IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 4 Ver. XIV (Apr. 2016), PP 16-19
www.iosrjournals.org

Role of Ct in the Evaluation of Orbital Tumors

Dr.B.Ushalatha[1,] Dr.K.Sambasivarao[2]
[1]*Assistant Professor inOphthalmology, RangarayaMedicalcollege, Kakinada.*
[2]*.AssistantProfessor,Radiodiagnosis, Rangaraya Medical College, Kakinada. Corresponding author : Dr.K.sambasivarao*

Abstract:
Objectives: *To analyze the role of CT alone in the evaluation of Orbital Tumors.*
Material And Methods:*50 patients presenting with orbital masses were evaluated for CT scan Orbits. Role of CT was evaluated in characterizing the precise location and extension of the lesions causing proptosis. Final diagnosis was made based on the histopathology, operative findings and clinical outcome.*
Results: *Most common Orbital tumor was a pseudotumor(26%) followed by lymphoma (18%). Among the pediatric orbital Tumors Optic nerve Glioma(10%) was the common lesion followed by hemangioma (8%) and dermoid cyst (6%). Accuracy of Computed Tomography in the diagnosis of orbital tumors was 86% with more sensitivity for diagnosing benign lesions(90.3%) than malignant lesions(78.9%).*
Conclusion: *Computed tomography is the simple, cost effective technique in the evaluation of orbital tumors with the accuracy of 86%.*
Keywords: *Computed Tomography;Tumors ,PseudoTumors,Lymphoma, Glioma.*

I. Introduction

A variety of space-occupying lesions may involve the orbit.The pathology of these lesions ranges from benign tomalignant.The evaluation of orbital masses include a detailed clinical history , ocular examination, laboratory investigations & imaging studies .As far as the radiological investigations are concerned , findings on plain radiographs &ultrasonography are not pathognomic of most of the orbital disease process though some help can be obtained in characterization of lesion in certain cases. Advent of CT& MRI has revolutionized the diagnostic imaging of orbit & its contents. MRI with its superb soft tissue contrast &multiplanar ability provides excellent rendering of orbital anatomy but is limited by lack of wider availability & high cost. On the other hand easy availability and operability, good maintenance and speed makes CT scan an affordable diagnostic tool in orbital diseases under existing circumstances and present set up. However, information about the accuracy of the radiological findings, correlated with the pathological or histological findings as a reference, is useful for the management of orbital lesions.

II. Material And Methods

This retrospective study reviewed 50 patients of various age groups & both sexes with orbital masses that were referred to the Department of Radiodiagnosis from the Department of Ophthalmology, Government General Hospital , Kakinada for Computed Tomography of Orbits over a period of 2 years between 2013-2015. Before commencing for CT examination, all the preceding history, clinical, laboratory data were recorded. A CT scanner (SIEMENS SOMATOM DUAL SLICE) was used for the study. The technique was to obtain a lateral scannogram with the patient supine and contiguous axial sections with slice thickness of 3 mm and interslice gap of 3 mm were obtained. Coronal 3-5 mm sections were obtained as and when required with the patient in prone position. The scans were obtained both prior to and after administration of non ionic intravenous contrast. The radiological findings were reviewed and the radiological diagnosis for each patient was defined by the conclusive diagnosis given on the radiological report after CT. MRI was done where ever necessary.Benign lesions have well defined margins, homogenous, with no bone destruction. Malignant tumors have ill defined, heterogenous with bone destruction and multi compartmental involvement .CT findings were correlated with final diagnosis based on clinical, laboratory findings , operative findings , histopathological study or response to treatment.

III. Results

Fifty patients with age groups between 2 to 70 years were reviewed. 28 patients were men and 22 patients were female. 22 children between the age of 2-12 years were also included in the present study. The lesions were categorized based on their location(Table-1) as ocular, intra conal, conal, extraconal, and multi compartmental. The lesions were characterized based on their density (attenuation), enhancement, necrosis, calcification,

adjacent fat stranding, and bone involvement, primarily as benign and malignant tumors (Table-2). Benign lesions (Table-3) accounted for 62% (31 cases) and malignant features (Table-4) were noted in 38% (19 cases).

TABLE :1 LOCATION OF LESIONS

Sl.No	Diagnosis	Frequency	%
1	Ocular	1	2%
2	Intraconal	7	14%
3	Conal	8	16%
4	Extraconal	12	24%
5	Multi Compartmental	22	44%

Multi compartmental tumors involving more than one compartment were most predominant in our study accounting for 44% of the tumors. Of the 22multi compartmental lesions 18 were malignant and 4 were benign. Lymphomas, Rhabdomyosarcoma, Lacrimal gland tumors, Metastases are multicompartmental. Extraconallesions are the most common single compartment lesions with 12 cases (24%).Hemangioma, Dermoid cyst are the most common extraconal lesions. Opti nerve gliomas and optic nerve sheath meningiomas are the most common intra conal lesions. Pseudotumors ate the most common conal lesions.

