IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 5 Ser. 3 (May. 2025), PP 37-45
www.iosrjournals.org

CT Evaluation Of Orbital Mass Lesions

Dr.Bipin Bihari Pradhan[1], Dr. Biswaranjan Behera[2],Dr. Sailendra Prusty[3], Dr.Bibartika Nayak [4]

Date of Submission: 05-05-2025 Date of Acceptance: 15-05-2025

I. Introduction

"Eyes are the windows of brain' through which one recognizes the world."

Orbital mass is defined as lesions which causes mass effect in bony orbital cavity and usually present with proptosis :which is an important manifestation of orbital disorders and is defined as abnormal protrusion of globe beyond the orbital margin.orbitalmass lesion have got varied etiological causesranging from orbital pseudotumour tomalignant rhabdomysarcoma. Most of the lesions are retro-orbital in location and is more often not accessible to clinical evalution, that is why orbital imaging for mass lesion is demanding and is considered essential for orbital mass lesion. Diagnosis of orbital disease is often not clear even after a thorough clinical examination.Imaging study of orbit have evolved over decades from radiography –B- scan USG ,computed tomography snd magnetic resonance imaging. Main drawback of X-ray was its inability to characterize soft tissue. Though USG is batter imaging modality but it has got limited value in accessing posterior orbit and imaging of adjacent structures like PNS and intracranial space.With advent of CT, it has become the procedure of choice in arriving at a diagnosis for orbital lesions. Both CT and MR provide excellent anatomic details and information regarding the presence, location and extent of intra orbital lesion as well as involvement of orbit bylesions arising adjacent to bone and paranasal sinus.CT remains the procedure of choice in case of acute trauma, acute infection or bony lesion or abnormality. The clarity of presentation of orbital structures by computed tomography has prompted investigations into detailed multiplanar anatomy of orbit is further enhanced with the advent of multi detector-row CT (MDCT). MDCT allows multiplaner views of bony orbital walls and their aperture i.e., the optic foramen, superior and inferior orbital fissure, and their respective affection y trauma, tumour or inflammation of panasa lsinus or head and neck tumour.

II. Aims And Objectives:

- To diagnose pathology and characterize the nature of mass lesion and its extent to surrounding tissue.
- To evaluate the efficacy of CT in dictation, localization, and characterization of orbital mass lesion.
- To corroborate the CT finding with subsequent surgery and histopathological studies.
- Comparing the result of study with series of work done previously by eminent.

III. Methodology

This study of computed tomographic evaluation of orbital diseases with clinical and pathological correlation was conducted on 30 patients at V.S.S. Medical college Hospital, Burla, Department of Radio-diagnosis between 2012-14 referred to the with suspicion of orbital lesion by ophthalmologist .

Exclusion Criteria

Patients who had come with recent history of trauma, to evaluate the extent of trauma or to detect the presence of foreign body.

Inclusion Criteria

Patients included had complaints of pain in the eye, redness of eye, proptosis, white reflex and restriction of ocular movement.

A detailed history was taken from each patient followed by clinical examination and findings were tabulated. Fine needle aspiration cytology; or biopsy was done in few cases. In few other patients enucleation of the eye was the treatment of choice, the excised tissue was subjected for histopathological examination. Details of treatment and procedure done on patients studied on out patient basis were obtained from the referring consultants and recorded.

IV. Result:

Table 1. Age & sex distribution in orbital mass lesion

Age	Male	Female	Total
0-9	6	3	9
10-19	1	1	2
20-29	1	1	2
30-39	0	2	2
40-49	5	2	7
50-59	3	3	6
60-69	1	0	1
70-79	0	1	1
80-89	17	13	30

Table 2: Associated Chief Clinical presentation in case of orbital mass lesion

Clinical Presentation	No. of Cases	Percentage (%)
Proptosis	20	67
Headache/Pain	9	30
Conjunctival Injection	3	10
Visual Impairment	7	23
Swelling of Lid	1	3
Swelling of Lacrimal Gland	2	7
Edema	4	13
Chemosis	4	13

