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EVALUATION OF ORBITAL NEOPLASMS ON COMPUTED TOMOGRAPHY

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ABSTRACT

Orbital problems can be of great concern to the patient, family and the physician. For the patient there can be permanent cosmetic deficit, ophthalmological deficit with loss of vision or the eye, and even loss of life. Many a times the diagnosis of orbital tumors is not clear even after thorough clinical examination. CT is useful to characterize: the precise location of the lesion- the intraconal space (including the muscle and optic nerve), extraconal space or the eye ball; the features of the lesion (density, calcification and enhancement). CT is also useful to demonstrate the precise extension of the orbital lesion, the involvement of the adjacent para nasal sinuses and nasal cavity, the evidence of the bone erosion and intracranial extension which helps in the pre treatment evaluation and post treatment follow up. The main aim of our study was to characterize orbital tumors with respect to their location, density, enhancement, calcification and bony changes and to correlate the findings of computed tomography with histopathology/surgical findings where ever applicable. A prospective study was conducted between December 2013 to December 2015 on 51 patients with suspected orbital tumors. Patients were evaluated with computed tomography using Toshiba Activion 16 and findings were correlated with histopathology / surgical findings / clinical follow up where ever applicable. Fifty one patients with orbital masses were evaluated in this study. A female predominant affection was noted (21 males and 29 females). The various tumors we came across in this study were Cavernous and Capillary Haemangioma, Pseudotumour, Retinoblastoma, Optic nerve glioma, Meningioma, Lymphoma, Lacrimal gland tumor, Thyroid orbitopathy, Plexiform neurofibroma, Dermoid and Choroid melanoma.

INTRODUCTION

Orbital problems can be of great concern to the patient family and the physician. Such problems may be developmental, inflammatory, associated with general or metabolic disease, traumatic, benign or malignant, neoplastic, vascular, or of unknown etiology.

Computed tomography has a tremendous impact in the field of diagnostic radiology. The natural intra orbital fat present with in the orbital cavity provides very good contrast on CT scans[1]. Most lesions with in the orbital cavity whether inflammatory, infectious or neoplastic are relatively hyper dense in comparison to the surrounding fat and they can be easily made out by CT. Above all CT is rapid and images are obtained in increments, and so the patient co operation is less important than MRI. CT is useful to characterize: the precise location of the lesion- the intraconal space (including the muscle and optic nerve), extraconal space (associated or not to an extra orbital lesion), or the eye ball; the features of the lesion (density, calcification and enhancement). The main aim of our study to demonstrate the usefulness of CT to demonstrate the precise extension

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of the orbital lesion, the involvement of the adjacent para nasal sinuses and nasal cavity, the evidence of the bone erosion and intracranial extension which helps in the pre treatment evaluation and post treatment follow up [1,2]

MATERIALS AND METHODS

Method of collection of data

A prospective study was conducted between December 2013 to December 2015 on 51 patients with suspected orbital tumors. Patients were evaluated using Toshiba activion 16 sclice CT scanner and findings were correlated with histopathology / surgical findings / clinical follow up where ever applicable. All patients with suspected orbital tumors were included in the study. Patients with tumors involving structures other than orbital contents. eg., sinuses and intra cranial pathology and patients with orbital tumors with contraindication to intravenous contrast Study were excluded from the study.

CT TECHNIQUES

Usually the accepted protocol is both axial and coronal images with the potential for multi planar reconstructions. For most studies 3 mm sections are adequate and coronal sections were taken at the lateral orbital rim and continued till the posterior aspect of the optic canal with anterior clenoid and/or dorsum sella as landmarks. Axial sections include images of the entire brain especially to include the retro orbital, optic apparatus with additional retrospective magnified views of orbit. Intra venous contrast agent is injected either manually / power injector depending on the lesion. Single dose or split doses one for each plane about 100 ml is used depending on the case. In all cases both soft tissue and bone windows are reconstructed and special windows are used depending on the case.

RESULTS AND ANALYSIS

A Prospective clinical study consisting of 51patients was undertaken to study the distribution of the various orbital tumors with relation to the different orbital compartments and CT scan diagnosis was correlated with the Histopathology findings. The results as described in the table no 1.

