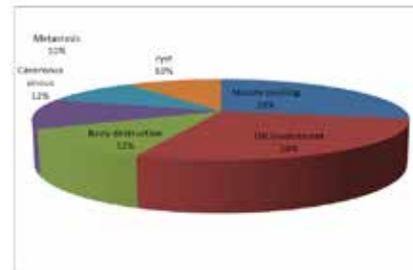
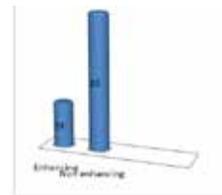
Finding in USG in 50 cases with intra orbital space occupying lesion :



USG and CT in Identifying Benign and Malignant Lesion

Total no. case	50	Case detected by USG	Case detected by CT	Both USG + CT
Benign	30	32(64%)	34(68%)	30(60%)
Malignant	20	18(36%)	16(32%)	20(40%)

Finding in CT Scan in 50 cases with intra orbital space occupying lesion



Cysticercosis with scolex which disappear after treatment



Figure 1

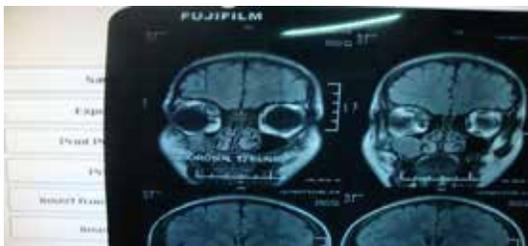


Figure 2

Mucormycosis causing erosion of cribriform plate and medial wall left orbit with ethmoidal sinusitis

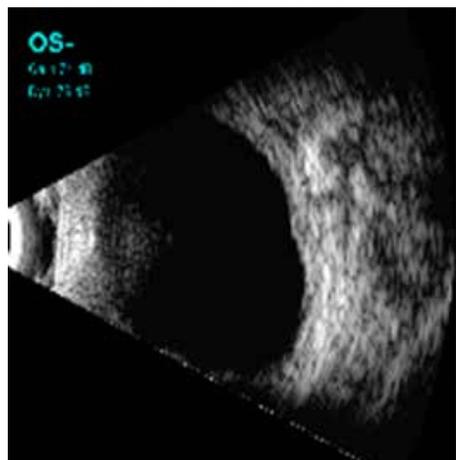


Figure 3

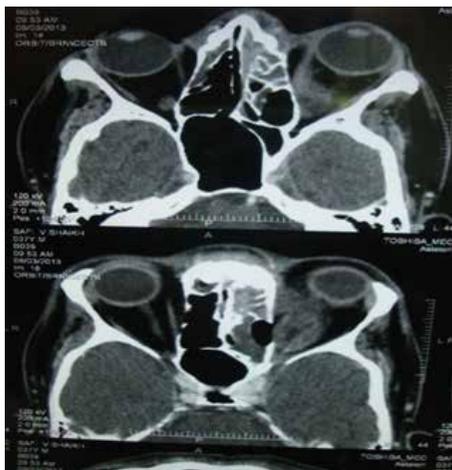


Figure 4
OPTIC NERVE GLIOMA

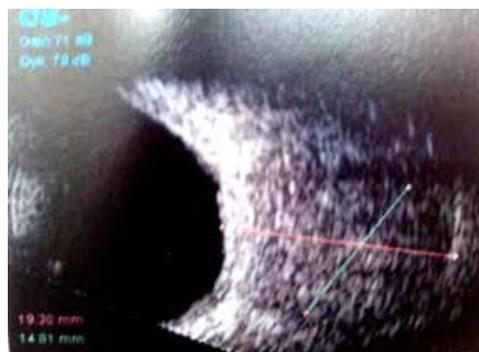


Figure 5



Figure 6

RETINOBLASTOMA



Figure 7



Figure 8
CONCLUSION

I would like to conclude that USG is rapid, handy tool , less expensive for preliminary diagnosis and follow up examination. Though expensive CT scan is superior to USG for deep orbital space occupying lesion and its associated condition for better surgical management , follow up and for monitoring the recurrence. In some cases we need CT scan to confirm diagnosis and MRI, FNAC and histo-patho examination as and when required.

REFERENCE

1. Mundt GH, Hughes WE. Ultrasonics in ocular diagnosis. Am J Ophthalmol 1956; 41:488-498.

2. 2. Oksala Lehtinen A. Diagnostic value of ultrasonics in ophthalmology. *Ophthalmologica*1957; 134:387-395.
3. 3. Baum G, Greenwood I. The application of ultrasonic location, techniques to ophthalmology: theoretic considerations and acoustic properties of ocular media: Part 1, Reflective properties. *Am J Ophthalmol* 1958;46:319 329.
4. 4. Purnell E W. B mode orbital ultrasonography. *Int Ophthalmol Clin* 1969;9:643- 665.
5. 5. Coleman D J, Lizzi FL, Jack RL. *Ultrasonography of the eye and orbit*. Philadelphia: Lea & Febiger,1977.