

Article ▶ Clinical Profile of Extraocular Muscle Palsy: A Retrospective Study

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ABSTRACT

Background: The sixth cranial nerve has been found to be the most commonly affected in previous studies of cranial nerve palsies. This study was carried out to determine the most common nerve involved in extraocular muscle (EOM) palsies and the most common cause of EOM palsy in Nepal.

Methods: The diagnosed cases of third, fourth, or sixth nerve palsy for 10 years (2000-2010) at the B.P. Koirala Lions Center for Ophthalmic Studies outpatient department were included in the study. A retrospective review of patients' records was performed, and the causes of EOM palsy were grouped as: vascular, trauma, tumor, aneurysm, undetermined, and others. Recovery of the palsy was evaluated by reviewing the records of the patients who were followed up one month after the initial visit.

Results: A total of 838 patients was included in the study. The average patient age was 37 years. The sixth nerve was most commonly affected (n=458, 54.65%), and the most common etiology was undetermined (n=408, 48.68%). Among the cases where the cause of palsy was known, the largest number of patients had trauma (n=188, 16.46%).

Conclusion: It was concluded that in Nepal, the most commonly affected cranial nerve is the sixth nerve, in accordance with the other studies done in the past in different parts of the world. Most of the cases of cranial nerve palsy were found to have no specific cause and were not associated with diagnosed systemic disease.

Keywords: cranial nerve palsy, etiology, extraocular muscle, Nepal, trauma

Introduction

Patients having an acute onset deviation of either eye or the presence of diplopia are frequently encountered in outpatient departments of tertiary-level eye care centers. The most common reasons for these problems are related to paresis/palsy of the cranial nerve supplying one or multiple extraocular muscles (EOMs). Studies concerning the etiology of cranial nerve palsies have found variable causes.¹⁻⁶ Among many studies the most common etiology was undetermined, followed by trauma, vascular, neoplasm, and aneurysm.¹⁻⁶ The sixth cranial nerve has been found to be the most commonly affected nerve in various studies.¹⁻⁶

Though several similar studies have been conducted elsewhere regarding the most common nerve involved, the most common cause, and the recovery rate of patients having EOM palsy, such studies have not been carried out in Nepal.¹⁻⁶ We undertook the current study to determine the most common EOM involved and possible causes in a Nepalese clinical population presenting with EOM palsy/paresis.

Methods

All the patients referred to the Neuro-Ophthalmology Clinic of B.P. Koirala Lions Center for Ophthalmic Studies from the outpatient department of the same center were included. Also, the referred patients from other hospitals for binocular diplopia, EOM restriction, and the diagnosed cases of third, fourth, or sixth nerve palsy for the last 10 years were included in the study. Congenital cases and those caused by conditions that mimic cranial nerve palsy, such as orbital wall fracture, myasthenia gravis, and thyroid eye diseases, were excluded.

A retrospective review of the patients' records fulfilling our criteria was performed. Characteristics such as age of onset, gender, presence of any systemic conditions, EOM involvement, and laterality were reviewed. Similar to previous studies,¹⁻⁶ the causes of EOM palsy were categorized into six groups: vascular, trauma, tumor, aneurysm, undetermined, and others.

Systemic condition was defined as having diabetes mellitus and/or hypertension. Vascular cases were defined as

Table 1: Percentages of cranial nerve palsy in various studies

Cranial Nerve	Richards et al. ¹	Rucker et al. ²	Rucker et al. ³	James et al. ⁴	Tiffin et al. ⁵	Park et al. ⁷	Current study
III	41.74%	33.50%	27.40%	29%	17%	23.30%	27.4%
IV	6.06%	6.70%	8.40%	17.20%	21%	22.33%	13.7%
VI	40.04%	40.90%	51.50%	41.90%	57%	52.42%	54.6%
Multiple	12.13%	18.90%	12.70%	1.19%	5%	1.94%	4.17%

Table 2: Distribution of the third, fourth, and sixth cranial nerve palsy patients by age, gender, laterality, and etiology

		III	IV	VI	Multiple
N		230 (27.44%)	115 (13.72%)	458 (54.65%)	35 (4.17%)
Mean Age		48.8±22.2	51.8±15.9	47.8±20.4	40±18.2
Range		3-75	12-80	13-79	18-81
Gender	Male	140	77	262	20
	Female	90	38	196	15
Laterality	Right	80	53	172	18
	Left	122	57	234	9
Bilateral		21	17	47	8

having at least one vascular risk factor (diabetes, hypertension, ischemic heart disease, or peripheral vascular disease) without the history of trauma or the evidence of aneurysm or neoplasm in image studies. ‘Other’ causes included complications of neurosurgical procedures and other systemic syndromes and diseases related to the cranial nerve function (e.g. Guillain–Barré syndrome). Recovery of the palsy was evaluated by reviewing the records of the patients who were followed up one month after the initial visit. Recovery was defined as decrease in the deviation angle of at least six prism diopters and/or elimination of diplopia.