Figure 1. Axial Orbital Ct Scan Showing Heterogenously Enhancing Mass In Case Of Lymphoma

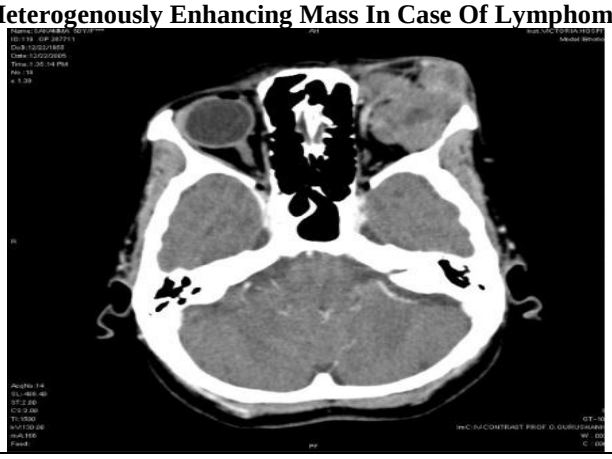

Figure 2. Axial orbital CT scan showing calcification in the retinoblastoma case

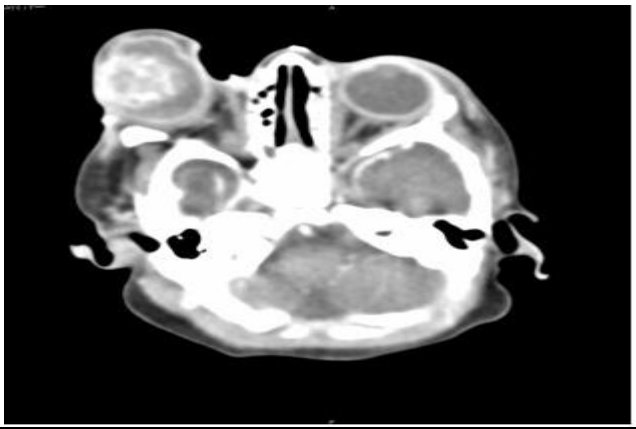

Figure 3. Axial CT orbit showing ill-defined retroconal mass in case of pseudotumor

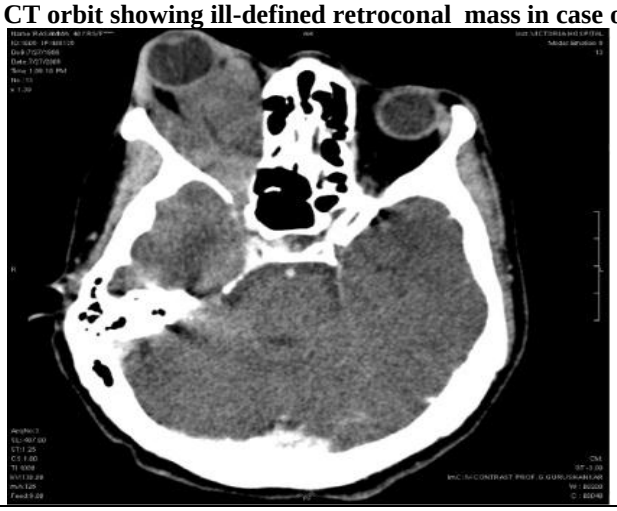

Table 1. Distribution of the various orbital tumors

SL No	Findings	Number (n=51)	% of cases	CT Diagnosis	HPE Diagnosis	Number correlated	Sensitivity of CT Diagnosis
1	Retinoblastoma	9	17.6	10	9	9	100.0
2	Hemangioma	8	15.7	7	8	6	75.0
3	Pseudotumor	9	17.6	13	9	8	88.9
4	Lymphoma	8	15.7	5	8	3	37.5
5	Lacrimal gland	3	5.9	3	3	3	100.0
6	Meningioma	4	7.8	2	4	2	50.0
7	Optic nerve glioma	2	3.9	3	2	2	50.0
8	Rabdomyosarcoma	1	1.9	0	1	0	0.0
9	Dermoid	1	1.9	1	1	1	100.0
10	Melanoma	1	1.9	1	1	1	100.0
11	Lipoma	1	1.9	1	1	1	100.0
12	Thyroid Orbitopathy	1	1.9	1	1	1	100.0
13	Yolk sac tumor	1	1.9	0	1	0	0.0
14	Plexiform neurofibroma	1	1.9	1	1	1	100.0
15	Osteosarcoma	1	1.9	1	1	1	100.0