Figure 1. Type of Orbital mass lesion

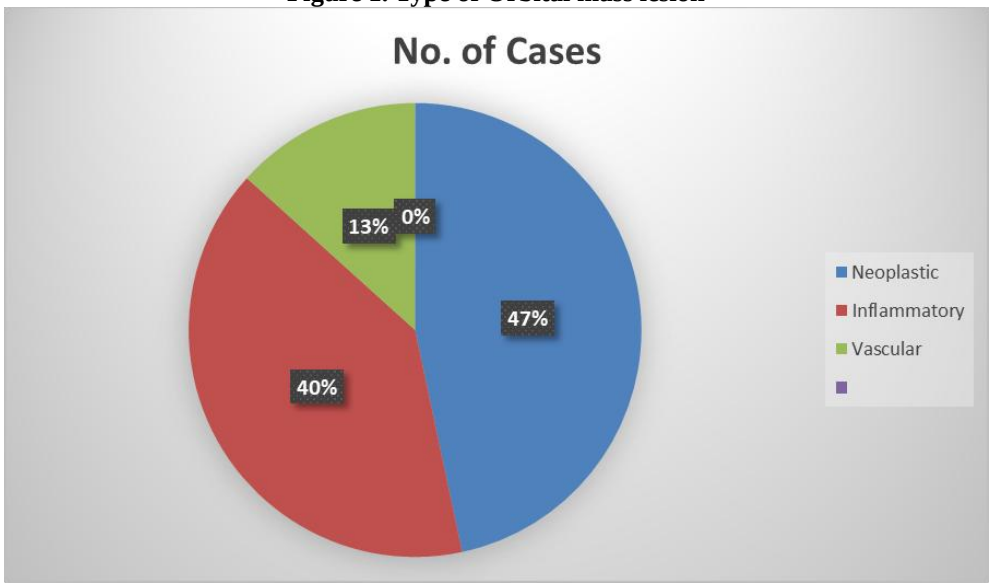


Figure 2: Frequency of distribution of orbital mass lesion in children

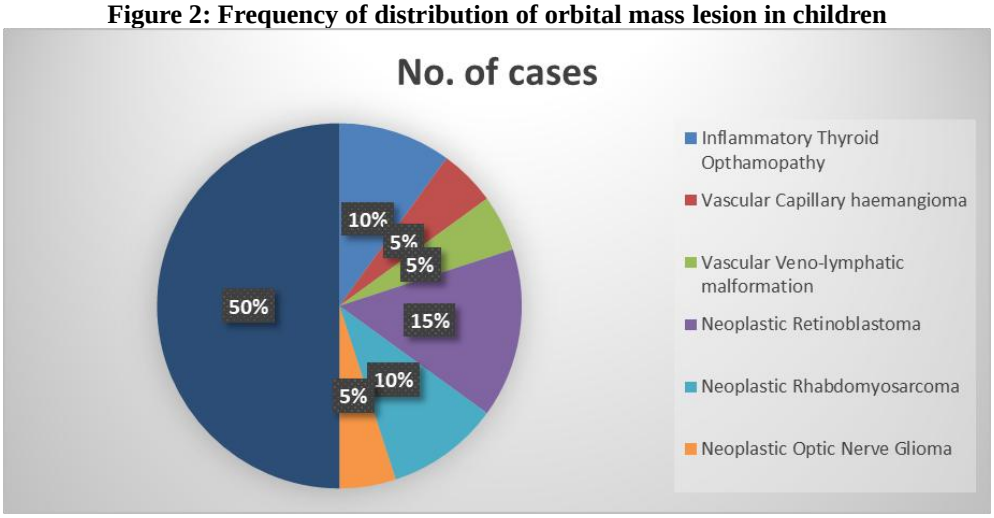


Figure 3.Frequency of distribution of orbital mass lesion in adult

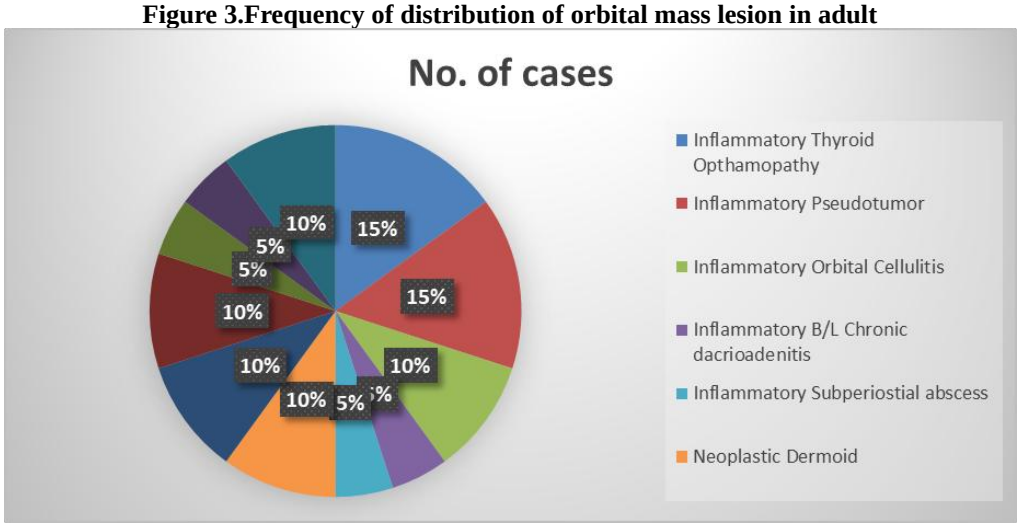


