

DIAGNOSTIC VALUE OF B-SCAN ULTRASOUND IN OPHTHALMIC TUMORS

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ABSTRACT

Background: Ophthalmic ultrasonography is a useful diagnostic tool for intraocular evaluation. **Objectives:** The objective of this study was to detect and characterize the ocular and orbital tumors with the help of B-scan ultrasound. **Patients & Methods:** This was a prospective descriptive study conducted in Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan, for a period of two years from January 2009. Contact B-scan methodology with 7.5 MHz linear probe was used in which probe was directly placed on closed eyelids. Scanning was performed in longitudinal as well as transverse planes and with eye movements in all directions. 51 consecutive patients of either sex and age were examined, referred from different ophthalmology centers and clinics having clinical suspicion of orbital masses. **Results:** Total 51 cases were examined, 27 (53%) were males and 24 (47%) were females. Right eye was involved in 51% cases, left was in 43% cases and both eyes were involved in 6% cases. Out of 51 cases, 88% cases were diagnosed to be extra ocular orbital tumors and 12% were intra ocular tumors. Among all tumor types, pseudo tumor was commonest variety and was 26%. **Conclusion:** Ultrasonography of eyes (B-scan) is non invasive, relatively cheaper and easily available method to diagnose orbital tumors.

Keywords: B-Scan ultrasound, Orbital tumors, orbital masses.

INTRODUCTION

Intraocular tumors have wide spectrum, having considerable morbidity & mortality potential.¹ Ophthalmic tumors are of two types. Tumors that develop within the eye ball, are intra orbital tumors and tumors those occur in the eye socket are orbital tumors which usually arise from muscles, optic nerve, fat and skin.² In both children and adults, a variety of intra orbital and orbital tumors can occur. Some grow slowly, and go unnoticed while others can grow rapidly; impairing vision and causing even greater problems. Ultrasonography, CT scan and MRI's are the best methods for detecting and differentiating these lesions prior to surgery.^{3,4}

In pediatric age group, most common intra orbital tumors include retinoblastoma, medulloepithelioma and secondary tumors. The most common orbital masses in children are cystic lesions of the orbit, mainly dermoids. Vasculogenic lesions are the second most common and include capillary hemangiomas, lymphangiomas, or cavernous hemangiomas.⁵ The remaining small number of cases include inflammatory lesions, adipose-containing lesions, lacrimal gland masses, lymphoid tumors and

leukemia, optic nerve and meningeal tumors, osseous and fibro-osseous masses, rhabdomyosarcoma, and metastatic lesions (most frequently neuroblastoma). The most common malignant processes include rhabdomyosarcoma, metastatic disease, lymphomas and leukemia.⁶

In the adult population, the more common intra orbital tumors include melanoma, non Hodgkin lymphoma and metastatic tumors.^{7,8} The most common orbital tumors include carcinomas (paranasal sinus, secondary & metastatic), inflammatory masses (pseudotumor), lacrimal gland tumors, cysts, lymphomas, meningiomas, and vascular tumors (cavernous hemangiomas). Secondary tumors commonly invade the orbit and include mucoceles, squamous cell carcinoma, meningioma, vascular malformations and basal cell carcinoma.^{6,9}

Noninvasive diagnostic methods are of high important during management of eye tumors. Ophthalmic ultrasonography is one of the most useful diagnostic technique for intraocular and orbital evaluation.^{2,3} Contact B-scan ultrasound is one of the convenient, noninvasive means for the evaluation of intraocular structures in situations where clinical examination is not possible because of opaque ocular media. Ultrasonography determines the dimensions, location and consistency of the tumor with great accuracy.⁴ Present study was conducted to detect and characterize orbital tumors with the help of B. Scan ultrasound.

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PATIENTS & METHODS

This is a prospective descriptive study conducted at Radiology Department, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. This study was carried out for two years from Jan 2009 to Dec 2010. Patients of any age and either sex were included in the study. A total of 51 consecutive cases were examined which were referred from different ophthalmology clinics and centers with a suspicious of orbital masses. Patients which were not proved having orbital masses on B-scan and lid and anterior chamber tumors were excluded from the study. Demographic and clinical data of the patients was recorded including Name, Age, Sex, Occupation, Social Status, Address, Presenting complaints and Clinical finding on general and local examination. Then the findings on B-mode scan were recorded.

Contact B-scan methodology with 7.5 MHZ linear probe was used, in which probe was directly placed on the tissue (closed eyelids) and the deeper tissues scanned in supine position. By coupling agent (methylcellulose) probe was applied on patient's eye gently and scanning was performed in longitudinal as well as transverse direction and making eyes move in all directions. Both eyes of the patients were thoroughly scanned for comparison.

RESULTS

A total of 51 cases were examined during a period of two years. Among 51 cases males were 27 (53%) and females were 24 (47%). Right Eye was involved in 51 % of cases and left in 43% of the case; both eyes were involved in 6% cases. Tumors were observed in all age groups ranging from 2 months to 65 years. 45 (88%) patients had extraocular tumors and 06 (12%) patients had intra ocular tumors. The presenting complaints are shown in Table I.

