



Original Article

Ocular motility problems after head trauma

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Objective: The aim of this study was to determine the pattern of ocular motility defects and the prevalence of most common cranial nerve palsies associated with eye movement disorders among the patients with head trauma and also to determine the association of the type of head injury with type of palsy.

Methods: Cross sectional study involving 35 patients with head trauma was carried out. Distance and near Visual acuity of patients was taken using Snellen visual acuity chart. Ocular motility was assessed using torch light. Lea screen was also used for final diagnosis.

Results: Fourth nerve palsy was the most common nerve palsy followed by the sixth cranial nerve palsy. Back side of head was involved in 5 patients while the 8 patients had injuries around the orbit. Most of them had normal distance and near visual acuity. Road traffic accident was the commonest cause of the head injuries.

Conclusion: Fourth nerve palsy was most common ocular motility disorder in head trauma followed by the sixth cranial nerve palsy. Total third nerve palsy was rare. However, isolated medial rectus and superior rectus palsy were also seen.



Introduction:

Ocular motility can be evaluated by following methods¹:

- Versions which refer to conjugate eye movements, i.e movements of both eyes in same direction.
- Ductions which are the movements of one eye.

Extraocular muscles control the eye movements. They comprise six tiny muscles, four rectus and two oblique muscles that surround and control the eye movements. The four rectus muscles control the eye movements from right to left and up and down. The primary function of oblique muscles is to rotate the eyes outward and inward. The superior and inferior rectus and oblique muscles also have secondary and tertiary actions. These actions depend upon the position of gaze and the movements of the eyes.²

Extraocular muscles and their palsies are:³

- III-Nerve: The third cranial nerve or oculomotor is purely motor in its function. It is responsible for supplying all the rectus muscles of the eyes except the superior oblique muscle and the lateral rectus. The Levator muscle, sphincter pupillae and the ciliary muscles are also supplied by third nerve.⁶ Impairment of this nerve causes weakness of levator function which results in ptosis. The Lateral rectus muscle abducts the eye in primary position due to the medial rectus muscle weakness. There is limited depression and elevation and pupillary dilation in case of total third nerve palsy.
- IV-Nerve: The fourth cranial nerve known as trochlear nerve emerges dorsally from brain the stem. It makes the longest pathway and is the smallest nerve to serve the eye. Superior oblique muscle is supplied by the fourth nerve.⁷ Superior oblique palsy causes combined horizontal, torsional and vertical movements of the eyes. The vertical deviation is the most noticeable feature of all. The condition is mostly unilateral but can be bilateral.
- VI-Nerve: The sixth cranial nerve is also known as abducen nerve. It supplies the lateral rectus muscle that abducts the eye. Damage to the sixth nerve prevents the eyeball from moving outwards. Patient complains of binocular double vision and Esodeviation at primary position which is greater on distant fixation.

Traumatic brain injury⁴ is caused by abrupt damage to the head or brain. It can be open or closed depending upon the cause of the trauma.

Open head or penetrating injuries occur when the object enters the skull or brain causing damage to specific parts of the brain. Symptoms depend upon the part of brain involved.

Closed head injuries: These occur when there is a blow to the

head. For example head strikes the dashboard or windshield in a bus accident.

Head injuries are commonly associated with ocular manifestations.⁵ Most common ocular signs are echymosis and conjunctival hemorrhages which account 30% of cases. Third nerve palsy accounts for 20% of the cases. Optic nerve injury is about 12.5%.⁶

Aims and Objectives:

- 1- To determine the pattern of ocular motility defects in patients with head trauma.
- 2- The prevalence of most common ocular cranial nerve palsy in head trauma.

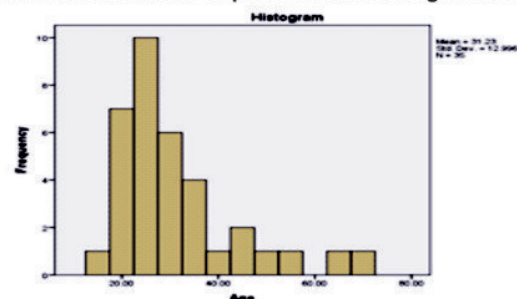
Results:

Table No 1: Distribution of patients according to Gender

		Frequency	Percent
	Male	26	74.3
	Female	9	25.7
	Total	35	100.0

Males have more ratio than females.

Fig No.1: Distribution of patients according to the age.



Most commonly affected age group ranges from 20-35.

Table No. 2: Distribution of patients according to the type of head injury.

Type of head injury	Frequency	Percent
open head injury	21	60.0
Closed	14	40.0
Total	35	100.0

Open head injuries are more common as compared to the closed head injury.

Table No. 3: Distribution of patients according to the cause of head injury

Causes of head injury	Frequency	Percent
Road traffic accident	26	74.3
Assaults	2	5.7
Others	4	11.4
Falls	3	8.6
Total	35	100.0

Road traffic accident is the most common cause of head injury

Table No.4: Distribution of patients according to the side effected.

