DOI: https://doi.org/10.53350/pjmhs22169712

ORIGINAL ARTICLE

Intra-Orbital Lesions (Melanoma/Retinoblastoma) Radiological Findings Correlation on Ultrasound and MRI

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ABSTRACT

Objective: The purpose of this study is to determine intra-orbital lesions by radiological findings correlation on ultrasound and MRI.

Study Design: Prospective study

Place and Duration: Radiology department of Sindh Govt Hospital Liaquatabad, Karachi and Jinnah hospital, Lahore for the duration from May 2021 to April 2022.

Methods: There were 75 patients of both genders presented in this study. Included patients were aged between 2-50 years. A CT scan was performed on all patients with a clinical suspicion of ocular and orbital abnormalities referred from the ophthalmology department. Outcomes among all patients were determined in terms of radiological findings correlated with MRI and ultrasound. SPSS 22.0 was used to analyze complete data.

Results: Among 75 cases, there were 43 (57.3%) males and 27 (42.7%) were males. Mean age of the patients was 21.8±4.42 years. Majority of the cases 70 (93.3%) were non traumatic and 5 (6.7%) cases were traumatic. Among 70 cases of non-traumatic lesions, the most common disease was neoplasm found in 32 (45.7%) cases, followed by infective and inflammatory lesions in 22 (31.4%) cases. We found that retinoblastoma was the most common non-traumatic lesion in 21 (30%) cases followed by endocrine orbitopathy and orbital cellulitis. Among 5 cases of traumatic lesions, frequency of fractures were 4 (80%), preseptal soft tissue swelling was found in 3 (60%) cases and retained foreign body (orbital and lid) in 2 (40%) cases.

Conclusion: CT is used to diagnose lesions, plan surgery, and track patients with ocular and orbital diseases. MDCT is superior for bone assessment, calcification detection, and determining lesion site, extent, and configuration. MDCT is suitable for evaluating ocular and orbital lesions.

Keywords: CT, Ultrasound, MRI, Orbital lesions, Ocular lesions

INTRODUCTION

Despite its modest size, the orbit contains a vast variety of vital organs. These orbital contents are often the source of tumours and tumor-like lesions, and radiographic assessment of the orbit in both adults and children is frequently warranted. When it comes to identifying and treating malignant tumours, cross-sectional imaging is an essential diagnostic tool. Clinical presentation and age assist to narrow down the possible diagnoses and choose which imaging modality should be used. Children are more likely to develop retinoblastoma and rhabdomyosarcoma (RMS), whereas adults are more likely to be diagnosed with lymphoma, malignant uveal melanoma, or inflammatory orbital pseudotumor (IOP). It is possible to employ clinical symptoms such as extraocular muscle palsies, diplopias, visual impairments, exophthalmos, and eye discomfort as an effective diagnostic tool. A biopsy, on the other hand, may be required to provide a tissue diagnosis [1–4].

The disease retinoblastoma is treatable and may be cured. As long as it's caught early and there are no metastatic risk factors, the youngster will almost always be able to make a full recovery [5]. Ocular preservation, initial tumour volume, the anatomical connections of the tumours to the macula and optic disc, and the side effects of the therapies (cataracts, vitreous haemorrhage) all have a role in preserving visual function. Metastatic risk factors need the use of adjuvant therapy to avert a potentially fatal recurrence. [6,7]

In order to diagnose retinoblastoma, fundoscopy (under general anaesthesia) and ultrasound (US) are often used. Eye doctors often do both examinations. A high degree of certainty may be gained by using US to identify typical intratumoral calcifications in virtually all situations. These approaches may be used to analyse a wide range of tumour characteristics, including tumour laterality, number, location, and size; tumour seeding to the vitreous, subretinal region, or anterior segment. The retinoblastoma is divided into several subgroups, and this information is crucial for making treatment options. Patients with 13q deletion syndrome may benefit from further imaging studies to determine the extent of the tumour and to look for any accompanying brain abnormalities, such as intracranial tumour extension, midline intracranial primitive neuroectodermal tumour (PNET), and brain malformations [8,9].

The genetic subset of paediatric retinoblastoma, which accounts for 5–15% of all cases, has been linked to PNETs, a combination known as trilateral retinoblastoma [10]. Besides the pineal area, tumours may also be seen in the suprasellar or parasellar regions, which include the temporal lobes. For most individuals, trilateral retinoblastoma is deadly; however, early discovery and aggressive (chemo) therapy may be lifesaving for others.[11,12]

Although previous studies have reported the diagnostic accuracy of MRI in detecting intraocular tumour extent and metastasis [13-15], our study provides a comprehensive evaluation of the diagnostic accuracy of 3 T ocular MRI, diagnostic role of DWIs, sensitivity, and specificity of different tumour diameter cut off values of post laminar optic nerve invasion (PLONI) and ocular coat invasion as well as the relationship of the abnormal anterior eye segment enhancement in MRI e. This study's goal is to identify intra-orbital lesions by comparing ultrasound and MRI data.

