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CROSS-SECTIONAL ASSESSMENT OF THE NON-TRAUMATIC ABNORMAL SHAPE OF POSTERIOR EYE GLOBE IN PATIENTS UNDERGOING BRAIN IMAGING.

Radio-diagnosis

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ABSTRACT

Introduction: Causes of abnormal shape of eye globe are axial myopia, staphyloma, coloboma, apparent enlargement of eye. The presence and types of staphyloma are determined by the entire eye shape in CT/MRI scans. To look for the shape of posterior eyeball in patients who come for brain imaging CT/MRI is useful in preventing the vision.

Aim & Objectives: To study various types of posterior eye globe shapes using cross-sectional imaging (CT/MRI).Role of cross-sectional imaging (CT/MRI) in the prevention of vision loss.

Material And Method: This is a cross-sectional observational study done in the department of radio-diagnosis, Pacific Institute of Medical Sciences, Udaipur from June 2021 to January 2022 (over the period of 6 months). This study included 2000 patients (age above 40 years) referred for cross-sectional brain imaging (CT/MRI) for various symptoms/abnormalities. In 50 patients, assessment for the posterior eye globe shape was performed. Axial lengths of orbits were also measured in all 50 patients.

Results: Out of 50 patients, 23 patients had axial myopia, 15 patients had staphyloma,4 patients had coloboma,3 patients had apparent enlargement of eye ball ,3 patients had enlargement of eyeball due to glaucoma and 2 patients had irregularity in shape of eye globe due to secondary involvement by mucormycosis.

Conclusion: Posterior enlargement of the eye globe is common in old age patient, and CT & MRI are useful modalities to diagnose various types of enlargement. In MRI, the sagittal and axial plane of T2WI are very useful for checking for eyeball size, shape, and pathology.

KEYWORDS

AIM & OBJECTIVES:

To study various types of posterior eye globe shapes using cross-sectional imaging (CT/MRI).

Role of cross-sectional imaging (CT/MRI) in the prevention of vision loss.

INTRODUCTION:

Causes of abnormal shape of the eye globe are axial myopia, staphyloma, coloboma, and apparent enlargement of the eye. The most common cause of such enlargement is axial myopia. Axial myopia is an idiopathic enlargement of the eye globe in the anteroposterior (AP) dimension that causes convergence of light anterior to the retina [1]. When AP diameter exceeds 22-24 mm, it is called enlargement. Another common cause is staphyloma. Staphyloma refers to focal enlargement of the cornea or sclera due to the thinning of uveal-scleral coats [2]. Staphyloma may be idiopathic or related to axial myopia [2]. Staphyloma can be unilateral or bilateral. Staphyloma associated with axial myopia generally occurs on the optic disk's temporal side [2]. Apparent enlargement of one eye can occur when the contralateral eye is relatively small. The characteristics of other structures, such as facial bones, which may also be hypoplastic, should help distinguish this entity from actual eye enlargement. Coloboma is a collective term encompassing any focal discontinuity in the eye structure [3]. Secondary glaucoma can also cause abnormal eyeball shape. Patients with mucormycosis or fungal infection of sinuses extended to the eye also show abnormality in the posterior eyeball. Generally, CT scans and MRIs do not show any space-occupying lesion or mass in orbit. CT is also useful for the evaluation of globe calcifications [4]. The normal eye ball-shaped is round to oval with smooth margins and without any discontinuity. Observing the shape of an eyeball in every patient comes for brain imaging. We can find abnormalities such as large eye, small eye, and changes in eye shape in a few patients. We can prevent such patients from vision loss by detecting early changes in the orbit's shape. On the CT scan, the eyeball appears hypodense, round to oval-shaped, while the lens appears hyperdense. On MRI to look for orbit most important sequence is T2WI. Eyeball appears hyperintense on T2WI with the hypointense lens. The sagittal and axial planes of T2WI are helpful for looking for size, shape, and any other abnormality.

MATERIAL AND METHOD:

This is a cross-sectional observational study done in the department of radio-diagnosis, Pacific Institute of Medical Sciences, Udaipur from June 2021 to January 2022 (over the period of 6 months).This study included 2000 patients (age above 40 years) referred for cross-sectional brain imaging (CT/MRI) for various symptoms/abnormalities. We included only scans with full orbital imaging. Patients with trauma or changes related to trauma and space-occupying lesions were excluded from the study. Already known case of any eye pathology was also excluded. Patients who had a contraindication to MRI were excluded. In contrast, study consent was taken from the patients. CT scan of the brain was done using 128 slice Syngovia machine. MRI was done using 1.5-tesla Syngovia machine. Patients were placed in a supine position on CT/MRI table. Detailed Clinical history was taken, including decreased vision, blurring of vision, pain /redness, or watering from the eye. Each patient was subjected to a detailed clinical examination. These patients were asymptomatic for eye related complaints. In 50 patients, assessment for the posterior eye globe shape was performed. Axial lengths of orbits were also measured in all 50 patients.

