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Clinical Study of Etiopathogenesis of Isolated Oculomotor Nerve Palsy

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ABSTRACT

To identify common etiologies of isolated oculomotor nerve palsy and to assess the factors influencing its recovery. Materials and Methods: Observational cohort study was conducted for 18 months in 36 patients diagnosed with isolated oculomotor nerve palsy of either congenital or acquired type. Exclusion criteria included, patients who are terminally ill and/or those who had trochlear or abducent nerve involvement apart from the third cranial nerve. The comprehensive ophthalmic examination was performed through an oblique illumination method apart from assessment of visual acuity, color vision and slit lamp examination. CNS examination was thoroughly done in all the patients to rule out the possibility of other cranial nerve palsies. CT and MRI neuroimaging were performed in selected cases. Results: Type of oculomotor nerve paresis, etiology for the development of paresis, influence of pain, diabetes, hypertension and trauma were analyzed in the patients. Conclusion: Microvascular ischemia, pupil sparing palsy and incomplete paresis are the significant indicators of complete recovery determined in our study.

KEYWORDS Third cranial nerve palsy, Etiopathogenesis, Diabetes, Hypertension, Oculomotor nerve palsy, Microvascular ischemia.

Introduction:

Third cranial nerve palsies may be partial or complete, congenital or acquired, isolated or accompanied by other neurological signs. They can result from lesions anywhere from nucleus to extraocular muscles. The clinical course of the oculomotor nerve palsy mainly depends on the etiology. The most common etiology is ischemia due to diabetes mellitus, which is usually pupillary sparing and resolves completely within 3 months. Compressive or traumatic third nerve palsy has an indolent course, worsening slowly with or without simultaneous features of aberrant regeneration and resolves incompletely over 6 months[1]. Complete third nerve palsy present with symptoms of complete drooping of the upper eyelid and diplopia as lid is elevated. Ocular signs include complete ptosis due to paralysis of levator palpebrae, exotropia due to palsy of all extraocular muscles except lateral rectus and superior oblique, mydriasis with ipsilateral loss of both direct and indirect pupillary reflexes due to paralysis of sphincter pupillae. The purpose of this study is to assess the factors influencing recovery of isolated oculomotor nerve palsy and to identify common etiologies of isolated oculomotor nerve palsy.

Materials and Methods:

This study was conducted in accordance with the principles of the Declaration of Helsinki. Institutional Ethics committee approval was obtained. This observational cohort study was conducted in 36 patients of male or female gender, diagnosed with isolated oculomotor nerve palsy of either congenital or acquired type, It is conducted for a duration of 18 months between January 2013- July 2014. Patients who are terminally ill and/or those who had trochlear or abducent nerve involvement apart from third cranial nerve were excluded from the study. A comprehensive present and past history of the patient was collected. In present history, emphasis was laid on symptoms such as drooping of eye lid(s), headache and diplopia. History about the presence / absence of diabetes, hypertension, trauma was carefully taken from the patients. Apart from history taking, blood pressure, random blood sugar tests were also done to confirm hypertension, diabetes. Through an oblique illumination method, assessment of head posture, ptosis evaluation, extraocular movements, Hirschberg test, cover test, prism cover test, pupil involvement and aberrant regeneration were performed. Visual acuity and color vision were assessed. Slit lamp examination was done to rule out adies pupil. Fundus examination was done to assess the extent of involvement of the optic nerve, presence of diabetic retinopathy, papilledema. Comprehensive eye examination has been performed through the above methods. CNS evaluation was done to examine the presence of other cranial nerve palsies, motor, sensory, autonomic and cerebellar signs. Neuroimaging was done in the form of computed tomography of brain and orbit with / without contrast or magnetic resonance imaging, according to etiology suspected and neuro specialty opinion is obtained as needed. Statistical analysis was performed using SPSS version 11. All tests used a value of 0.05 as a level of significance.

Results:

Of 36 patients, 27 were males and 9 were females. Of all, the majority of patients were in the age group of 41-50 years constituting 27.7 % of the study population. All 36 patients had unilateral oculomotor nerve palsy. Right eye oculomotor nerve palsy was involved in 16 patients, whereas left eye was involved in 20 patients. No patients had bilateral third cranial nerve palsy. Of the entire study population, 24 patients had pupil sparing oculomotor nerve palsy with microvascular ischemia as a major cause in 21 patients while, remaining 12 patients had pupil involving oculomotor nerve palsy without etiology of microvascular ischemia.

Table 1: Distribution of etiology

Cause	Number	Percentage
Microvascular	21	58.3%
Trauma	8	22.2%
Idiopathic	4	11.1%
Miscellaneous	3	8.3%

Microvascular ischemia is most common etiology in the majority of patients (21 patients, 58.3 %). Miscellaneous factors include TB meningitis, medication use, demyelinating disease.

Table 2: Recovery from Ocular motor nerve palsy

	Complete recovery	Partial recovery	No recovery	Lost to follow up
Microvascular	8	9	2	2
Trauma	0	3	4	1
Idiopathic	0	0	3	1
Miscellaneous	1	0	1	1

Complete recovery was observed in patients with the etiology of microvascular ischemia. In trauma, recovery was only partial during the study period. Through Chi Square test at 0.05 level of significance, P value was calculated for recovery between patients who had pupil sparing and non pupil sparing ocular motor nerve palsy.

Table 3: Comparison of recovery between pupil sparing and non pupil sparing ocular motor nerve palsy.

	Recovered	Not recovered	P value
Pupil sparing	16	5	0.027
Pupil involving	4	7	

As P value is 0.027, there is a significant association in recovery patterns between pupil sparing and non pupil sparing ocular motor nerve palsy.