Figure 4. Frequency of distribution of orbital mass lesion in location

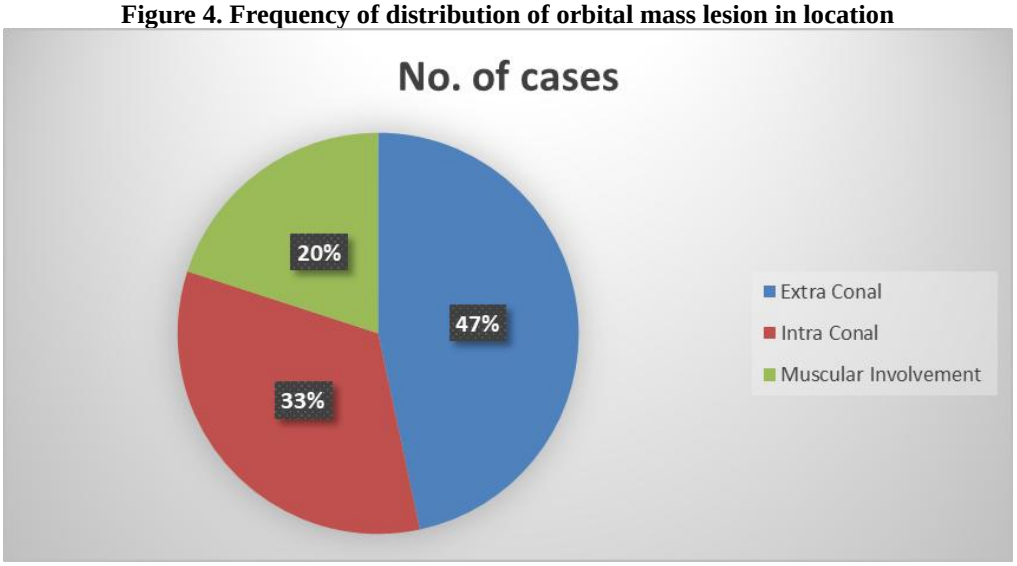


Figure 5. Frequency of distribution of various CT attenuationof various orbital mass lesion

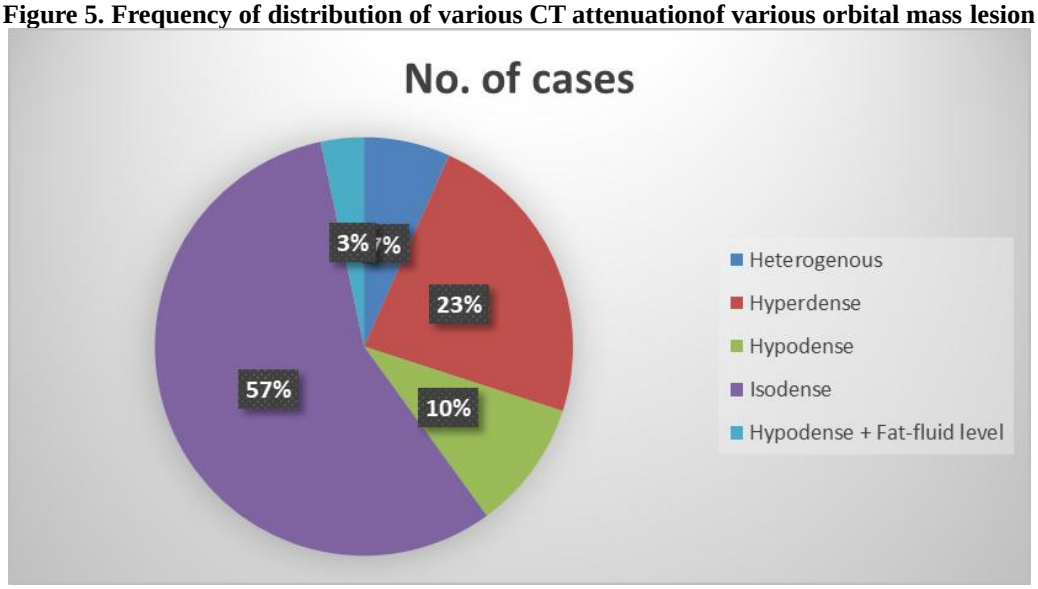


Figure 6. Frequency of distribution of orbital mass lesionshowing post contrast enhancement