Table I: Presenting complaints of patients

| Sr. No | Chief Complaint | Number of Cases (%) |
|--------|-----------------|---------------------|
| 1 | Proptosis | 43 (84) |
| 2 | Painful eye | 24 (47) |
| 3 | Redness | 14 (27) |
| 4 | Discharging eye | 12 (24) |
| 5 | Irritation | 08 (15) |
| 6 | Fever | 07 (13) |
| 7 | Headache | 05 (10) |
| 8 | Vomiting | 01 (02) |

Fig 1: Retrobulbar Abscess and Haemangioma



Tumor Calcification was seen in 12% of masses where as 88% of masses showed no calcification. Majority of patients presented with proptosis (84%), painful eye (47%), redness (27%) and irritation (15%) (Table I). Color Doppler Imaging revealed neovascularization in 20% cases, while 88% of cases showed no abnormal flow in tumor mass. (Figure I) Retrobulbar involvement was seen in 35% cases. Extraocular muscular involvement was shown in 29% cases. In present study tumor type according to its percentage is shown in table (II).

Table II: Frequency of tumor types.

| Sr. No | Type of tumor | Number (%) |
|--------|------------------------------------|------------|
| 1 | Orbital Inflammation (Pseudotumor) | 15 (29%) |
| 2 | Vascular tumors | 9 (18%) |
| 3 | Retinoblastoma | 7 (13%) |
| 4 | Cystic tumors | 6 (12%) |
| 5 | Graves Disease | 6 (12%) |
| 6 | Neurogenic tumors | 5 (10%) |
| 7 | Lacrimal Gland tumors | 3 (6%) |

DISCUSSION

In our study, we diagnosed 51 cases of orbital masses having different characteristics of various types of tumors. Fifteen (29%) cases were diagnosed as orbital inflammatory masses. Among 15 cases 5(33%) cases showed single extra ocular muscle involvement which showed enlargement having feeble internal echos. Five (33%) cases showed involvement of all the extra ocular muscles having

signs of inflammatory edema, whereas 3(20%) cases showed inflammatory change around the optic nerve. Sonographic changes were demonstrated as chain of echos within the substance of optic nerve or around the margins of optic nerve. In our study, one case (7%) demonstrated as irregular solid mass, in which the sound is absorbed by the tissue (attenuated) and the structures behind the growth are ill-defined. In one case we failed to diagnose inflammatory changes. Similar finding was reported in previous studies.^{10,11,12} Nine cases of Vascular tumors were studied. These were the second most common tumor in this study. Two types of lesions were demonstrated.

Hemangioma are tumors which originate from posterior fundus and typically are dome shaped and exhibit high internal reflectivity. In our study, 4 cases were diagnosed as hemangiomas, among them three of them were of adult type (75%), whereas one was (25%) of juvenile type. On ultrasonic examination three growths (75%) were well circumscribed and were diagnosed as cavernous hemangiomas of adult type. These lesions were highly vascular on CDI. Similar finding had been reported by Piccolino FC, where haemangioma was seen as smooth rounded growths having well defined limiting capsule.¹³ All five cases of hemangiomas had multiple fluid filled cystic spaces having no internal echos and these lesions were easily demonstrable after valsalva maneuver.

In our study, 6(12%) of our cases were diagnosed as cystic tumors. This made the fourth most common tumor of the orbit in our study. On ultrasound all cystic tumors had well defined, round contour. Two cases (33%) were diagnosed dermoid cysts and two cases (33 %) were diagnosed as ethmoidoceles. Dermoid cysts contain materials which originate from the ectodermal layer of the body, so internal echoes were seen in these cysts where as ethmoidoceles had clear fluid having no internal echos. Previous studies also favored that ultrasound is helpful to detect this fluid filled round growth adjacent to a paranasal sinus.^{11,12}

Seven cases (13%) were diagnosed as retinoblastoma, which made the third most common tumor in our study. In 4 (55%) cases vitreal cavity was seen full of tumor mass, where as 3(45%) cases vitreal cavity was partially

occupied by mass. In all cases dense calcification was detected. Leukokoria is evident in all cases clinically. Similar findings were reported in a study, by Decpak G. Gedi, who mentioned ultrasonography as an important follow up technique for retinoblastoma.

In our study, six cases (12%) were diagnosed as Grave's disease. On ultrasound the enlargement of extra-ocular muscles was the most common finding seen. 83% patients had more than one muscle enlargement and this was the cause of proptosis found in these orbits. Medial rectus was involved 83% cases, lateral rectus involved in 66% cases and inferior rectus was involved 17% cases. No case had enlargement of superior rectus muscle. So our findings that medial and lateral recti are most commonly involved, is in correlation with the findings of all the ultrasonography based studies.^{15,16}

To summarize ultrasonic findings of enlargement of extraocular muscles and retrobulbar fat oedema are the most important findings noted in our series as well as in all available literature. 5 cases (10%) were diagnosed as Neurogenic tumors having unilateral exophthalmos. Most common variety of neurogenic tumors was optic nerve meningioma. These tumors commonly had calcific foci. In our study, all neurogenic tumors were diagnosed as meningiomas showed marked discrete, dense internal echogenic spots and these calcific spots were 100% diagnostic for meningioma.

6% of the total orbital tumors were lacrimal gland tumors in our study. Benign lesions were well defined and well encapsulated where as malignant lesions were ill defined and had irregular capsule. In our study, we found the ultrasound reliable to differentiate between the benign and malignant nature of the lacrimal gland tumor.

CONCLUSION

Ultrasonography is non-invasive with relatively cheaper, easily available, economical and handy methodology than the costly investigations like CT scan. B-scan is first line diagnostic tool to demonstrate ophthalmic masses like vascular tumors, solid and cystic masses, neurogenic tumors and inflammatory conditions. All the soft tissue contents of orbit are well seen sonographically. Characterization of different types of tumors is easily delineated by B-scan.

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**The very spring and root of honesty
and virtue lie in good education.**

Plutarch