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A Clinical Study of Ocular Motor Cranial Nerve Palsies

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Abstract
Introduction: *Third, Fourth and Sixth cranial nerves together facilitate the movements of the eye ball. Hence these together are called as OCULAR MOTOR CRANIAL NERVES. Ocular motor nerve palsies are commonly encountered in clinical practice and they vary widely in clinical presentation and etiology.*
Aim: *The aim is to study the clinical aspects of ocular motor cranial nerve palsies. Material and Methods: This is a prospective observational study conducted on thirty patients of 3rd , 4th and 6th cranial nerve palsies either singly or in combination, who attended the ophthalmology OPD during the period between June 2015 to October 2016. Detailed history was taken followed by a systematic general, ocular and neurological examination in each patient. The necessary laboratory and radiological investigations were done with a special emphasis on CT and MRI as per the requirement.*
Results: *out of the 30 cases included in the study 50% were of isolated third nerve palsy. Vascular etiology was the most common cause. Among the ocular symptoms double vision was the most frequent. CT reveled abnormality in seven and MRI in five cases.*
Conclusions: *Third cranial nerve was the most commonly affected among all the ocular motor cranial nerves. Vasculopathy and trauma were the leading causes. CT and MRI were helpful in localizing the lesion and identifying the cause in significant number of cases.*
Keywords: *ocular motor cranial nerve palsies*

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I. Introduction

Third, fourth and sixth cranial nerves supply extra ocular muscles and hence control all the extra ocular movements of the eye ball. The third nerve in addition also supplies Levator palpebrae superioris, Sphincter pupillae and ciliary muscles. Therefore drooping of lid and pupillary involvement are common in cases of third nerve palsy along with diplopia which is a common manifestation of any of the extra ocular muscle palsies. Ocular motor nerve palsies can be caused by lesions that affect the nerves at any location from their nuclear origin to their termination in the extra ocular muscles. Ocular motor cranial nerve palsies may be unilateral or bilateral, may involve one or more nerves at the same time. Clinical manifestations of these palsies may differ according to the type and localization of the lesions involving the nerves. They usually present with double vision, restriction of ocular movements, drooping of lid and blurred vision.Data on the causes of the ocular motor nerve palsies and their clinical manifestations in a defined population may be useful in guiding diagnosis and evaluation especially when collaborative work up and sophisticated complimentary investigations are not available. Very few reports are available on this subject from our country. The present study is designed to find out various clinical and aetiological aspects of ocular motor nerve palsies.

II. Aim

To study the clinical aspects of ocular motor cranial nerve palsies.

III. Objectives

1.To determine the etiological factors contributing to 3rd, 4th and 6th cranial nerve palsies.
2.To study the clinical manifestations associated with ocular motor cranial nerve palsies. .

IV. Material And Methods

Study design: This is a prospective observational study.

Inclusion criteria: 1.All infranuclear neurological lesions of 3rd , 4th and 6th cranial nerves either in isolation or in combination.

2. Patients of all age groups and both sexes who were willing to participate in the study.

Exclusion criteria: Patients with Supranuclear, nuclear, myogenic and neuromuscular afflictions. After obtaining institutional ethical committee acceptance, the study was conducted on 30 patients of 3rd, 4th and 6th cranial nerve palsies who attended the Out patient department of Ophthalmology, SVRRGG Hospital, Tirupati. All the patients were examined as per the protocol. In history taking an enquiry was made regarding the mode of onset of present illness, attacks of headache, vomiting, fever and convulsions .Ocular symptoms like double vision, drooping lid, blurred vision and neurological symptoms like altered sensorium, loss of consciousness, ear and nose bleeds were inquired. Presence of systemic diseases such as diabetes mellitus, hypertension, tuberculosis and syphilis was noted. A detailed general examination was made to find any septic foci, anemia and lymphadenopathies.

Ocular examination: In each patient best corrected visual acuity was recorded followed by a complete ophthalmological examination. Head posture, facial asymmetry, chin position and extra ocular movements were noted. Anterior segment evaluation was done by slit lamp. In cases with ptosis measurements like MRD 1, MRD 2 and MRD3 were taken to assess the severity of ptosis. Levator muscle function was assessed by BURKE's method. Bells phenomenon and Marcus gunn jaw winking phenomenon were noted. A complete orthoptic evaluation was done in all patients. Extra ocular movements were recorded in all the cardinal positions of gaze which helped in detecting the muscle and thereby the nerve which is paralyzed. Direct cover test was done to detect manifest deviation. Alternate cover test was done to detect primary deviation, secondary deviation and to differentiate incomitant from concomitant squint. To find out the angle of deviation tests like Hirschberg corneal reflex test, Prism bar cover test and Synaptophore examination were done. Worth four dot test and diplopia charting were done to assess diplopia.Forced duction test and Force generation test were done to differentiate between paralytic and restrictive causes. Intra ocular pressure was recorded by Goldmann applanation tonometer.After dilating the pupil a complete posterior segment examination was done by direct ophthalmoscopy and Slit lamp with a +78D OR +90D lens.