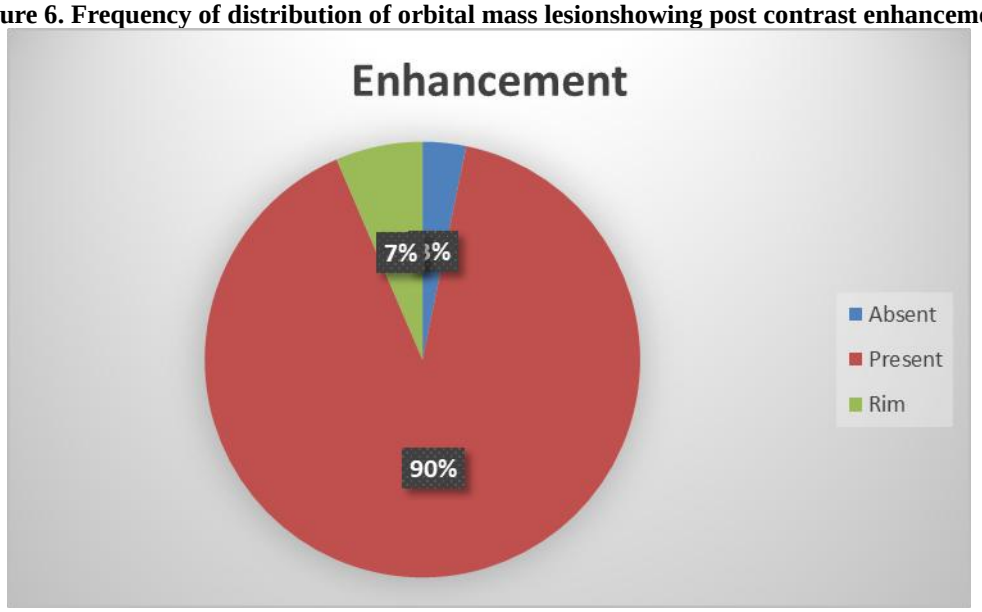


Figure 7.Frequency of distribution of CT Diagnosis of Orbitalmass

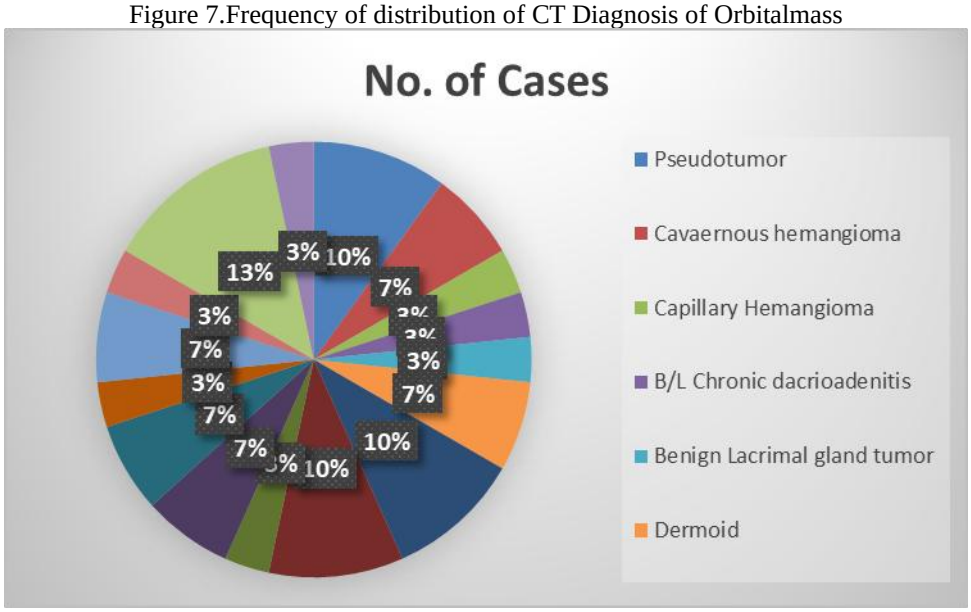
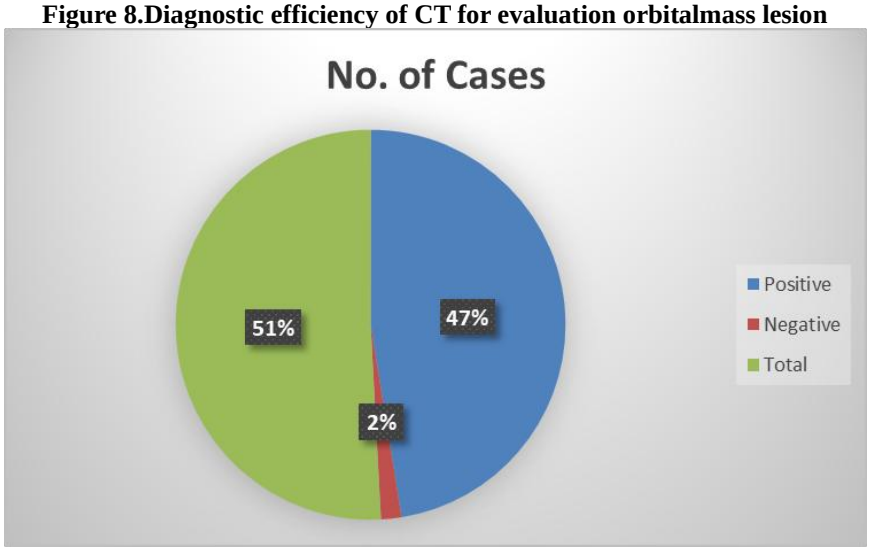
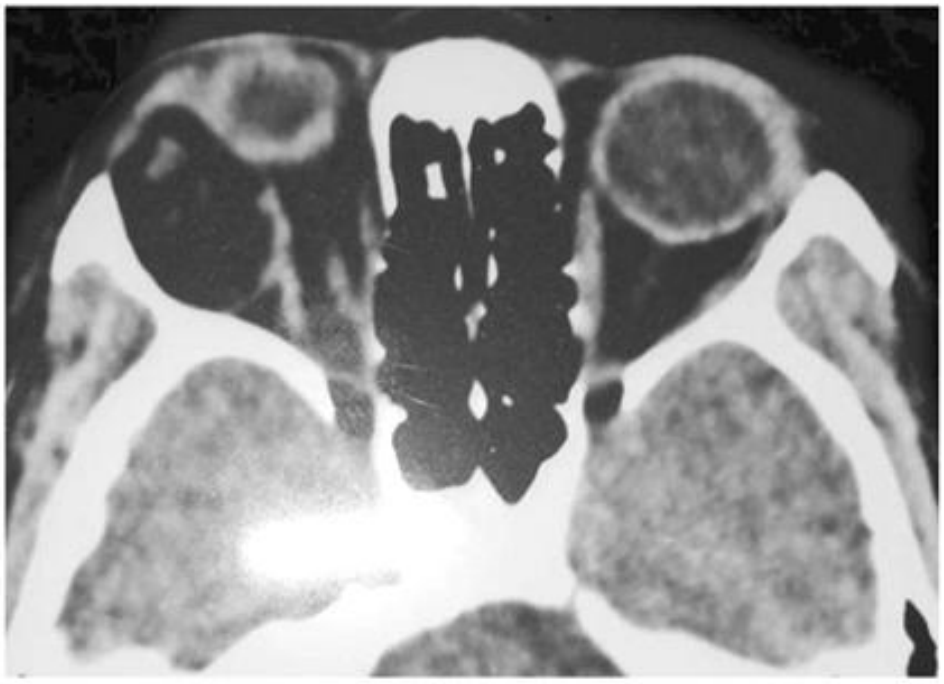