TABLE :2 ORBITAL TUMORS

Sl.No	Diagnosis	Frequency	%	Adults	Children
1	Orbital Lymphomas	9	18%	6	3
2	Optic Nerve Glioma	5	10%	-	5
3	Rhabdomyosarcoma	4	8%	1	3
4	Meningiomas	3	6%	3	-
5	Metastases	2	4%	2	-
6	Hemangioma	4	8%	-	4
7	Dermoid Cyst	3	6%	-	3
8	Lacrimal Gland Tumor	3	6%	3	-
9	Retinoblastoma	1	2%	-	1
10	Orbital Pseudotumors	13	26%	10	3
11	Fibrous Dysplasia	1	2%	1	-
12	Osteoma	2	4%	2	-
		50		28	22

Orbital pseudotumors are the most common orbital mass lesions in 13 patientsof which 4 patients show multicompartmental involvement , followed by lymphomatous involvement of the orbit in 9 cases and all the cases presented with proptosis as their chief presenting complaint and all cases have multicompartmental involvement. Pseudotumor case s have shown response to steroids , and showed a decrease in size. Optic nerve gliomas are the most common pediatric orbital masses in 5 children followed by hemangiomas in 4 cases. Retinoblastoma was seen in one female child of two years. Rhabdomyosarcomas were the most common pediatric malignant tumor in 3 cases. (13.6%). Most of the pediatric tumors are benign in nature (86.4%). Osseous lesions were seen in 3 cases, and were symptomatically managed due to their smaller size.

TABLE :3 BENIGN ORBITAL LESIONS

SL.NO	DIAGNOSIS	FREQUENCY	%
1	ORBITAL PSEUDOTUMORS	13	26%
2	DERMOID CYST	3	6%
3	HEMANGIOMA	4	8%
4	MENINGIOMAS	3	6%
5	OPTIC NERVE GLIOMA	5	10%
6	FIBROUS DYSPLASIA	1	2%
7	OSTEOMA	2	4%

Orbital pseudotumors are the most common benign orbital mass lesions in 26% of patients, unilateral involvement is seen in 11 cases and both eyes are involved in 2 cases . 4 cases are conal, 3 are intraconal 2 are extraconal and 4 are multicompatmental lesions and show good response to steroids. Optic nerve Glioma was the most common pediatric orbital tumour (10%) causing proptosis. The lesion was diagnosed with a characteristic fusiform enlargement involving optic nerve with mild to moderate contrast enhancement . Meningiomas were found in3 cases. On CT they appeared as well defined hyper dense homogenously enhancing intraconal mass with central lucency (Optic nerve) with calcification and Minimal sclerosis of adjacent bones. Hemangioma appeared as Well defined capsulated hyperdense mass with moderate enhancement in four patients

TABLE :4 MALIGNANT ORBITAL TUMORS

SL.NO	DIAGNOSIS	FREQUENCY	%
	ORBITAL LYMPHOMA	9	18%
2	RHABDOMYOSARCOMA	4	8%
3	LACRIMAL GLAND TUMORS	3	6%
4	METASTASES	2	4%
5	RETINOBLASTOMA	1	2%

Lymphoma is the most common malignant orbital tumour in adults(18%). Lymphoma appeared as homogenously enhancing soft tissue masses in extraconal space with involvement of intraconal space in four patients . Extraocular muscles were involved in all patients and Optic nerve involvement was seen in one patient. Four patients of Rhabdomyosarcoma (8%) presented as homogenously enhancing extraconal masses with involvement of extraocular muscles in all four patients. Epidural extension was seen in one patient. Three out of four cases of Rhabdomyosarcoma were seen in children. Two patients in our study presenting with proptosis were proved to be metastases in the orbit. One of the patients presenting with extraconal masses in superolatateral quadrants in left orbit was proved to be a case of Ewings sarcoma. One patient was a follow up case of Carcinoma breast and was shown to have metastatic extraconal mass in the left orbit. In our study Retinoblastoma was unilateral in the left orbit of a 2 years old female child. On CT Retinoblastoma revealed homogenously enhancing masses involving whole of the eyeball with Calcification and thickening of the Optic nerve.

IV. Discussion

Of the fifty patients evaluated by CT in our study, the most common orbital tumor was a pseudotumor in 26% , followed by lymphoma 18%, and are the common tumors in adults. Optic nerve gliomas are the most common pediatric tumors in 10% cases, followed by Rhabdomyosarcomasin 8% of the cases , hemangioma (8%), optic nerve sheath meningioma, Dermoidcyst(6%). CT has been accurate in delineating benign and malignant lesions with a sensitivity of 96% . Accurate diagnosis has been made based on contrast enhanced CT of benign lesions with a sensitivity of 90.3%, and less accurate in diagnosing malignant tumors with a sensitivity of 78.9%.Overall the diagnostic accuracy of CT in diagnosing orbital tumors was 86%.