Neurological examination: A complete neurological evaluation was done in each patient with the help of a neurologist.

Laboratory Investigations: Besides routine investigations like Hemoglobin percentage, Total and Differential counts and blood sugar levels, special investigations like VDRL, Mantoux test and HIV screening were done when indicated on clinical grounds.

Radiological investigations: X rays of skull , para nasal sinuses, orbits and chest were taken when indicated. CT scan and MRI brain were done as per neurologist's advice.

Clinical, anatomical and etiological diagnosis was made and cases were referred when ever required to neurologist, neurosurgeon or ENT surgeon for their opinion and further management.

Observations and results:

The mean age was 46 years. Most of the patients were in age group of 40-49 years followed by 50-59 years. Males were more affected (63.33%) than females (36.66%). Out of total 30 cases right eye involvement was more commonly seen accounting for 66.66% and left eye for 26.66%.

Table 1: Aetiology in case of ocular motor nerve palsies

Nerves	Trauma	DM	HTN	TB	Tumor	Others	Undermined	Total
3rd nerve	4	7	1	1	1	-	1	15
4th nerve	-	-	-	-	-	-	-	-
6th nerve	4	3	2	1	-	-	-	10
Multiple cranial nerves	-	2	-	2	-	1	-	5
Total	8	12	3	4	1	1	1	30

Table: 2 Distribution of ocular motor cranial nerve palsies

Type of nerve palsy	Number of cases	percentage
3rd nerve	15	50.00
4th nerve	-	-
6th nerve	10	33.33
Multiple cranial nerves	5	16.66
Total	30	100

In this study third cranial nerve is the most commonly affected (50%) followed by sixth cranial nerve (33.33%) and multiple ocular motor nerves (16.66%). No single case of isolated fourth nerve palsy was noted.

Table: 3 Aetiological factors

Aetiology	No of cases	Percentage (%)
Vascular	15	50
Trauma	8	26.66
Tumor	1	3.33
TB	4	13.3
Undetermined	1	3.33
Others	1	3.33
Total	30	100

In this study out of all aetiological factors vascular was the most common cause accounting for 50% of the total followed by trauma.

Table: 4 Causes of third nerve palsy

Aetiology	Number of cases	percentage
Vascular	8	46.66
Trauma	4	23.33
Tumor	1	6.66
TB	1	6.66
Undetermined	-	-
Others	1	6.66
Total	15	100

Out of 15 cases of isolated third nerve palsy vascular aetiology was seen in 8 cases (46.66%),trauma was the cause in 4 cases(23.33%),tumor in one case (6.66%),TB in one case (6.66%) and others in one case. Total number of cases of sixth nerve palsy is 10. Of these vascular aetiology was seen in 5 cases (50%), traumatic aetiology is the cause in 4 cases (40%) and Tuberculosis in 1 case (10%).

Table: 5 Causes of 6^{th} cranial nerve palsy

Aetiology	No of cases	Percentage (%)
Vascular	5	50
Trauma	4	40
Tumor	-	-
TB	1	10
Undetermined	-	-
Others	-	-
Total	10	100

Table: 6 **Causes of multiple cranial nerve palsy**

Aetiology	No of cases	Percentage (%)
Vascular	2	40
Trauma	-	-
Tumor	-	-
TB	2	40
Undetermined	-	-
Others	1	20
Total	5	100

Total number of cases of multiple nerve palsy was 5. Of this vascular aetiology was seen in 2 cases (40%), Tuberculosis in 2 cases (40%) and others in 1 case (20%).

Table: 7 **Symptoms in ocular motor nerve palsies**

symptoms	3^{rd} nerve	4^{th} nerve	6^{th} nerve	Multiple cranial nerves	Total
Diplopia	15	-	10	5	30
Drooping of lid	15	-	-	5	20
Diminished vision	5	-	-	-	5

100% of cases had diplopia and 66.6% cases had drooping of lid. 100% of third nerve palsy cases had both diplopia and drooping of lid.