Descriptive statistical analysis has been carried out in the present study. Significance is assessed at 5 % level of significance. Chi square test /Fisher Exact test has been used to find the significance of association of CT scan findings with Final diagnosis(HPE). Diagnostic statistics such as sensitivity, Specificity, PPV, NPV and Accuracy has been used to find the correlation of CT scan with final diagnosis.

Statistical software: The Statistical software namely SPSS 15.0, Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data.

DISCUSSION

Fifty one patients with orbital masses were evaluated in this study. The age of patients ranged from 1 month to 74 years. A female predominant affection was noted (21 males and 29 females). Forty seven cases were of unilateral involvement and four cases showed bilateral involvement. The various tumors we came across in this study were Cavernous and Capillary Haemangioma, Pseudotumour, Retinoblastoma, Optic nerve glioma, Meningioma, Lymphoma, Lacrimal gland tumor, Thyroid orbitopathy, Plexiform neurofibroma, Dermoid and Choroid melanoma. Apart from these, a rare intraocular yolk sac tumor was diagnosed.

Out of fifty one patients in the study, 39 patients were correlated with the histopathological findings Lymphoma (fig 1) was the commonest tumor noted in the adult population. This was also noted in the study conducted by Hakan Demirci et al [3] and K Ohtsuka [4] where the commonest tumor in adult population was lymphoma. Retinoblastoma was the commonest seen in the pediatric age group. Excluding the intra ocular tumors in the pediatric population, hemangiomas were the commonest tumor in our study.[5] The following distribution was noted with respect to the location of the tumors, pre-septal-19.9%, extraconal-56.8%. intraconal-58.8%, muscle cone-52.9%, optic nerve involvement-24.5%, intraocular-35.3% and orbital apex involvement-5.9%.

Retinoblastomas [6] (fig 2) were the most common tumors we came across in the pediatric population, obviously all were intraocular. A total of 9 cases were seen. All the 9 cases were intraocular with 3 cases showing intraconal, 2 extraconal and 2 muscle cone extension and 3 tumors involved the optic nerve. Out of the 9 cases, all showed calcification and in 3 cases bilateral eye involvement was seen. All the cases were seen between the age group of 3 months to five years.

In our study nine cases of pseudotumor (fig 3) were diagnosed, confirmation was by histopathological examination/ steroid therapy and follow up. The lesions were all illdefined involving mainly the muscle cone and extraconal space with few extending into the intra conal space and two of them involving the optic nerve. The lesions were mainly isodense (7/9) and most of the lesions were showing enhancement [7].

The vascular tumors [8] seen in this series were all cavernous hemangiomas except one which was capillary hemangioma. There were a total of eight cases, of which seven were cavernous hemangiomas and one was capillary hemangioma. Out of the fifty one cases evaluated, the CT diagnosis was correlated with histopathological diagnosis in 39 cases (76.47%). In a similar study by K K Sabharwal et al [9] the CT diagnosis correlated with histopathological studies in 78.26%

CONCLUSION

CT is a fairy good diagnostic modality in assessing orbital neoplasms. Computed tomography can give useful information about orbital neoplasms. For maximum information to be obtained careful attention to the technique of scanning, intravenous contrast agent and systemic analysis of various CT characteristics of the

various tumors is required. Appropriate scan planes and appropriate window setting enable evaluation of bone and soft tissue. CT is fairly accurate in narrowing the differential diagnosis, however, in certain cases correlations with the clinical finding as well as other investigations will be helpful to narrow down the differential diagnosis. So to conclude computed tomography is fairly a good diagnostic modality considering its cost effectiveness, non-invasiveness and is a reliable tool for the evaluation of the orbital tumors.

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