Results

A total of 838 patients was included in the study. Among them, 499 (59.54%) were male and 339 (40.45%) were female. The percentages of the affected cranial nerve palsies in various studies are shown in Table 1, and the distributions of affected nerve, gender, and laterality of each group are summarized in Table 2. Tables 3, 4, and 5 give the distribution by nerve and etiology of the cases analyzed. The left eye was found to be involved in 422 (50.35%) cases and both eyes were involved in 93 (11.09%) cases.

The average age of onset was 37 years (range, 3 – 81 years). The sixth nerve was most commonly affected (n=458, 54.65%), and the most common etiology was undetermined (n=408, 48.68%), followed by trauma (n=188, 16.46%). Pupillary involvement was found in 46 (5.54%) patients, 39 (85.1%) of whom had a third nerve palsy. Hypertension was

Table 3: Causes of paralysis of Third Cranial Nerve

Causes	No. of cases (%)
Undetermined	105 (45.65%)
Vascular	45 (19.56%)
Tumor	8 (3.47%)
Trauma	60 (26.08%)
Aneurysm	11 (4.78%)
Other	1 (0.43%)
Total	230

Table 4: Causes of paralysis of Fourth Cranial Nerve

Causes	No. of cases (%)
Undetermined	60 (52.17%)
Vascular	5 (4.34%)
Tumor	6 (5.21%)
Trauma	30 (26.08%)
Aneurysm	8 (6.96%)
Other	6 (5.21%)
Total	115

recorded in 97 (11.57%) cases, while 33 (3.93%) had diabetes and 26 (3.1%) had both hypertension and diabetes.

Third nerve palsy

The causes of palsy involving the third cranial nerve (n=230, 27.4%) are displayed in Table 3. The greatest number of cases had no identifiable cause and therefore fit into the undetermined category. In the cases where the underlying cause of palsy was known, the largest number of patients had suffered trauma (n=60, 26.08%), followed by vascular causes (n=45, 19.56%).

Fourth nerve palsy

There were 115 (13.7%) cases of fourth nerve palsy (Table 4). The number of cases with an undetermined cause was 60 (52.17%). In cases where the cause was determined, trauma caused the largest number of fourth cranial nerve palsies (30,

Table 5: Causes of paralysis of Sixth Cranial Nerve

Causes	No. of cases (%)
Undetermined	236 (51.52%)
Vascular	95 (20.74%)
Tumor	20 (4.36%)
Trauma	88 (19.21%)
Aneurysm	13 (2.82%)
Other	6 (1.31%)
Total	458

Table 6: Causes of paralysis of Multiple Cranial Nerves

Causes	No. of cases (%)
Undetermined	7 (20%)
Vascular	7 (20%)
Tumor	5 (14.28%)
Trauma	10 (28.57%)
Aneurysm	1 (2.86%)
Other	5 (14.28%)
Total	35

26.08%). Four patients had hydrocephalus and two had herpes zoster ophthalmicus.

Sixth nerve palsy

Paralysis of the sixth cranial nerve was the most frequently encountered palsy and was unilateral in 407 (88.86%) patients and bilateral in 51 (11.14%). Similar to cases of paralysis of the third and fourth cranial nerves, most patients (236, 51.52%) did not have an identifiable cause (Table 5). Vascular diseases were common: 20 (4.36%) had diabetes mellitus, 50 (10.91%) had hypertension, and 25 (5.45%) had both diabetes mellitus and hypertension. In comparison, vascular disease as a whole caused fewer cases of third nerve palsy than sixth nerve palsy. Twenty patients (4.36%) had tumors. Ten patients had meningitis, and there were two cases each of multiple sclerosis, viral infection, and pseudotumor cerebri.

Multiple Nerve palsy

There were 35 (14.28%) cases of multiple nerve palsy present in our study. Metastatic tumor was present in two cases, pituitary adenoma in five cases, and vascular disease in seven cases (20%). Seven cases (20%) of multiple nerve palsies could not be attributed to an underlying cause. One patient had each of the following associated disorders: Tolosa-Hunt syndrome, Guillain-Barré syndrome, empty sella syndrome, carotid-cavernous fistula, and multiple sclerosis.