MATERIAL AND METHODS

This prospective study was conducted at Radiology department of Sindh Govt Hospital Liaquatabad, Karachi and Jinnah hospital, Lahore for the duration from May 2021 to April 2022 and comprised of 75 patients who had intra orbital lesions. After obtaining written agreement, the demographics of all patients recruited in the study were meticulously documented. Patients <2 years ad those did not give any written consent were excluded from this study.

It was determined to include a minimum of 75 patients every year, based on the prior number of patients who had been sent to our institution annually for orbital CT scans to evaluate suspected ocular and orbital abnormalities. There were no restrictions on age or gender in this research; patients with a history of surgery or

chemotherapy or radiation were excluded, as were those sent to the ophthalmology department with clinical suspicion of ocular or orbital lesions. The Hitachi Eclos 16 slice multidetector CT was used for the scans, which followed the normal procedure. In the supine posture, axial pictures of the orbit were taken from the infra-orbital margin to the supra-orbital margin. Images were taken along an infra-orbitomeatal line which was perpendicular to the orbital plane.

Depending on the pathology, the scanning was extended even farther. Tube currents of 150-175 mA and 120-140 kVp were used for the volumetric sectional pictures. An interslice gap of no more than 2.5 mm between slices was eliminated by processing the raw data and creating multiplanar and three-dimensional reconstructions. When required, a non-ionic intravenous contrast agent was used. The final diagnosis was based on histopathological examination of the operative specimen, FNAC, clinical response to treatment (on follow-up), supportive biochemical/microbiological findings, and supporting findings on other radiological investigations (USG and MRI) depending on the nature of the pathology. SPSS 22.0 was used to do a comprehensive analysis of the collected data sets.

RESULTS

Among 75 cases, there were 43 (57.3%) females and 27 (42.7%) were males. Mean age of the patients was 21.8±4.42 years.(table 1)

Table-1: Age and gender of enrolled cases

Variables	Frequency	Percentage
Gender		
Female	43	57.3
Male	27	42.7
Mean age (years)	21.8±4.42	

Majority of the cases 70 (93.3%) had non traumatic lesions and 5 (6.7%) cases were had traumatic lesions.(figure 1)

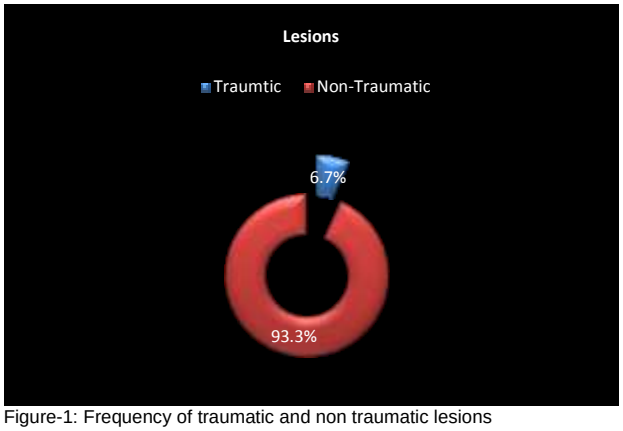

Figure-1: Frequency of traumatic and non traumatic lesions

Table-2: Radiological findings correlated with MRI and ultrasound among non-traumatic ocular orbital lesions

Variables	Radiological	Ultrasound	MRI
Retinoblastoma	21	-	13
Melanoma	11	-	6
Endocrine orbitopathy	10	-	5
Orbital cellulitis	8	-	3
Preseptal cellulitis	7	-	1
Isolated dermoid cyst	3	-	4
Endophthalmitis	2	-	3
Myocysticercosis	2	3	1
Orbital pseudotumo	2	-	1
PHPV	2	2	3
Staphyloma	1	-	2
Staphyloma	1	1	1

We found that retinoblastoma was the most common non-traumatic lesion in 21 (30%) cases followed by melanoma in 11 (15.7%) cases, endocrine orbitopathy, orbital cellulitis, preseptal cellulitis, isolated dermoid cyst, endophthalmitis, myocysticercosis, orbital pseudotumo, PHPV and staphyloma.(table 2)

Among 70 cases of non-traumatic lesions, most common disease was neoplasm found in 32 (45.7%) cases, followed by infective and inflammatory lesion in 22 (31.4%) cases.(table 3)

