Research Article

Clinical study of intracranial space occupying lesions and its ophthalmic manifestations

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Abstract

Purpose:This study was aimed at determining the ophthalmic manifestations of patients presenting with intracranial space occupying lesions. **Methods:** The prospective study was conducted on 100 patients diagnosed with brain tumours from May 2012 to April 2013 at the Tertiary care centre where they had undergone detailed ocular, neurological and systemic examination. **Results:** The present investigation focused on 100 patients; 65 males and 35 females with a male to female ratio of 1.85:1. The mean age of patients was 25 years. Ophthalmic manifestations included Papilloedema (58%), Diplopia (27%), Diminution of vision (DOV) (49%), Proptosis (4%) and optic atrophy (7%).Extra ocular signs (Cranial nerve palsy) of raised Intracranial pressure (ICP) were detected on neurological examination. VI Cranial nerve palsy was recorded in 31% cases followed by VII cranial nerve palsy in 27% cases. Glioma (21%) followed by Cerebello Pontine Angle Tumours (18%) and pituitary adenoma (14%) were the most common brain tumours encountered. **Conclusions:** Early diagnosis of ICSOL could be possible through these ocular manifestations thereby allowing for localisation and early investigation of these tumours.

Keywords: Intracranial space occupying lesions, Intracranial pressure, ophthalmic manifestations.

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INTRODUCTION

Intracranial Space Occupying Lesions (ICSOL) is lesions which expand in volume to displace normal neural structures due to an increase in intracranial pressure (ICP). Intracranial tumours mostly do not exhibit any pathognomonic clinical features[1],they hence pose a problem in being diagnosed.The increased ICP acts on the visual pathway, ocular nerves and orbito-ocular tissues causing ophthalmic abnormalities. Raised ICP gives rise to symptoms and signs which may be systemic or ocular. Systemic symptoms include headache, projectile vomiting, seizures and referred pain to face or ear and throat, whereas systemic signs comprise of altered sensorium, hypertonicity in limbs, changes in vitals such as bradycardia, irregular respiration and hypertension. Ocular symptoms of raised ICP are deviation of eye, diplopia and diminution of vision (DOV) depending upon the area of brain involved[2]. Ocular signs include papilloedema, abducent nerve and other cranial nerve palsies, nystagmus, scotomas and optic atrophy. Presentation of ocular signs and symptoms in brain tumors is largely affected by the type, location and size of the tumors[1].The presenting neuro-ophthalmic manifestations may be decisive in the differential diagnosis of the tumor and may facilitate in determining the exact location of intracranial tumors. In patients harboring intracranial space occupying lesions, ocular symptoms and signs usually occur earlier than general signs. Steady progressiveness of this focal symptoms and signs is an important indication of intracranial tumours[1].These signs have immense localizing importance[4].More than 60 percent of these patients first present to an ophthalmologist[2]. Thus in cases of intracranial space occupying lesions, ophthalmologists play a vital role in early diagnosis and referral of patients. As ophthalmic clinical features can

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be an early indicator of intracranial tumours, they facilitate in early diagnosis of the condition thereby decreasing the morbidity and mortality rates.Computerized tomography (CT) scanning and magnetic resonance imaging (MRI) have revolutionized approach to many neuro-ophthalmic diseases. They have facilitated early diagnosis and planned management.The purpose of this investigation was to assess the types of intracranial tumours that caused impairment of visual system, neuro-ophthalmic manifestations, and other clinical features presenting prior to the diagnosis of the tumors and further to establish a relationship between the ocular manifestations and site of brain tumours.