Discussion

In our study, sixth cranial nerve palsy was the most common, accounting for 54.65% of total cases, and

Table 7: Recovery percentages of different cranial nerve palsies

Cranial nerves	Recovery percentage
Third	17.39%
Fourth	45.21%
Sixth	22.60%
Multiple	14.28%

Table 8: Recovery percentages in different etiologies

Etiology	Recovery
Undetermined	62.3%
Vascular	57.8%
Trauma	45.7%
Tumor	13.3%
Aneurysm	5.1%
Others	3.9%

fourth nerve palsy was the least frequent. This is similar to previous studies.²⁻³ The greatest number of cases fell into the undetermined category, followed by vascular causes, which is in accordance with the study done by James et al. The most common etiology had not changed even between successive reports from the same institute.²⁻³ Differential diagnosis between a vascular and an undetermined etiology may be challenging and is usually based on the presence of vascular risk factors. Also, the inclusion criteria were different amongst the other reports. The onset age of 37 years was somewhat younger than other reports.⁵⁻⁷ Males were affected more than the females, which matches the study done by Park et al.⁷

We evaluated patients' recovery at a follow-up visit which was one month after the initial presentation (Table 7). Patients with longer latency before their initial examination in the clinic might have experienced recovery during the intervening period, resulting in bias toward a lower recovery rate. This also suggests that recovery starts as early as within one month of onset and those who were first seen between one and three months of onset might have less latent potential for further recovery than those seen within a month.⁷

Patients with palsies due to vascular disease, such as diabetes mellitus, hypertension, or atherosclerosis, frequently recovered regardless of the nerve affected. All the cases of fourth nerve palsy due to trauma showed recovery. This may be due to the fact that fourth nerve palsy is mostly found in closed head traumas, whereas third and sixth nerve palsies are more frequently seen in forcible traumas causing skull fractures.⁴ Vascular and undetermined groups showed a higher overall recovery rate than other etiological groups (Table 8). This suggests that a large portion of the undetermined etiology group might share the same causes with the vascular group, as a kind of microvasculopathy undetectable by laboratory and imaging tests. A wide range of recovery rates is thought to

result from variable criteria for recovery among the studies and criteria that are often not well defined. Successful management of treatable underlying disease can affect recovery from the cranial nerve palsy.⁷

Conclusion

The most commonly affected cranial nerve in Nepal is the sixth nerve. This is in agreement with the other studies done in the past in different parts of the world. Most of the cases of cranial nerve palsy fell into the undetermined category, having no specific cause of occurrence, and were not associated with any systemic diseases. Vascular cases showed greater recovery than the other known causes that lead to cranial nerve palsy, but this was independent of the nerve affected.

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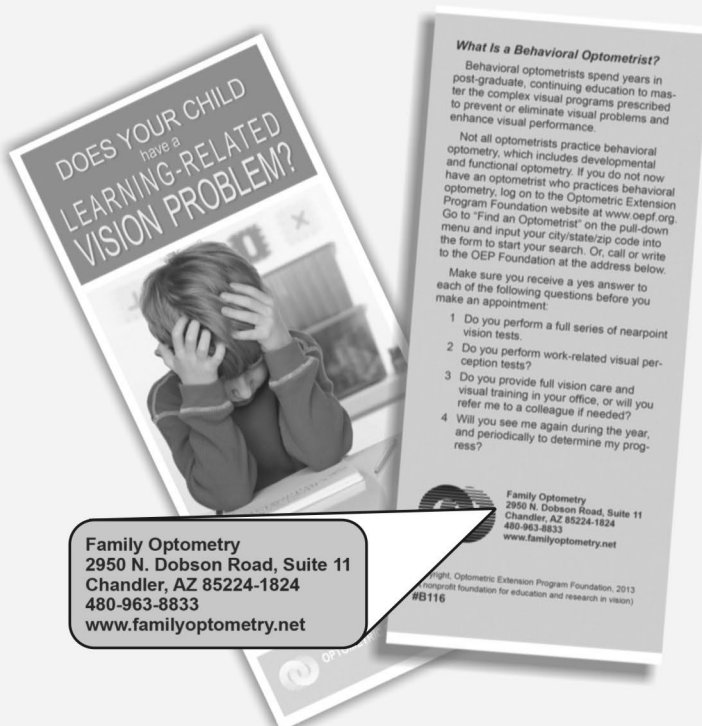
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