Figure 8.Diagnostic efficiency of CT for evaluation orbitalmass lesion

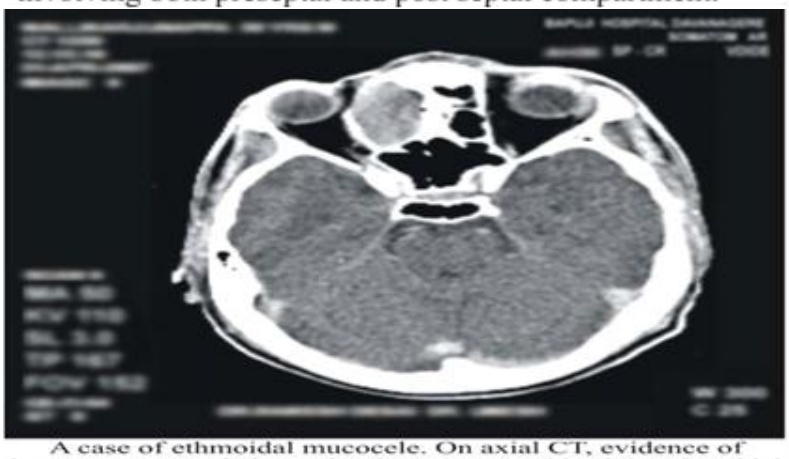


A case of Dermoid: A 40 year old patient complaining of slowly progressive proptosis of right eye since many years.

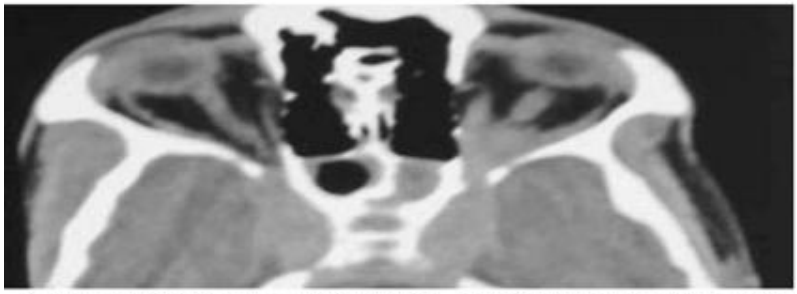


A case of Dermoid. Evidence of well defined cystic lesion noted in extra conal compartment

A case of rhabdomyosarcoma. Axial CT section showing ill defined mass noted in supermedial quadrant of left orbit involving both preseptal and post septal compartment.



A case of ethmoidal mucocele. On axial CT, evidence of homogeneous soft tissue density mass noted in right ethmoidal sinus which is eroding adjacent bone and protruding into orbit



A case of Tolossa hunt syndrome. Evidence of heterogenous lesion noted in left orbital apex extending into proximal cavernous sinus.

V. Discussion

Table-1 shows age and sex distribution of 30 cases of orbital mass subjected for CT evaluation. The incidence of mass lesion appear to be nearly equally distributed among male (56%) and female (44%) and two peak age of incidence were observed that is between 1-9 years and 40-49 years. Kambio DK and Associates (1995) in their study in a group of 129 patient of orbital mass lesion which almost all presented with proptosis observed that 61% of cases were male, 39% of cases were female and majority of cases were in the age group 30-50 years. In this study the discriepancy could be due to different geographical factor and small study sample size.

Table-2 shows chief presenting features in orbital mass lesions, they are in decreasing order of frequency are proptosis, headache/ pain, diminished vision, lid edema & chemosis. There findings correlates well with finding of Kambio DK and associates (1995) in which proptosis and headache/ pain was the most frequent clinical picture.

Table-3 shows frequency of different cases of orbital mass lesion. In this study neoplastic mass lesion accounted for 47%, followed by inflammatory mass lesion (40%) and vascular lesion (15%) . This correlate with study of Kambio and Associates (1995) in which inflammatory disorder account for 36% case and neoplastic came in 40% of cases.

Table-4 shows distribution of lesion in childrens. In the study retinoblastoma (30%) was the most common case of orbital mass lesion followed by orbital cellulitis (20%) and Rhebdomyosarcoma (20%). These finding correlates well with Sindhu and Associates (1998) in which orbital callulitis causes mass lesion in (38%) of cases in children.

Table-5 shows frequency of distribution of mass lesion in adult. In the study inflammatory mass lesion accounted for 50% cases followed by neoplastic mass 40%, thyroid opthamopatty and preadutomour was the cause 15% each. In a study conducted by Richard Dallow and Associates (1982), they found that inflammatory mass accounted for 51% of cases of orbital mass lesions, followed by neoplastic mass lesion (31%). The discrepancy be due to small study group.

Table-6 shows frequency of mass lesion in different orbital compartment. In the study there were 46% case extraconal, 33% cases intraconal compartment and 6% of cases confined to muscles. Compartmentalization of the levison helps in arriving at a diagnosis early (Shediy Forbes – 1980)

Table-12 shows frequency of distribution of the lesions showing post contrast enhancement. In the study majority of mass lesions (90%) showed post contrast enhancement, one case of (3%) ethanoidal mucocele did not show any enhancement and 2 cases (7%) of dormoid showed rim like enhancement.

Table-14 shows the CT diagnosis in orbital mass lesions.