Table: 8 **Pupil involvement in cases of ocular motor nerve palsies**

Pupil	3rd nerve	4th nerve	6th nerve	Multiple cranial nerves	Total	Percentage %
Involved	7	-	-	4	11	36.66
Not involved	8	-	10	1	19	63.33
Total	15	-	10	5	30	100

Out of total 30 cases pupil involvement was seen in 11 cases (36.66%). 7 cases out of 15 of third nerve palsy and four cases of multiple nerve palsy had pupillary involvement.

Neuro-imaging

Out of 30 cases **CT** was done in 29 cases, out of which 7 cases had abnormality .Cerebral edema (2), midbrain infarcts (2), hyperdense lesion (1), petrous bone # (1) and tumor (1). **MRI** was done in 8 cases only, out of which 5 cases have shown abnormality. Tubercular granuloma (2), brain infarcts (3).

V. Discussion

In this study of 30 patients of ocular motor cranial nerve palsies ,third nerve is the most commonly affected(50%) followed by sixth cranial nerve (33.3%) and multiple ocular motor cranial nerve palsies were the least common (16.6%).

Table: 9 **Comparison of distribution of nerve palsies (%) with other studies.**

Cranial nerve palsy	Rucker[3] 1966	Rush and young[4] 1981	Menon et al[5] 1984	Berlit P et al[6] 1991	Mwanza JC et al[7] 2006	Sitaula S et al[8] 2014	Dharmaraju et al[9] 2016	Present study
3rd nerve	27.4	29	32	41.70	11	22	30	50
4th nerve	8.4	17.2	6.1	6	-	10	-	-
6th nerve	51.5	51.5	44.6	40	12	49	36	33.33
Multiple nerves	12.7	12.7	17.3	-	8	10	34	16.66

Table 9 shows the comparison of frequency of nerve palsies between the earlier reports and present series. The results of our study are comparable to the study by Berlit P et al with respect to third and sixth nerve palsies. Third cranial nerve is affected more frequently in our series (50%).

Table: 10 Comparisons of Aetiologies with other studies

Aetiology	Rush and Young 1981	Menon et al 1984	Sitaula S et al 2010	Dharmaraju S et al 2016	Present series
Vascular	17.2	7.1	26.37	12	50
Trauma	19.7	18.7	15.38	14	26.6
Infections	-	7.6	-	-	13.3
Neoplasms	14.3	12.2	9.89	8	3.33
Others	15.4	21.75	15.38	-	3.33
Undetermined	26.3	30.5	31.87	16	3.33
Inflammatory	-	7.6	-	48	-
BIH	-	-	1.10	-	-
Aneurysm	-	-	-	2	-

In this study vascular aetiology (50%) was found to be the most common cause, followed by Trauma (26.6%) and Tuberculosis (13.3%). In a south Indian study by Dharmaraju et al inflammatory aetiology (48%) was found to be the most common. In the present study there were no cases of inflammatory aetiology which could be due to prompt and appropriate treatment leading to decreased rate of complications. In comparison to Nepal study by Sitaula S et al (6.1%) in the present study there is an increase in vascular aetiology (50%).This may be due to an increase in prevalence of systemic diseases like diabetes and hypertension. In present study Trauma was the cause in 26.6% cases which is in accordance with earlier studies by Rush and Young (19.7%), Menon v et al (18.7%), Sitaula et al (15.38%) and Dharmaraju et al(14%).

Percentage of cases with infectious aetiology was doubled (13.3%) in the present study when compared to Menon et al study. Inspite of all the investigations done the etiology could not be found in 3.33% of case in the present study. In earlier studies by Rush and Young (26.3%), Menon V et al (30.5%), Sitaula et al (31.8%) more number of cases of undetermined aetiology were found for which no definite explanation was offered.

Third cranial nerve palsy

Table: 11 **Comparison of aetiology of isolated 3rd cranial nerve palsy with other studies.**

Aetiology	Rush and Young	Menon V et al	Sitaula et al	Dharmaraju S et al	Present series
Vascular	20.7	3.15	36.30	26.66	46.66
Trauma	16.2	22.2	13.60	13.33	23.33
Infectious	-	-	9.1	-	6.66
Neoplasms	11.7	9.5	13.60	6.66	6.66
Inflammatory	-	9.5	-	46.66	-
Aneurysms	13.8	3.15	-	2	-
Others	14.5	22.2	-	-	6.66
Undetermined	23.1	30.15	27	6.66	-

