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To Study The Etiopathological Profile Of Ocular Motor Nerve Palsy At A Tertiary Care Hospital

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Abstract

This prospective cohort study evaluated the etiological profile, clinical characteristics, and recovery outcomes of 90 patients presenting with acute-onset third, fourth, or sixth cranial nerve palsies at a tertiary care center over a two-year period. The mean age at presentation was 45.2 years, with a marked male predominance, likely reflecting greater exposure to trauma and vascular risk factors. Unilateral involvement was more common than bilateral cases, occurring in 92% of patients. The abducens nerve was the most frequently affected, followed by the oculomotor and trochlear nerves, consistent with its long intracranial course and susceptibility to microvascular and compressive insults. Microvascular ischemia constituted the leading cause of ocular motor nerve palsy (40%), followed by trauma (21.1%) and neoplastic etiologies, while a smaller proportion remained idiopathic despite appropriate investigations. Pupillary involvement was noted in nearly half of the third nerve palsy cases, predominantly in traumatic and compressive lesions. At the six-month follow-up, 78.9% of patients demonstrated overall improvement, with complete recovery achieved in 52.2%. Recovery was significantly associated with etiology, age group, and initial severity of ocular motility limitation, with microvascular and traumatic cases showing better outcomes than inflammatory and neoplastic causes. Patients with milder grades of movement restriction exhibited superior recovery, underscoring the prognostic value of early clinical assessment. This study highlights the predominance of vascular and traumatic etiologies in ocular motor nerve palsies and emphasizes the importance of systematic evaluation and follow-up to guide appropriate management and predict visual and functional prognosis.

Keywords: Ocular motor nerve palsy; Third nerve palsy; Fourth nerve palsy; Sixth nerve palsy; Diplopia; Neuro-ophthalmology

Introduction

The term "ocular motor system "refers to the entire somatic motor system which controls the position and movements of eyes. It includes extra ocular muscles,3rd,4th and 6th the cranial nerves and their nuclei that innervate them and the forces that stimulate and inhibit their actions, "Ocular motor nerves " refers to third (oculomotor) , fourth (trochlear) and sixth (abducents) cranial nerves. Palsy of these nerves leads to ophthalmoplegia, diplopia, abnormal head posture.

As ophthalmologist is usually the first consultant such patients turn to, it is important to have a thorough knowledge regarding the anatomy and clinical course of the ocular motor nerves, the various clinical presentations and recovery pattern of the nerve palsies

so that appropriate investigations are ordered to arrive at at a definitive diagnosis. The frequency of ocular motor nerve palsies,the various etiologies and the recovery pattern have been reported in some studies. Only very few studies have analysed the factors affecting the recovery of the nerve palsies. In our study ,the frequency, etiological pattern,recovery and the factors associated with the recovery of the infranuclear 3, 4 and 6th nerve palsies are analysed.

Methodology:

This prospective study was conducted in the Department of Ophthalmology over two years after Institutional ethics committee approval. 90 patients between the age of 6-85 years presenting with recent onset isolated or combined third, fourth or sixth cranial nerve palsy were included.

Exclusion criteria included supranuclear or internuclear palsies, congenital palsies, thyroid eye diseases, myasthenia gravis and patient not following up.

All patients underwent detailed history taking, comprehensive ophthalmic examination, extraocular motility grading (0 to -4), diplopia charting, pupillary evaluation and fundus examination. Systemic examination included measuring blood pressure and metabolic workup. MRI Brain with MR Angiography was performed in cases with trauma, pupillary involvement, multiple nerve palsies, neurological deficit or not improving after 3 months.

Etiology was categorised as microvascular, traumatic, neoplastic, inflammatory, infectious or undetermined. Patients were followed up at 1,3 and 6 months. Recovery was defined as improvement of at least one grade of ocular motility.

Statistical analysis was performed using SPSS-25. Chi-square test was used for categorical variable. A p value <0.05 was considered statistically significant.