In this study of 3 patients in the pediatric age group has orbital cellulitis. The extent of infection in two cases were extra-conic and intra-conic and in one case it was extra conic. The present findings correlate wall with the study of orbital cellulitis in a group of 18 patients by Zinnerman who concluded that the CT scan can localize the extent of infection.

One patient in this study group has ethmoid mucocele. The CT features was well defined hypdense mass without contrast enhancement. As per Vashist (1985) the characteristic findings in mucocele is well defined mass without contrast enhancement.Two cases of maxillary sinus malignancy was found. Lesions were extending from maxillary sinus into orbit. It was extending into ethimoid, sphenoid sinus and check and in both cases bony erosion was noted.

Three patient in this study group had preudotomour with bilateral involvement in 2 cases and unilateral involvement in one case. Which on contrast study showed moderate enhancement alongwith contrast enhancement of uveo-scleral thickening and thickening of various rectus muscle. This finding correlates well with the study of Berhardino (1977) who dearibed contrast enhancing Uveo-scleral thickening with enlargement of extra ocular muscles as characteristic finding of preudotomours.

Three patients in this study group has thyroid opthamopathy CT scan showed all bilaterial orbital involment. There was no evidence of any body erosion, retrobulbar fat obliteration or optic nerve involvement. These findings correlate well with the study of Enzmass et all (1979)

Three cases of Retinoblastoma were deleated and the characteristic CT findings were well defined soft tissue mass involving the globe with presence of calcification and with optic nerve involvement.

Three cases of hemagioma found in this study group, 2 of which are intra conal and one is extraconal, all lesions having hyperdence which on contrast showed intense enhancement.

One case of optic nerve glioma found in this study group the CT finding were well defined isodense intraconal mass involving the optc nerve which on contrast showed mild enhancement, Byrd (1978) described similar CT features in optic nerve glioma.

Two cases of optic nerve meningioma presented as a well defind isodense mass with speck of calcification on contrast study there was moderate enhancement. Jackobiee (1989) also derived similar CT features in optic nerve meaninggioma.

Two cases of dermoid were seen one is 21 year old and other 40 year old patient, both mainly complained of proptosis. Both had hypodense lesion, in one case there was fat fluid level and both showing rim like enhancement.

Two cases of Rhabdomyosarcoma seen, one 8 year and other 7 year old child complaining of rapidly developing proptoses. In both cases the mass was involving superomedial qudrant and both are extracoral masses which are isodence and showing mild enhancement.

In the present study group 1 case of lacrimal gland lesion was evaluated by CT scan. The lesion was extra-coral in location and of soft tissue density (Isodense) and the margin was well defined, post contrast study showed mild enhancement. The CT findings in this present study correlates with the study of Mahmood (1999).

In the present study group in one case CT diagnosis was missed as lacrimal gland adonorma which was confirmed on histopathological examination as adenocystic carcinoma, similar observation has made by Sheedy Forbes (1980).

VI. Summary & Conclusion

The following informations gathered during the course of study.

- The age of the patient ranged from 1.5 year to 70 year with two peak age of incidence - one below 10 year and another between 40 to 49 year. Both male and female nearly equally affected.
- Most common clinical presentation in orbital mass lesion is proptosis.
- Neoplastic lesions are the most common cause of orbital mass lesion (47%) followed by inflammatorry (40%) and vascular (13%).
- In children most common cause of orbital mass lesion were retinoblastoma (30%), followed by orbital cellulitis (20%) and in adults throid opthalmopathy (15%) and pseudo tumour (15%) are the most common cause of orbital mass lesion.
- Unilateral orbital mass lesion is the most common (80%) while bilateral mass lesion seen in 20% of cases. Thyroid opthalmopathy was the most common cause of bilateral mass lesion accounted for 50% of cases, followed by pseudotumour (33%).

In the study group it is observed that CT gave accurate diagnosis in approaxmately 96% of cases. Hence CT should be the modality of choice for evalution of orbital mass lesions. It is very much useful in detectating, characterizing and determining the extent of lesion. Compartmentalization of the orbital lesions helps in arriving at a diagnosis, and is fairly accurate in narrowing the differential diagnosis. CT is easily available, less time consuming, cheeper comaired to MR, and can be used to monitor the response of therapy and follow up of patients.