In the present study isolated third nerve palsy was the most common type of nerve palsy .The greatest incidence of third nerve palsy was in 50-60 years age group. The right third nerve palsy was in nine and left in six cases. Sex ratio was 1:0.8.This was similar to the study by Green WR et al in which the incidence was approximately equal in both sexes. In this study vascular aetiology was found to be the most common (46.66%) that correlates well with the study conducted by Sitaula S et al (36.39%) and Berlit P et al (40%). In the present study 4 cases (26.6%) were due to head injury sustained in road traffic accidents. This is comparable to Rama et al study (18.3%) and Menon V et al study (22.2%).In Green WR et al[10] study the incidence of traumatic third nerve palsy was 10.8%. Hooper [11] reported third nerve involvement in 12 out of 58 patients (20.68%) with head injury. Of the 335 cases of third nerve paralysis reported by Rucker 15.2% were due to trauma.

Rush JA and associates reported incidence of traumatic third nerve palsy as 16.2%.In trauma as suggested by Solomons DJ[12] and associates , third nerve may be damaged either directly as a result of injury or indirectly due to compression from an expanding extra dural or subdural hematoma. Heinz J[13] disclosed that third nerve was damaged in fatal, high speed closed head injury by either avulsion from mesencephalon, primary contusion necrosis or intra and peri neural hemorrhage in sub arachnoid space. In Rama et al study (1980) trauma was the most common cause of isolated third nerve palsy followed by vascular causes. In the present study infectious aetiology was found in 1 case (6.66%) and this was comparable to the Nepal study by Sitaula S et al in which 2 cases (9.09%) were noted. On comparing the present study to both studies in Rucker series (1958 and 1996), more number of cases were of undetermined aetiology in the later. In Menon V et al (30.15%), Green et al (1964), Richard and Young (1992), Rush and Young (1981) study more number of cases were of undetermined aetiology. In PS Reddy et al[14] study (1972) most common cause of third nerve palsy was Tuberculosis followed by vascular cause. In Dharmaraju et al study inflammatory aetiology was the most common cause.

Sixth cranial nerve palsy

Isolated sixth nerve palsy was the second common ocular motor nerve palsy (33.3%) in this study .More number of patients of sixth nerve palsy were in the age group of 40 -49 years. In a study by Sitaula S et al the aetiology of sixth nerve palsy was relatively comparable to our study. Vascular diseases like diabetes and hypertension were the most common definitive aetiology (50%) of sixth nerve palsy. Head injury was responsible for 4 cases (40%), Tuberculosis for 1 case (10%).

Table: 12 Comparison of Aetiology of sixth nerve palsy with others studies

Aetiology	Rush and Young	Menon V et al	Sitaula JC et al	Dharmaraju S et al	Present study
Vascular	17.7	5.1	20.30	16.66	50
Trauma	16.7	10.2	8.16	27.77	40
Infectious	-	3.4	-	22.22	10
Neoplasms	14.6	10.2	2.04	11.11	-
Inflammatory	-	-	-	-	-
Aneurysms	3.6	5.1	-	-	-
Others	17.4	18.18	24.40	-	-
undetermined	29.6	36.3	40.80	22.22	-

Fourth cranial nerve palsy

There is no single case of isolated 4th nerve palsy in this study .This may be because of rarity of the condition. In Rama et al study there was one case of isolated 4th nerve palsy (1.1%) out of ninety cases. In

Rucker series (1958, 1966) it was 6.7% and 8.4% respectively. In PS Reddy et al study it was 1 out of 100 cases. In Menon V et al 4th nerve palsy was observed in 6.1% of cases.

Multiple ocular motor cranial nerve palsies

Out of 30 cases included in the study 5 (16.6%) were of multiple ocular motor nerve involvement. This is almost similar to that reported by Menon V et al (17.3%).In Rucker series and Rush and Young study it was 12.7%.

Table: 13 Comparison of aetiology of multiple nerve palsies

Aetiology	Rush and Young	Menon V et al	Sitaula J et al	Present study
Vascular	5.04	-	30	40
Trauma	21	26.4	10	-
Infectious	-	-	-	40
Neoplasms	34.45	20.5	40	-
Inflammatory	-	23.5	-	-
Aneurysm	10.92	-	-	-
Others	20.06	14.7	-	20
Undetermined	8.4	14.7	20	-

Pupil involvement in cases of ocular motor nerve palsies

In the present study pupillary involvement was seen in 36.6% of total cases, 46.6% of isolated third nerve palsy and 80% of multiple cranial nerve palsies. Pupillary involvement in isolated third nerve palsies was 73.7% in Dharmaraju et al study and 36.8% in Mwanza et al study.