Results:

Among the 90 patients studied, the majority of the patients belonged to the 46-65 year age group (47.8%). Males constituted 64.4% cases. Unilateral involvement was seen in 83 patients (92.3%)

Abducens nerve was most frequently involved (51.1%), followed by oculomotor nerve (32.2%). Multiple cranial nerve palsies accounted for 13.3% cases.

Microvascular ischemia was the most common etiology (40%), particularly in patients aged above 45 years while trauma predominated in younger children. Neoplastic causes accounted for 12.2 % cases. Pupillary involvement in third cranial nerve palsy was significantly higher in neoplastic (80%) and traumatic cases compared to microvascular causes (23.5%).

At six months follow up, 47 patients (52.2%) achieved complete recovery, 24 (26.7%) had partial recovery, and 13 (14.4%) showed no recovery. Recovery was significantly associated with etiology and initial severity of motility restriction. Patients with microvascular and traumatic etiologies and milder initial limitations demonstrated better outcomes.

Table 1: Demographic and Clinical Profile of Study Subjects (n = 90)

PARAMETER	NUMBER	PERCENTAGE
AGE GROUP (YEARS)		
6-25	12	13.3
26-45	28	31.1
46-65	43	47.8
>65	7	7.8

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GENDER		
Male	58	64.4
Female	32	35.6
LATERALITY		
Right eye	42	46.7
Left eye	41	45.6
Bilateral	7	7.8
TYPE OF NERVE PALSY		
Third cranial nerva	29	32.2
Fourth cranial nerve	3	3.3
Sixth cranial nerve	46	51.1
Multiple cranial nerve	12	13.3

Table 2: Etiological Distribution of Ocular Motor Nerve Palsy (n = 90)

Etiology	Number (n)	Percentage (%)
Microvascular	36	40.0
Trauma	19	21.2
Inflammatory	15	16.7
Neoplastic	11	12.2
Undetermined	9	10.1

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Table 3: Recovery Outcome at 6-Month Follow-up According to Etiology (n = 90)

Etiology	Complete recovery (n)(%)	Partial recovery(n) (%)	No recovery (n)(%)	Lost to follow up(n) (%)
Microvascular (n-36)	25 (69.4)	5 (13.9)	5 (13.9)	1 (2.8)
Trauma (n-19)	11 (57.9)	4 (21.1)	2 (10.5)	2 (10.5)
Inflammatory (n-15)	6 (40.0)	4 (26.7)	4 (26.7)	1 (6.7)
Neoplastic (n-11)	1 (9.1)	8 (72.7)	1 (9.1)	1 (9.1)
Undetermined (n-9)	4 (44.4)	3 (33.3)	1 (11.1)	1 (11.1)
Total (n-90)	47 (52.2)	24 (26.7)	13 (14.4)	6 (6.7)

Discussion:

The mean age male predominance observed in this study are comparable to previous reports by Park et al. and Tamhankar et al. The predominance of sixth nerve palsy reflects its longer intracranial course and vulnerability to ischemia and compressive insults.

Microvascular ischemia was recognised as the most common cause consistent with earlier studies, emphasizing the role of systemic vascular risk factors. Pupillary involvement in third cranial nerve palsy was strongly associated with compressive etiology, reinforcing the need of urgent neuroimaging in such cases.

Nearly 80% patients showing improvement. Etiology and initial severity of motility restriction were significant prognostic indicators. Neoplastic and inflammatory causes demonstrated poor recovery, highlighting the importance of early diagnosis.

Limitations of the study were subjective grading of ocular motility and relatively small sample size.

Conclusion:

Ocular motor nerve palsies most commonly affect middle aged males and are predominantly unilateral. Microvascular ischemia and trauma are leading etiologies. Recovery is significantly influenced by etiology and initial severity of motility limitation. Early systemic evaluation and appropriate follow up are essential for diagnosis, management and predicting prognosis.

Consent:

Written informed consent from each patient/ parent/ guardian in case of children less than 10 years of age. An information sheet was given to all the participating patients.Informed consent was taken before using pictures of patients for thesis research purposes.

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