Bibilography

[1] Forbes G. CT Of Orbit. RCNA 1982; 20 (1): 37-49.
[2] Tamraz JC. Tamraz CO And Saban R. MRI Anatomy Of The Optic Pathway. RCNA 1993; 37 (1): 10-12.
[3] Som PM. Curtin DH. Head And Neck Imaging In Orbit: Embryology, Anatomy And Pathology Mafee MF (Ed) 4 Edition, 531.
[4] Dubey RB, Tara NP And Sisodiyer KN. Computed Tomography Evaluation Of Orbital Lesions Pictorial Essay. Ind J Radiol 2003; 13 (3): 261-270.
[5] Son PM, Curtin DH. Head And Neck Imaging In Orbit: Embryology, Anatomy And Pathology. Mafee MF (Ed) 4th Edition, 533-543.
[6] Aids To Radiological Differential Diagnosis. Stephen Chapman And Richard Nakielny (Eds), 4th Edition, 2003: Pp.375-377.
[7] Kaufman LM, Villablanca JP. And Mafee MF. Diagnostic Imaging Of Cystic Lesions In Child's Orbit.RCNA 1998; 36: 1149-1164
[8] Aviv IR, Casselman J And Misztrid K. Orbital Imaging. Clinical Radiology 2005; 60(3): 279-307
[9] Vashist S, Ghai S, Hatimota P, Ghai S, Betharia SM. Cystic Lesions Of Orbit: A CT Spectrum. Ind J Radiol Imaging 2003; 13: 139-144.
[10] Dubey RB, Tara NP, Sisodiya KN. Computerized Tomographic Evalution Of Orbital Lesions.Pictorial Essay. Ind J Radiol Imaging 2003; 13: 261-70.
[11] Harsh Kandpal, Sushma Vashisht, Raju Sharma, Ashu Seith. Imaging Spectrum Of Pediatric Orbital Pathology.A Pictorial Review. Ind J Ophthalmol 2006; 54: 227-36
[12] Weber AL, Romo LV. Pseudotumour And Orbit: Clinical Pathological And Radiological Evaluation. Radiological Clinics Of North America 1999; 37 (1): 151-168.
[13] Dresner S, William E, Rothfur, Thomas L, Slamovits, John S, Kennerdell, Hugh D Curtin: Computed Tomography Of Orbital Myositis. AJR Sept 1984; 143: 671-674.
[14] Som PM, Curtin DH. Head And Neck Imaging.4th Edition, 584-590.
[15] Valvasori GE, Sabnis SS. Imaging Of Orbital Lym Hoproliferativ Pe Disorders. RCNA 1999; 37: 135-150.
[16] Peyster RG, Hoover ED, Hershey BL, Haskin ME, "High Resolution CT Of Lesions Of The Optic Nerve" 140; 869-8 AJR 74 May 1983.
[17] Caroll GS, Haik BG, Fleming JC, Robert A. Weiss And Mafee MF.Peripheral Nerve Tumors Of Orbit. RCNA Jan 1999 (37:1)9;199 195-202.
[18] Flanders AE, Epinosa GA. Orbital Lymphoma. RCNA 1987; 25: 601-612.
[19] Mafee MF, Goldberg MF. "Persistent Hyperplastic Primary Vitreous; Role Of Computed Tomography And Magnetic Resonance.RCNA Vol 25 (4) July 1987; 683-691.
[20] Weber ATL, Caruso P, Sabates NR. The Optic Nerve Radiological Clinical And Pathological Evaluation, Neuroimaging. Clinics Of North America 2005;15: 175-201.