Table-3: Disease among non-traumatic lesions

Variables	Frequency (70)	Percentage
Diseases		
Neoplasm (benign/malignant)	32	45.7
Infective and inflammatory lesion	22	31.4
Congenital and developmental lesions	8	11.4
Miscellaneous (bone and PNS lesions	5	7.1
Parasitic	2	2.9
Vascular lesions	1	1.4

Among 5 cases of traumatic lesions, frequency of fractures were 4 (80%), presaptal soft tissue swelling found in 3 (60%) cases and retained foreign body (orbital and lid) in 2 (40%) cases.(table 4)

Table-4: Association of disease among traumatic cases

Variables	Frequency (n=5)	Percentage
Diseases		
Fractures	4	80
soft Tissue swelling	3	60
Foreign body (orbital and lid)	2	40
Optic nerve injury	1	20
Retrobulbar hemorrhage	1	20
Retrobulbar fat stranding	2	40

DISCUSSION

Emergent orbital abnormalities may be detected by imaging, and the involvement of the radiologist in directing patient therapy is critical to achieving positive results. A thorough understanding of the imaging characteristics of different orbital diseases is critical to preventing irreversible vision loss and other potentially disastrous outcomes. In order to get the best possible outcomes, imaging can discriminate between pathogenic entities and physiologic calcifications, post-therapeutic alterations, and orbital implants. Imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) have had a substantial impact on ophthalmology. Ophthalmologists benefit from familiarity with common imaging findings of eye and orbital diseases in order to better assess disease progression and monitor treatment outcomes. [16] While CT is the primary imaging modality for evaluating the orbit in an emergency situation, MR imaging may be an additional diagnostic aid due to its superior tissue contrast resolution. The use of computed tomography (CT) in the diagnosis and treatment of eye and orbital illnesses has changed forever. It is much easier to plan and execute surgery with less risk of complications when the exact site of a lesion is known. [17]

In the current study 75 patients were presented. Among 75 cases, there were 43 (57.3%) males and 27 (42.7%) were males. Mean age of the patients was 21.8±4.42 years. Majority of the cases 70 (93.3%) were non traumatic and 5 (6.7%) cases were traumatic. Results of the presented study were comparable to the previous studies.[18,19] Among 70 cases of non-traumatic lesions, most common disease was neoplasm found in 32 (45.7%) cases, followed by infective and inflammatory lesions in 22 (31.4%) cases. It was found that 28 instances of proptosis were neoplastic, 12 cases of inflammation, seven cases of congenital origin and three cases of traumatic origin were studied by Mahsud[20].

There was a lot of overlap between the ocular and orbital lesions that we found in our investigation. There were 49 patients with eye and orbital tumours evaluated by Chinda et al[21] who found that the most prevalent tumour in this group was retinoblastoma, which was found in 18 (46.15%) of the cases.

Retinoblastoma was found in 30 (30 percent) of the orbital mass cases studied by Vashisht et al[22]. Most prevalent lesion was retinoblastoma in 12 of the 50 individuals in our research. On average, eighty-three percent of retinoblastoma tumours were discovered to have calcification in Arrigg et al[23] whereas on the other hand, ninety-two percent of RB tumours in Asih et al[24] exhibited signs of calcification.Our study resented same results to above mentioned studies. We found that retinoblastoma was the most common non-traumatic lesion in 21 (30%) cases followed by melanoma in 11 (15.7%) cases, endocrine orbitopathy, orbital cellulitis, preseptal cellulitis, isolated dermoid cyst, endophthalmitis, myocysticercosis, orbital pseudotumor, PHPV and staphyloma.

Among 5 cases of traumatic lesions, frequency of fractures were 4 (80%), preseptal soft tissue swelling found in 3 (60%) cases and retained foreign body (orbital and lid) in 2 (40%) cases.[25] When evaluating orbital injuries, LeBedis and colleagues[26] recommended CT as the first-line imaging modality. It was revealed that CT scans had an accuracy of 86-91 percent when it came to locating and measuring the size of intra-orbital mass lesions as well as forecasting their kind in 100 individuals with suspected orbital mass. [22]The diagnosis accuracy of CT scan was 80 percent in a study conducted by Mahsud[20] on 50 patients with proptosis. For non-traumatic lesions, MDCT's sensitivity, specificity, and accuracy were from 50% to 100%, 96.95-100%, and 96% to 100%, respectively. In our investigation, just a few of patients with various clinical illnesses were diagnosed correctly on MDCT, which resulted in 100% sensitivity, specificity, and accuracy.

CONCLUSION

CT is used to diagnose lesions, plan surgery, and track patients with ocular and orbital diseases. MDCT is superior for bone assessment, calcification detection, and determining lesion site, extent, and configuration. MDCT is suitable for evaluating ocular and orbital lesions.

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