RESULTS:

Out of 2000 patients, 1400 patients underwent CT scans of the brain and 600 patients underwent MRI of the brain. Out of 2000 patients, 1280 were male, and 720 were female patients. A total of 50 patients had posterior eyeball abnormality out of 2000 patients included in the study. Incidence of posterior eyeball abnormality was 2.5% seen in 50 patients, 27 were male and 23 were female. Slight male preponderance was noted in the patients with posterior eyeball abnormality. The most common age group was 55-60 years. Maximum patients were in the fifth decade, followed by the sixth decade.

Table No .1. Distribution Of The Cases On The Basis Of Abnormal Shape Of Posterior Eye Ball Observed.

RADIOLOGICAL DIAGNOSIS	NUMBER OF PATIENTS
Axial myopia	23
Staphyloma	15
Coloboma	4
Apparent enlargement of eye	3
Enlargement of eyeball due to glaucoma	3
Irregularity in shape of eye globe due to secondary involvement by mucormycosis	2

Table No. 2 Types Of Staphyloma

Type	Number of patients
Macular	11
Peri-papilary	4

Table No 3. Staphyloma With/ Without Axial Myopia

Association	Number of patients
Staphyloma with axial myopia	9
Staphyloma without axial myopia	6

A possible diagnosis of orbital pathology was made, and patients were referred to the ophthalmology department. Conservative and operative management was done accordingly in the ophthalmology department.

DISCUSSION:

Axial myopia is an idiopathic enlargement of the eyeball in the anteroposterior (AP) dimension that causes convergence of light anterior to the retina. [Figure.1] The normal AP diameter of the eyeball is 22-24 mm [5]. In evaluating the myopic eye, imaging has been proven vital in assessing disease complications [6] and prognostication for future management. Axial myopia is the most common cause of macrophthalmia [7]. It is commonly associated with proptosis and may be unilateral or bilateral. The process is chronic with no associated pain. Amblyopia (impairment of vision without organic cause) is usually present. Patients with severe axial myopia or high myopia are more susceptible to other ocular abnormalities such as retinal detachment, chorioretinal atrophy, and glaucoma [5]. [Figure .2]Axial myopia may also be seen with orbital infections, Grave disease, and staphyloma [1]. No intraocular masses are found in CT/MR imaging, and the globes are enlarged, generally in the anteroposterior axis. Therefore, in axial myopia, the globe is oval. Posterior staphyloma is an outpouching of a circumscribed region of the posterior fundus and has been considered a hallmark of pathologic myopia. Staphyloma can be unilateral or bilateral. There are multiple types of posterior staphyloma: macular, narrow macular, then peri-papillary, inferior, and finally nasal. Macular is the most common type. [Figure.3 & 4] Staphyloma may be isolated or related to axial myopia [6]. When related to axial myopia, the prevalence of staphylomas increases with the globe's size. Staphylomas associated with axial myopia generally occur on the temporal side of the optic disk [8] but may also be seen anteriorly or along the equator of the eye [7]. Peripapillary staphyloma is a rare non-hereditary congenital anomaly characterized by a relatively normal-appearing optic nerve head located at the base of a staphylomatous excavation. [Figure.5]It is generally not associated with other congenital defects or systemic diseases. Staphyloma has a risk for advanced chorioretinal degeneration that is generally due to posterior vitreous detachments, choroid retraction from the optic disk, and atrophy of the choroid and retina [9]. These changes lead to an increased prevalence of retinal detachment and choroidal hemorrhage associated with a grave prognosis for vision. In the majority of cases, there is no effective treatment. Sometimes, a normal-sized globe may be misinterpreted as enlarged in the presence of a small contralateral eye (microphthalmia). Isolated microphthalmia is generally housed in a small bony orbit and may be due to persistent hyperplastic primary vitreous, posterior coloboma, retinal folds, radiation therapy, and infections or trauma during early childhood. Coloboma is a collective term encompassing any focal discontinuity in the eye structure. Chorioretinal coloboma affects the posterior globe and is most likely to be seen on imaging [10]. [Figure 6] Patients with mucormycosis have orbital involvement. Infection is spread from the paranasal sinus to orbit. Examination reveals proptosis in patients with mucormycosis. [Figure.7] Diagnosis of early involvement of orbit helps in patients.