[21] Davis PC, Hopking KL. Imaging Of Pediatric Orbit And Visual Pathway. CT And MR Imaging.Neuroimaging. Clinics Of North America 1999; 9: 93.
[22] Mahmood F Mafee, Morton F Gold Mark Berg,J Greenwald, Joel Schulman, Allan Malmed And Adam E Flanders. : Role Of CT And MR Imaging In Retinoblastoma And Simulating Lesions . RCNA 1987; 25 (4): 667-681.
[23] Role Of MRI And Computed Tomographyoptic Nerve Tumours Kia AB, Naheedy MH, Elias DA, Mafee MF, Fine M. : . RCNA 1987; 25(3): 561-581
[24] James M, Proengzale, Sridharan. Trilateral Retinoblastoma: Clinical And Radiological Progression. A.J. Roentgenol 2004; 183: 505-511.
[25] Mafee MF, Goldberg MF, Greenwald MJ, Schulman J, Malmed A And Flander AE. Retinoblastoma And Simulating Lesions: Role Of CT And MR Imaging. RCNA July 1987; 25 (4): 667-691.
[26] Danginger A, Prici ML. CT Findings In Retinoblastoma. AJR 1979; 133:-695 702.
[27] Kaufman LM, Mafee MF And Song CD. Role Of CT, MRI Imaging And Use Of Gd-DTPA Contrast Enhancement. RCNA 1998; 36 (6): 1101-1118.
[28] Son PM, Curtin DH. Head And Neck Imaging. 4th Edition, 500-506.
[29] Robert G, Peyster, Marc D, Shapiro, Haik BG. Orbital Metastasis: Role Of MRI And CT. RCNA 1987; 25 (3): 647-662.
[30] Peyster RG, Angsburger JJ, Shields JA, Satchell TV, Markoe AM, Clarke K, Haskin ME. Choroidal Melanoma Comparison Of CT Fundoscopes And US.Radiology 1985; 156: 675-680.
[31] John R, Hesselink, Kenneth R Davis, Alfred L Welber, James M Davis And Jaun M Taveras. Radiiological Evaluation Of Orbital Metastasis With Emphasis On CT Radiology 1980; 137: 363-366.
[32] Hasso AN. CT Of Tumours And Tumour Like Conditions Of PNS. RCNA 1984; 22(1):119-130
[33] Curtin DH, James D. Extension To The Orbit From Paraorbital Diseases. RCNA 1998; 36(2): 1201-1213.
[34] Coonely MF, Mafee MF. Orbital Rhabdomyosarcoma And Simulating Lesions, Neuroimaging. Clinics Of North America 2005; 15 (1): 121-136.
[35] Mahmood F Mafee, Eegene Pai And Binu Phillip. Rhabdomyosarcoma Of The Orbit: Evaluation With MR Imaging And CT. RCNA Nov 1998; 36 (6): 1215-1227.
[36] Peter M Som, Curtin DH. Head And Neck Imaging.4th Edition, 577-582.
[37] Ansari SA, Mafee MF. Orbital Cavernous Haemangioma: Role Of Imaging, Neuroimaging. Clinics Of North America 2005; 15 (1): 137-158.
[38] Larissa T Bilaniuk. Orbital Vascular Lesionsof. Role Imaging. RCNA 1999; 37: 169-183.
[39] Mahmood F Mafee, Deepak P Edward, Kelly K Koeller And Sherivin Dorodi. Lacrimal Gland Tumors And Simulating Lesions: Clinicopathologic And MR Imaging Features. RCNA Jan 1999; 37 (1): 219-241.
[40] Vashisht S, Goulatia RK, Dayal Y, Bhargava S. Impact Of Computerized Axial Tomography On Orbital Diagnosis. Ind J Ophthalmol 1983; 317-5: 342.
[41] Sabharwal KK, Chouhan AL, Jain S. CT Evaluation Of Proptosis. Ind J Radiol Imaging 2006; 16: 683-8.
[42] Alford L Weber, Laura Vitale Rome :Clinical, Pathological And Radi Ologic Evalution Of Pseudotumour Of Orbit. RSNA 1996 Nov.
[43] Appelboom T, Durso F : Ratinoblastoma Presenting As Total Hypoma. Ann Ophthalmol 1985;17:508-510
[44] Albert DM, Rubeinstain RA, Scheie HG : Tumour Metastasis To The Eye : I. Incidence In 213 Adult Patients With Generalized Malignency. Am. J. Ophthalmol 1967;63:723-726
[45] Balchunas WR Et Al. : Lacrimal Gland And Fossa Mass : Evalution By Computed Tomography And A Mode Echography. Radiology 1983;149:751-758
[46] Byrd SE, Hardwood-Nash DC, Fitz CR, Barry JF Et Al. : Computed Tomography Of Intraorbital Optic Nerve Glioma In Children. Radiology 1978;129:73-78
[47] Bilaniuk LT, Zimmerman RA : Computer Assigned Tomography : Sinus Lesion With Orbital Involvement. Head & Neck Surg 1980;2:293-301
[48] Bernadino ME, Zimmerman RD, Citrin CM Et Al. : Scleral Thickening : A Sign Of Orbital Pseudotumour. AJR 1977;129:703-706.
[49] Dresner S. Rothfus WE, Samovitz TL Et Al. : Computed Tomography In Orbital Myositis. AJR 1981;143:671-674.
[50] Ebsmann D, Donaldson Ss Et Al. : Computer Tomography In Orbital Pseudo Tumour (Idiopathic Orbital Inflammation). Radiology 1076;120:597-601
[51] Enzmann Dr. Donlaldson SS Et Al. : Appearence Of Graves Disease On Orbital Computed Tomography. J. Comut. Assist Tomogr 1979;3:815-819.
[52] Handlar IC, Davey IC Et Al. : The Acute Orbit : Differention Of Orbital Cellulites From Subperiosteal Abscess By Computed Tomography. Neuroradiology 1991;33:15-18.
[53] Jakobeie FA, Depot MJ : Combined Clinical And Computed Tomographic Diagnosis Of Orbital Glioma And Meningioma. Opthalmology 1984 Feb;92(2):137-55.
[54] Johns TT, Citrin CM Et Al. : CT Evalution Of Perineural Orbital Lesions : Evalution Of The Tram Track Sign. AJNR Am. J. Neuroradiology 1984 Sept. Oct.;5:587-590.
[55] Jones IS, Jakobiee FA : Disease Of Orbit. Hagerstown, MD,Harpr & Row, 1979.
[56] Kaimbo DK, Kilangalana J Et Al. : Orbital Abscess ; Presentation, Diagnosis, Therapy And Sequele. Ophthamology 1982;259:199-204
[57] Lindah LS : Computed Tomgraphy Of Retinoblastoma. Acta Radiol. Dign. (Stockh) 1986 Sept. Oct.;27:513-518.
[58] Ozen A, Ariyure KM : Normative Measurements Of Orbital Struture Using CT. AJR (Am. J. Roet Genol)1988 Apr.;170(4):1093-1096.
[59] Richard L. Dallw, Steven G. Pratt, Jeffrey P. Green : Approach To Orbital Dissorders And Frequence Of Dissese Occurence. Albert Jacobiee Priciples And Practice Of Ophthalmology.
[60] Sindhun K, Downie J, Gharbrial R, Martin F. :Aetiology Of Childhood Proptosis. F. J. Paed. Child Health 1998 Aug:34(4)
[61] Zimmerman RA, Bilaniuk LT : CT Of Orbital Infection And Its Cerebral Complications. Am. J. Roentgenol Radium Ther Neul Med 1980a;134:45-50.
[62] Wuz, Hou G Et Al. : CT Scan In 52 Cases Of Retinoblastoma. Yankexue Bao 1993 Jul;9(2):61-5.
[63] Sheedy Forbes : CT Evalution Of Orbital Tumours. BJR 1980 Nov:256-265.
[64] Mohmood F. Mafee, Deepak P. Et Al. : Lacrimal Gland Tumours And Simulating Lesions. CT & MR Imaging Features. RSNA 1999, Nov.
[65] Vashist S, Goulitia RK : Radiologiacal Evalution Of Mucocele Of Paranasl Sinuses. Br. J. Radiol 1985 Oct;58:694.