The diagnosis of an orbital lesion may be made accordingto the imaging appearance. The location of alesion within the orbit may serve as a clue to the diagnosis.Certain lesions have a predilection for either the intraconalor extraconal space. Optic nerve gliomas,optic nerve sheath meningiomas are intraconal ,hemangiomas, dermoid cysts, benign lacrimal gland lesions are extraconal. Whether an orbital disease is

unilateralor bilateral is also important. pseudotumor tend to involve the orbit bilaterally. Multicentricityof lesions would suggest lymphoma, malignant process or a pseudotumor.

Specific lesion characteristics such as theappearance of the margin may be helpful .lesions withwell-defined margins are often benign, whereas vague,poorly defined margins suggest an infiltrative process suchas lymphoma or pseudotumor. The shape of the lesion alsoaid the diagnosis, especially vascular lesions that possesscomponents of a characteristic tubular shape. Cystic lesionsare recognized by a capsule that is of higher density than thecentral contents. Calcification may be found in mixedtumors of the lacrimal glands, cavernous hemangiomas,retinoblastomas, dermoids,optic nerve sheath meningiomas, and optic gliomas. Bonedestruction is an important clue to the diagnosis of orbitallesions. Frank bone destruction generally signifies an aggressiveor malignant process, whereas smooth erosions ormolding indicates a long-standing benign lesion. Hyperostosisis noted in fibrous dysplasias, meningiomas, and lacrimalgland tumors.

CT is a good choice for viewing almost every lesion in thecraniofacial area except for the intracanalicular optic nerve. CT scan is highly useful in describing the precise location and extent of the lesion and is fairly accurate in lesion characterization. Although MRI is considered to be a superior technique forevaluating soft tissues, in the orbit, most pathologic processesare adequately demonstrated by CT. Thus, in this study,not all patients required both CT and MRI scans. Only thosepatients for whom CT yielded insufficient information formaking the diagnosis or insufficient anatomical detail forfuture surgical management underwent MRI.

Radiological diagnosis was mostaccurate for diagnosing nonmalignant lesions , cystic and vascular lesions and was less accuratefor lacrimal, lesions. Thisfinding may be due to the fact that cystic and vascularlesions have characteristic features that are easily recognizableradiologicallyOn the other hand, malignantlesions such as lymphoma are particularly difficultto differentiate from benign inflammatory conditions ofthe orbit .Radiological investigations were found to be accurate forruling out malignant conditions, with a high specificity. An accurate preoperative diagnosis by CT is essential for managing patients with orbitalmasses.Collaboration and discussion between clinicians andradiologists are therefore essential for making accurateradiological diagnoses.

V. Conclusion

CT is useful to characterize the precise location ,extent and features of the lesion (density, calcification, enhancement.). These findings are helpful to generate a differential diagnosis. CT is also useful to demonstrate the precise extension to adjacentparanasal sinuses &nasalcavity, The evidence of bone erosion and intracranial extension which helps in pre treatment evaluation & post treatment follow up. To conclude CT scan can be considered as a cost effective, non invasive, reliable diagnostic tool for evaluation of orbital tumors. Early CT scan evaluation is required for prompt adequate management and for early intervention.

References

[1]. Shields JA. Diagnosis and management of orbital tumors.Philadelphia: Saunders; 1989:89-388.
[2]. Kanski JJ. Clinical ophthalmology. A systematic approach.4th ed. Oxford: Butterworth Heinemann; 1999:574-584.
[3]. Shields JA, Shields CL, Scartozzi R. Survey of 1264 patients with orbital tumours and simulating lesions. The 2002 Montgomery Lecture: Part 1. Ophthalmology 2004;111:997-1008.
[4]. Hammerschlag SB, Hesselink JR, Weber AL. Computed tomography of the eye and orbit. Norwalk: Appleton CenturyCrofts; 1983:24-25.
[5]. De Potter P, Shields JA, Shields CL. MRI of the eye and orbit. New York: Lippincott Williams and Wilkins; 1995:8-17.
[6]. Gonzalez CF, Becker MH, Flanagan JC. Diagnostic imaging in ophthalmology. New York: Springer-Verlag; 1986:29-37.
[7]. Gyldensted C, Lester J, Fledelius H. Computed tomography of orbital lesions. A radiological study of 144 cases.Neuroradiology 1977;13:141-150.
[8]. Lloyd GAS. CT scanning in the diagnosis of orbital disease. ComputTomogr 1979;3:227-239.
[9]. Masters BR. Noninvasive diagnostic techniques in ophthalmology. New York: Springer-Verlag; 1990:25-46.
[10]. Sassani JW. Ophthalmic pathology with clinical correlations. Philadelphia: Lippincott Raven; 1997:1-76.
[11]. Alan C. K. Ng The accuracy of radiological imaging in the diagnosis of orbital lesions in a regional hospital, HKJO VOL.9

Acknowledgements: My Special Acknowledgements To Dr.M.Muralikrishna,Ms, Professor &Hod Of Ophthalmology, Department Of Ophthalmology ,Rangaraya Medical College, Kakinada And To Dr .K. RadhaRaniMd, Professor &Hod Of Radiodiagnosis , Department Of Radiodiagnosis, Rangaraya Medical College, Kakinada For Their Constant Support And Encouragement.