		Frequency	Percent
	right	11	31.4
	left	11	31.4
	back	5	14.3
	front	8	22.9
	Total	35	100.0

Right and left sides of head are most commonly affected sides.

Fig No.2: Distribution of patients according to their right visual acuity.

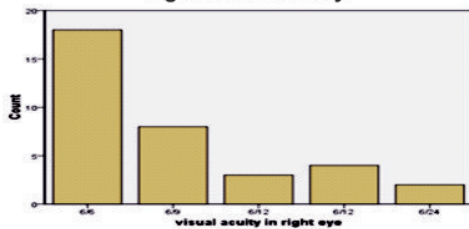
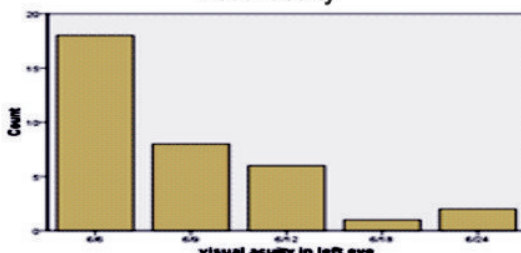
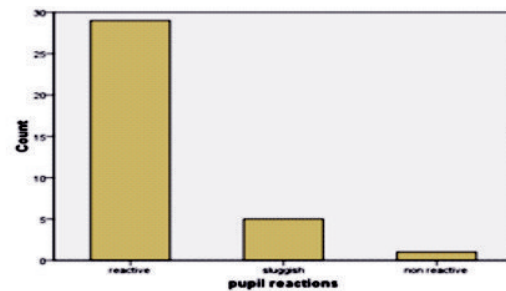


Fig No. 3: Distribution of patients according to their left visual acuity.



Most of the patients have normal visual acuity.

Fig#4: Distribution of patients according to their pupil reaction.



Most of the patients have normal pupillary reactions.

Table No. 5: Distribution of patients according to their type of palsy.

Nerve palsies	Frequency	Percent
sixth nerve	9	36
fourth nerve	13	52
third nerve	3	12
Total	25	100

Fourth cranial nerve palsy is most prevalent followed by the sixth cranial nerve.

Table No. 6: Distribution of patients according to the muscle restrictions.

Restrictions	Frequency	Percent
lateral rectus	2	20
medial rectus	4	40
superior rectus	1	10
inferior rectus	3	30

Medial rectus restriction is most common followed by inferior rectus muscle.

Table No.7: Gender versus Nerve palsies

	Palsies			Total
	sixth nerve	fourth nerve	third nerve	
Male	7	9	2	18
Female	2	4	1	7
Total	9	13	3	25

This table shows that males have more types of palsies than female.

Table No. 8: Gender versus restrictions

	Restrictions				Total
	lateral rectus	medial rectus	superior rectus	inferior rectus	
Male	2	2	1	3	8
Female	0	2	0	0	2
Total	2	4	1	3	10

This table shows that males are affected more than females.

Table No. 9: Type of head injury versus Nerve palsies

Type of Head injury	Palsies			Total
	sixth nerve	fourth nerve	third nerve	
open	6	6	2	14
Closed	3	7	1	11
Total	9	13	3	25

Open head injuries are most frequently associated with nerve palsies.

Table No. 10: Type of head injury versus restrictions

Type of Head injury	Restrictions				Total
	lateral rectus	medial rectus	superior rectus	inferior rectus	
open	1	4	1	1	7
Closed	1	0	0	2	3
Total	2	4	1	3	10

Restrictions are mostly associated with open head injuries.

Discussion:

The basic purpose of this study was to evaluate the most common ocular motility disorders and their prevalence in the patients with of head injuries. Study was carried out at the Eye Clinic Mayo Hospital Lahore. 35 patients, 26 males and 9 females with head trauma were included in the study, age ranging from 18-60 yrs. All of them were having head trauma. Most of them had normal distance and near visual acuity. Road traffic accident was the commonest cause of the head trauma. 13 patients had fourth cranial nerve palsy, 9 had sixth nerve palsy and 3 patients were with third cranial nerve palsy. Restrictive ophthalmopathy was present in 10 patients. Medial rectus muscle was most restricted followed by the inferior rectus muscle. Studies done to determine the types and frequency of symptomatic ocular motility disorders by

head trauma and association with the severity of head trauma show that fourth cranial nerve is frequently affected by head trauma. Fourth nerve supplies the superior oblique muscle. So the patients with fourth nerve palsy may have difficulty in reading and some patients adopt compensatory head posture to have control over deviation. Sixth nerve palsy was second most frequent nerve palsy after fourth nerve. Sixth nerve supplies the lateral rectus muscle. Patients with sixth nerve palsy cannot abduct the eyes. Diplopia is the most presenting complaint of the patients with acquired sixth nerve palsy⁶. As opposed to paralysis, patients with restrictive ophthalmopathy cannot move their eye in opposite direction of the field action of the muscle involved.⁷

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