Symptoms in ocular motor nerve palsies

In the present study diplopia (100%), drooping eye lid (66%) and diminution of vision (16%) were the common symptoms. In third nerve palsy drooping of eye lid was seen in 100% of cases. In Mwanza et al study diplopia was seen in 35.4% of cases, ptosis in 41.9% and visual impairment in 12.9%.

CT/ MRI in ocular motor nerve palsies

In the present study CT was abnormal in 26.6% of cases.MRI was done in 8 necessary cases of which 5 showed abnormality.

VI. Summary

In the present study isolated third nerve palsy (50%) was the most common followed by sixth nerve palsy (33.3%). In isolated third nerve palsy vascular aetiology was most common and pupillary involvement was seen in 46.6% cases. The most frequent cause of 6th nerve palsy was vascular followed by trauma and tuberculosis. Diabetes and tuberculosis were the most common aetiology of multiple cranial nerve palsy. Males were affected (63.33%) more than females (36.66%). Double vision (100%) was the most common ocular symptom in all the groups. Droopy lid (100%) topped the list in isolated 3rd nerve palsy. Pupillary involvement was seen in 36.66% of ocular motor nerve palsies, 46.6% of isolated third nerve palsies and 80% of multiple cranial nerve palsies. CT revealed abnormality in 26.6% and MRI in 16.66% of cases.

VII. Conclusions

A detailed and systematic clinical ocular and neurological examination combined with an array of investigations is necessary to establish an aetiological diagnosis in ocular motor nerve palsies**.** The fact that diabetes , hypertension and trauma due to road traffic accidents topping the list of etiologies of ocular motor cranial nerve palsies is representative of a changing trend of life style diseases out numbering the infectious diseases in the present scenario. However tuberculosis being the cause in significant number of cases, stresses the need to focus more on control of tuberculosis. CT and MRI though expensive are invaluable in establishing the cause in significant number of cases.

Abbreviations

CT Computerized Tomography
DM Diabetes mellitus
ENT Ear nose throat
HIV Human immune deficiency virus.
HTN Hypertension
MRI Magnetic resonance imaging
MRD Margin reflex distance
TB Tuberculosis

VDRL Venereal diseases research laboratory

References

[1]. Muller NR .The ocular motor system: embryology, anatomy, physiology and topographic diagnosis. Section IV .In: Walsh and Hoyts clinical neuro-ophthalmology 4th ed.vol.2.Baltimore: Williams and Wilkins 1985; 559-652.
[2]. Eggers HM.Oculomotor system. Chapter 41.part 5 .In: Master Techniques in Ophthalmic Surgery, Roy FH.Baltimore: Williams and Wilkins 1995; 303-307.
[3]. Rucker CW.The cause of third, fourth and sixth cranial nerves. Am J Ophthalmol 1966;61:1293-1998
[4]. Rush JA.Young BR.Paralysis of cranial nerves III, IV and VI: causes and prognosis in thousand cases. Arch Ophthalmol 1981; 99:76-79.
[5]. Menon V, Singh J, Prakash P.aetilogical patterns of ocular motor nerves.IJO.1984; 32:447-453.
[6]. Berlit P.Isolated and combined paresis of cranial nerves third, fourth and sixth .Retrospective study of 412 patients .J Neurol SCI 1991; 103:10-15.
[7]. Mwanza JC, Ngweme GB, Kayembe DL. Oculo motor nerve palsy, a clinical and aetiological study.IJO.2006:54(3); 173-176.
[8]. Sitaula S, Sharma AK, Shrestha GB, Gajurel BP, Shrestha GS.Clinical manifestation of ocular motor nerve palsies. Journal of institute of medicine.2014:36(3).
[9]. Dharmaraju, Giridhar B, Chethana L. A clinical study of aetiological factors contributing to third, fourth and sixth cranial nerve palsies. Asian Pac.J.Health Sci., 2016; 3(3):10-17.
[10]. Green WR, Hackett ER, Schlezinger NS.Neuro Ophthalmic evaluation of Oculo motor nerve palsy .Arch Ophthal 1964; 72:154-67.
[11]. Hooper RS.orbital complication of head injury.Brit J Surg 1951; 39:126-138.
[12]. Solomons DJ, SolomonJC, De Villiers D.Direct traumatic third nerve palsy. S Afr Med J 1980; 58:109-111.
[13]. Heinz J. Cranial nerve avulsion and other neural injuries in road accidents. Med J Aust 1969;56:1246-51
[14]. PS Reddy ,RC Reddy , M Satapathy ; Aetiological study of third, fourth and sixth cranial nerve palsies.IJO ,1972;20:4:159-163.

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