MATERIALS AND METHODS

A prospective study was conducted during the period of May 2012 to April 2013 at the tertiary care centre on 100 patients diagnosed with brain tumours visiting Ophthalmology OPD and Neurosurgery OPD.Patients who were uncooperative on account of deteriorating general conditions and marked behavioural changes, patients with history of previous head injury, cases of aneurysms and demyelinating diseases were excluded from the study.All the patients underwent detailed general and neurological examination in addition to X-ray, CT scan, MRI and automated perimetry. Clinical history was taken from the patients as well as from the relatives. Symptoms like transient blurring of vision, progressive diminution of vision, headache, projectile vomiting, diplopia , deviation of eyes, protrusion of eye, drooping of eyelids were further investigated.General and central nervous examinations were performed to find out signs of raised intracranial tension and any systemic neurological deficit. The complete external examination of eye was done. Any abnormality in head posture that might have been assumed to overcome diplopia was noted. The palpebral apertures were compared and any widening because of lid retraction or proptosis was noted. Any lagophthalmos because of facial nerve palsy was noted. If proptosis was present, it was completely examined, its directions were noted and measurements were taken. Similarly, where ptosis was present, its examination was done in detail. Distant and near visual acuity of both eye was recorded. Examination of anterior segment of eye was done. Corneal sensations in both eyes were tested. Pupils and pupillary reactions were assessed in terms of size, reactivity to light and any abnormal reactions. Uniocular and binocular eye movements were tested separately. Activity of ocular muscles was noted. If squint was present its type was noted. In cases of diplopia, chartings were done and charts were analysed. If nystagmus was seen, its type was noted. Fundus examination of both eyes was done by direct ophthalmoscope to find out evidence of papilledema, optic atrophy etc. Routine and necessary investigations were done. Automated perimetry for visual field defects and diplopia charting for deviation of eye was done.In certain number of cases, clinical diagnosis could be confirmed without ascertaining anatomical site of lesion. In such cases, a CT scan of head with orbit or MRI head with orbit was performed.

RESULTS

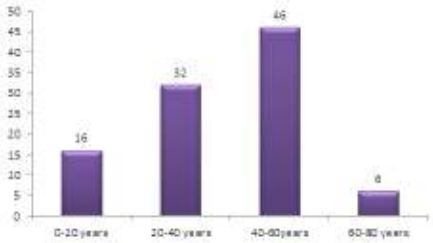

Figure 1: Distribution of Cases in different age groups

Table 1: Distribution of cases according to Symptoms and Signs

Symptoms	Number of cases
Headache with or without projectile vomiting	63
Deviation of angle of mouth	14
Projectile vomiting	11
Seizures	07
Hearing loss	05
Chronic cough	02
Diminution of vision	49
Diplopia	27
Deviation of eye	21
Drooping of eyelids	06
Protrusion of eyeball	04
Scotomain front of eye	05
Signs	
Papilledema	58
VIth cranial nerve palsy	31
VII th cranial nerve palsy	27
Vth cranial nerve palsy	13
IIIrd cranial nerve palsy	06
Optic atrophy	07
Pupillary defects	13
Proptosis	04
Nystagmus	03

Table 2: Association of Intracranial lesions with systemic diseases in patients

Systemic Disease	Number of Cases
Hypertension	10
Diabetes mellitus	5
Parasitic infestation	2
Tuberculosis	3
Hypertension and diabetes mellitus	2
None	78

Table 3: Distribution of intracranial lesions according to site

Site	Intracranial Tumours
Parietal lobe	12
Fronto-parietal	04
Frontal lobe	17
Fronto- temporal	08
Temporal lobe	5
Occipital lobe	14
CP angle tumour	18
IIIrd ventricle	02
Peri-chiasmatic	20

Table 4: Visual Acuity

Visual Acuity	Number of cases
6/6 – 6/12	56
6/18 – 6/36	29
6/60-CF 4	4
CF 4 meter-CF 1	3
CF 1 meter to LP	5
NLP	2
Not accessible	1

Table 5: Visual field defects in the present study

Nature ofField defects	Number of cases
None	71
Enlargement of Blind Spot	3
Homonymous hemianopia	3
Homonymous Quadrantinopia	1
Bitemporal Hemianopia	9
Constriction of peripheral fields	2
Central scotoma	3
Could not be tested because blindness	8

Table 6: Spectrum of Intracranial tumours

Type of intracranial tumour	No. of Cases
Gliomas	21
Cerebello Pontine Angle Tumours	18
Pituitary Adenomas	14
Craniopharyngioma	6
Meningiomas	11
Tuberculomas	6
Colloid Cyst (Iiird Ventricle)	2
Secondary In Skull	2
Neurocysticercosis	3
Others	17
Total	**100**

Age wise distribution

The study consisted of 65 males and 35 females with a male to female ratio of 1.85:1. The mean age of patients was 25 years. Incidence of brain tumours was highest (46%) in the 40-60 years age group and lowest (6%) in the population of 60-80 years age group. A graph illustrating the age distribution has been depicted in Figure 1.

Symptoms and Signs

Headache was the most common systemic presenting symptom (63%) followed by seizures (7%). Diminution of Vision (49%) was the most common ocular presenting symptom followed by diplopia (27%). Maximum number of patients presented with more than one symptom.Papilloedema (58%) was the most common ocular sign. Proptosis (4%), optic atrophy (7%) and Nystagmus (3%) were also seen sporadically. About 13% cases were of papillary defects. On Neurological examination, extra ocular signs (Cranial nerve palsy) of raised ICP were detected. VI Cranial nerve palsy was recorded in 31% cases followed by VII cranial nerve palsy in 27% cases. A summary of all observed clinical signs are represented in Table-I.