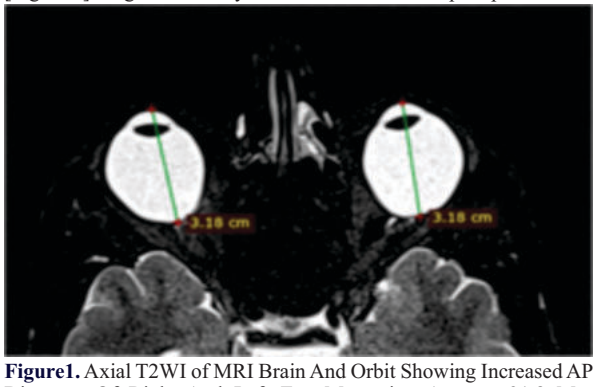

Figure1. Axial T2WI of MRI Brain And Orbit Showing Increased AP Diameter Of Right And Left Eye Measuring Approx. 31.8 Mm Bilaterally. This Is A Typical Case Of High Axial Myopia. Patient Present With Decreased Vision Since Last 5 Years Gradually.

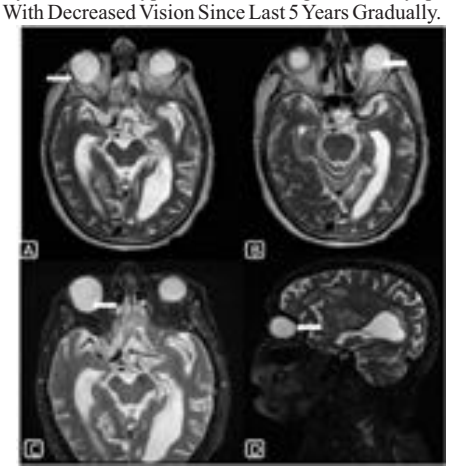

Figure 2. Axial (A, B AND C) and sagittal (D) T2WI of MRI brain and orbit showing enlargement of both eye balls secondary to glaucoma(white arrows).

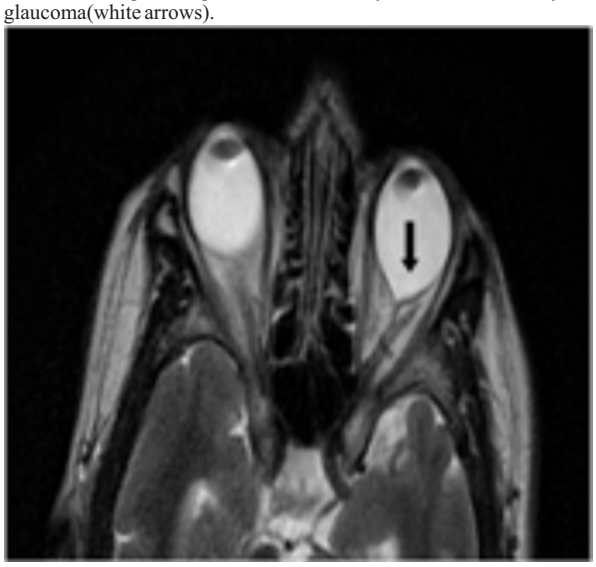

Figure 3. Axial T2WI of MRI brain & orbit showing narrowing of posterior part of left eye ball at the centre suggestive macular staphyloma (black arrow). There is also presence of axial myopia.

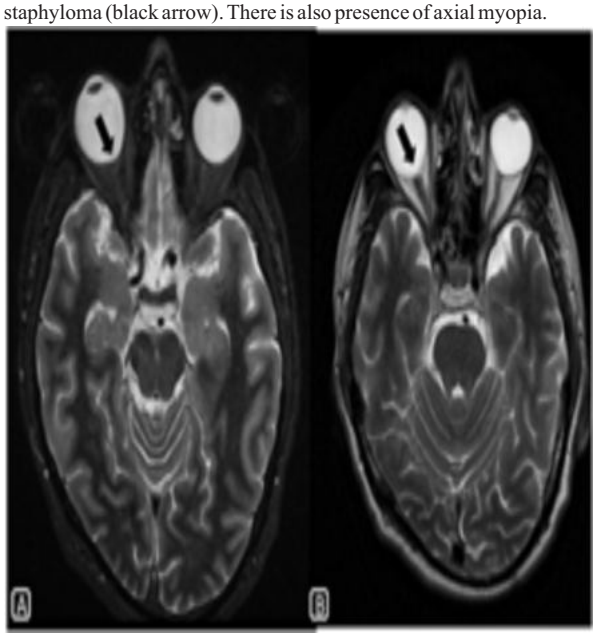

Figure 4. Axial T2WI of MRI brain and orbit showing macular staphyloma in right eye(black arrow).