Table 4: Comparison of recovery from oculomotor nerve palsy in patients with or without pain

	Recovered	Not recovered	P value
Pain	15	2	0.049
No pain	8	7	

Influence of pain in recovery was calculated using Fisher`s exact test with a level of significance as 0.05. A significant association (P value<0.05) was observed between recovered and non recovered in comparison of pain.

Table 5: Comparison of recovery with Diabetes

	Recovered	Not Recovered	P value
Diabetic	15	4	0.021
Non Diabetic	5	8	

The majority of the diabetic (15 patients) were recovered from the oculomotor nerve palsy. There is a significant association (P value<0.05) found between diabetic and non diabetic groups. Of 19 patients with diabetes, 11 patients suffered complete oculomotor nerve palsy with 8 of them recovered from paresis, while, remaining 8 suffered from partial oculomotor palsy with 7 recovered from it. Duration of diabetes was less than 10 years in 11 patients. In these patients, the recovery rate is high, with 9 patients shown a reduction in signs of oculomotor nerve palsy. The blood glucose level was in control in most of the patients due to efficient control of plasma glucose levels through anti diabetics. In 8 patients, whose duration of onset of diabetes was more than 10 years, recovery from ocular paresis was seen only in 50 % (4 patients) of 8 patients. Plasma glucose levels were not adequately controlled in most of these patients.

Table 6: Comparison of recovery pattern between hypertensive patients and patients with normal blood pressure

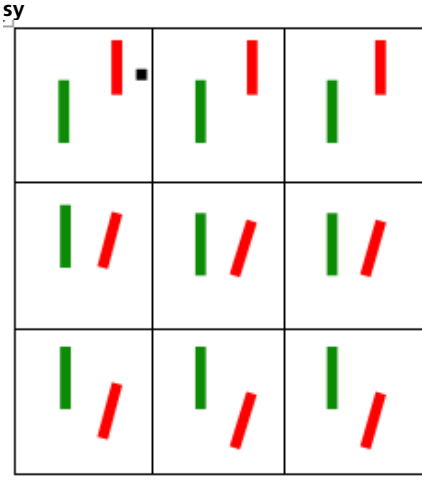
	Recovered	Not Recovered	P value
Hypertensive	7	1	0.092
Non Hypertensive	13	11	

Recovery pattern in patients with Hypertension was also analyzed. More patients with hypertension had recovered from oculomotor nerve palsy when compared with patients whose blood pressure is normal. P value of 0.092 indicated that there is no significant association in recovery patterns between hypertensive and normal blood pressure patients. In hypertensive patients, 4 patients had incomplete oculomotor nerve paresis. All of them, had recovered within a period of 6 months. Complete oculomotor nerve palsy was observed in another 4 patients, with a complete recovery seen in 3 of them.

Table 7: Comparison of recovery with trauma

	Recovered	Not recovered	P value
Trauma	3	4	0.379
Non trauma	17	8	

Figure 1: Diplopia charting in right partial third nerve palsy



Discussion

Isolated third cranial nerve palsy is the second most common ocular nerve palsy next to sixth nerve palsy. In this study, various etiological patterns were studied and factors influencing recovery are identified. In age distribution, maximum number of patients belong to fourth decade i.e, from 41 to 50 years of age while in a study conducted by Menon V. et al [2], 11 to 40 years of age was the commonest age group. This may be because we had classified patients in 10 year age groups and diabetes was the predominant cause in our study. Male to female ratio in this study was 3:1. Whereas, a study conducted by Green et al[3] noted equal ratio of gender. In this study right nerve involvement was 55.5% (20 patients) and Left nerve involvement was 45.5% (16 patients) which is comparable with Rush and Younge[3] study in which there were 47.8% right nerve and 48.1% left nerve involvement. Internal ophthalmoplegia was noted in 33.3% (12 patients) of the total population in our study, which is comparable to Menon V, et al[3] study where Internal ophthalmoplegia was 36%. All patients (100%) with ischemic causes had Internal ophthalmoplegia and 13% (2 patients) of total patients with non ischemic causes had Internal ophthalmoplegia.

Microvascular ischemia (58.3%, 21 patients) was the most common etiology in this study. The highest incidence of microvascular etiology in our study is probably because we have studied only isolated oculomotor nerve palsies, and the same is the reason for trauma being a less common cause. 89% of patients with microvascular ischemia showed complete or partial recovery in our study. This is comparable with RushJA, Young BR[5] study which showed 71.2% recovery rate. Traumatic oculomotor nerve palsy accounts for 22.2% of cases which was comparable to Menon V. et al[3] (22.2%) and Rucker CW[6] study(21.2%). Undetermined causes of oculomotor nerve palsy accounted for 11.1% of total cases which is comparable to Rama V, et al study (10.5%). None of these patients recovered. A long follow up probably could have revealed a detectable cause. Demyelinating Poly Radiculopathy is reported in 1 patient (2.7%) . Drug induced palsy is reported in 1 patient (2.7%) and the agent implicated was chlorpromazine.

Overall, 65.2% of cases showed complete or partial recovery in our study, which was more than RushJA, Younge BR[5] (44.6%) and Singh VP study[8] (50%).

Conclusion:

Microvascular ischaemia appear to be the major aetiopathological factor producing oculomotor nerve paralysis which can be easily diagnosed with simple, laboratory investigations and has better chance for complete recovery. Diabetes is the most common etiology of isolated oculomotor nerve palsy. Most of the diabetic oculomotor nerve palsies recovered within six months. Hypertension is the next most common cause of isolated oculomotor nerve palsy and most of the patients recovered within six months. Trauma is the third most common cause of isolated oculomotor nerve palsy and shows poor recovery over time. Most of the patients with pupil sparing oculomotor nerve palsy recovered within 6 months. In spite of neuroimaging, 11% patients were undiagnosed and they require longer follow-ups.

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