Association of Intracranial lesions with systemic diseases in patients

Among 100 cases of intracranial space occupying lesions, hypertension was found in 23 cases followed by diabetes milletus. Two patients were having both of the above systemic ailments. Three patients were found to be known cases of tuberculosis and three patients had parasitic infestations. Table II depicts the association of intracranial lesions with systemic diseases in patients.

ICSOL distribution

In the present investigation, the most common tumour was glioma which accounted for 21% of all intracranial tumours and cerebellopontine angle tumours were recorded as the second most common tumours (18%). In the order of decreasing frequency; the remaining tumours were pituitary adenoma (14%) and meningiomas (11%). Both craniopharyngiomas and tuberculomas accounted for 6% each. Also, there were other forms of tumours that accounted for 17% (Table III).14 cases of Pituitary adenoma were noted in the present study. All of them presented with slow progressive diminution of vision, and three of them had primary type of optic atrophy in both eyes. Visual field examination showed classical Bitemporal hemianopia in 5 patients. The diagnosis was confirmed using an MRI scan. Those 5 cases also presented with symptoms of headache and vomiting along with DOV.They had papilledema in both eyes and one of them showed supra-temporal quadrantinopic field defect.Depending on the site of the intracranial tumour, it was noted that around 20% of intracranial lesions were found in the perichiasmatic area (20%) and 18% of tumours were located in the cerebellopontine angle (18%) and 17% were located in the frontal lobe (Table-IV).

Visual Acuity

Good visual acuity (from 6/6-6/12) was recorded in 56 patients. In 29 cases, the visual acuity was between

6/18-6/36 and in 8 patients the vision was found to be less than one metre. The vision of one case was not assessable due to age factor (Table-V).

Visual field defects

Visual field testing helps in localizing and lateralizing the intracranial lesions. Automated perimetry of 71 cases did not show any visual field defects. Perimetry of 9 patients showed bitemporal hemianopia and 3 patients showed homonymous hemianopia. Constriction of peripheral field was present in 2 cases and 3 cases were found to have central scotoma. Perimetry of 8 patients could not be done due to decreased visual acuity (Table-VI).

DISCUSSION

Most of the patients having intracranial space occupying lesions first come to an ophthalmologist rather than a physician. In the present study, majority of the brain tumours were detected in the 4th and 5th decade of life and the incidence of brain tumour were least in patients in their 6th to 8th decade.Sex distribution and the discovery of a clear sex predilection of certain tumor types have proved to be particularly significant[4]. An analysis of our complete case series resulted in the general conclusion that there was a preponderance of males which is in agreement with prevailing literature[2,3]. Headache, seizure, behavioral change, hemiparesis, cranial nerve palsies and papilloedema have been reported to be the most common signs and symptoms of intracranial tumours[2].The ocular manifestations due to ICSOL correlate with the site in which they are present. In the current study, headache was the most common complaint noted in almost 63% of all observed cases, followed by DOV; hence patients coming with these symptoms should be evaluated properly. Maximum patients have false localizing signs or signs of systemic neurological involvement at the time of presentation. Papilledema (58%) was the most common ocular sign of raised ICP. 21 cases of Gliomas were observed in the present study followed by 18 cases of by cerebello-pontine angle tumours. Among the cranial nerve palsies, abducent nerve palsies (31%), facial nerve palsies (27%) and multiple nerve palsies were observed. The association of intracranial lesions with systemic diseases in patients was investigated and it was found that 70 patients had no accompanying systemic disease, whereas 10 patients were suffering from hypertension.

CONCLUSION

Ocular features are considered as portal to the brain through which neurological disorders can be detected. Early diagnosis of ICSOL could be possible through these ocular manifestations thereby allowing for localisation and early investigation of these tumours.Visual fields must be tested in every patient complaining of disturbances of vision, without any obvious ocular cause to account for it. Plain radiographs of skull and orbit are not much helpful for exact diagnosis of patients with intracranial space occupying lesions. Magnetic Resonance Imaging scan is essential to arrive at the exact anatomical localisation and diagnosis of lesion. If symptoms of patients of intracranial space occupying lesions are evaluated properly and detailed examination and investigations are performed, these conditions can be diagnosed earlier. Consequently prognosis is much improved as the patients get proper treatment at an early stage. Ophthalmologists play a very important role in early diagnosis of intracranial space occupying lesions and therefore improve improving prognosis regarding vision and life of the patients.

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