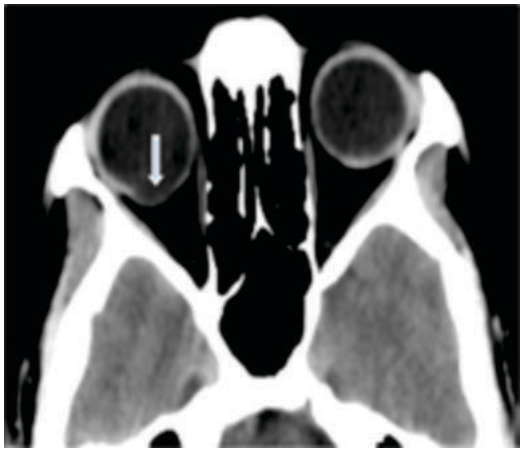

Figure 5 Axial section of NCCT brain and orbit showing protrusion of posterior part of right eye ball(white arrow) causing change in shape of normal eye globe suggestive of peri-papillary staphyloma.

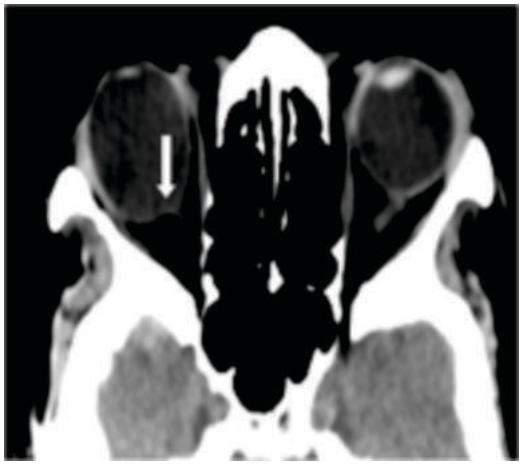

Figure 6. Axial section of NECT brain & orbit shows increased AP diameter of right eye and protruded conical posterior part of eye globe (white arrow) suggestive of coloboma.

Figure 7. Axial(A) and sagittal(B) T2WI of MRI brain and orbit shows posterior subluxation of right lens with retinal detachment and posterior staphyloma. Left eye appears normal.

CONCLUSION:

Posterior enlargement of the eye globe is common in old age patient, and CT & MRI are useful modalities to diagnose various types of enlargement. In MRI, the sagittal and axial plane of T2WI are very useful for checking for eyeball size, shape, and pathology. Even the incidental observation of any abnormal shape in the eye globe should be mentioned in the report as it might lead to an early ophthalmic reference and vision preservation.

REFERENCES

1. Kempen JH, Mitchell P, Lee KE, Tielsch JM, Broman AT, Taylor HR, Ikram MK, Congdon NG, O'Colmain BJ, Eye Diseases Prevalence Research Group: The prevalence of refractive errors among adults in the United States, Western Europe, and Australia. Arch Ophthalmol 2004;122:495–505.
2. Haaga JR, Boll D. CT and MRI of the whole body. Mosby. (2009) ISBN: 0323053750.
3. Nakamura KM, Diehl NN, Mohney BG. Incidence, ocular findings, and Systemic associations of ocular coloboma: a population-based study. (2011) Archives of ophthalmology (Chicago, Ill.: 1960). 129 (1): 69-74.
4. Curtin BJ, Karlin DB. Axial length measurements and fundus changes of the myopic eye. I. The posterior fundus. Trans Am Ophthalmol Soc. 1970; 68:312–34.
5. Brodey PA, Randel S, Lane B, Fisch AE. Computed tomography of axial myopia. J Comput Assist Tomogr 1983; 7:484-485.
6. Roy AA, Davagnanam I, Evanson J. Abnormalities of the globe. Clin Radiol. 2012;67:1011–1022.
7. Kempen JH, Mitchell P, Lee KE, Tielsch JM, Broman AT, Taylor HR, Ikram MK, Congdon NG, O'Colmain BJ, Eye Diseases Prevalence Research Group: The prevalence of refractive errors among adults in the United States, Western Europe, and Australia. Arch Ophthalmol 2004;122:495–505.
8. Swayne LC, Garfinkle WB, Bennett RH. CT of posterior ocular Staphyloma in axial myopia. Neuroradiology 1984; 26:241-243.
9. M. Salzmann, The Anatomy and Histology of the Human Eyeball in the Normal State, Its Development and Senescence, The University of Chicago Press, Chicago, Ill, USA, 1912.
10. Anderson RL, Epstein GA, Dauer EA. Computed tomographic diagnosis of posterior ocular staphyloma.AJNR 1983; 4:90-91.