

A STUDY OF ETIOLOGY AND CLINICAL FEATURES OF 6th CRANIAL NERVE PALSY

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ABSTRACT

Aim: The aim of the present study was to determine the clinical presentation and document the etiological factors in patients with ocular motor nerve palsy involving 6th cranial nerve.

Methods: The cross-sectional study was conducted at a tertiary care center in western India from September 2020 to October 2022 and 33 consecutive patients presenting with cranial nerves were included in study from wards and opd in a tertiary care center and sample size was calculated according to win pepi method.

Results: The Mean±SD age of the patients were 50±15.7 years and the range were 11-78 years. Majority of the patients were males (51.5%), followed by females (48.5%). Left side was affected among 51.5%, while 48.5% had their right side affected. RTA was the most common in 6th nerve and hypertension (16%) were found as majority among the sixth nerve palsies. Majority of the patients had a visual acuity of 6/9 (15.2%) and 6/24p (12.1%).

Conclusion: Abducens was the most commonly involved nerve while trauma was most common etiology in our study. The most common cause for cranial nerve palsy was vascular i.e diabetes and hypertension. Therefore, early diagnosis and proper management of these systemic diseases can prevent ocular motor nerve palsies and its complications. Our study evaluated ptosis, diplopia, visual impairment, complete ophthalmoplegia, ocular deviation as some of the most common causes for ocular motor nerve palsies.

Keywords: cranial nerve, ocular motor nerve palsy, etiology

INTRODUCTION

Although relatively uncommon in general ophthalmology clinics, ocular motor cranial nerve palsies (OMCNPs) are a common presentation in neuro-ophthalmology clinics worldwide.¹ The aetiology of OMCNP depends on the characteristics of the population in question. In addition, clinical presentation depends on the cranial nerve (CNs) involved. Causes of

OMCNP include trauma, microvascular ischaemia, nerve compression, inflammation, and demyelination.² Less frequently, congenital CN palsies or agenesis are seen.³ Prompt diagnosis and multidisciplinary care is a key component of assuring a favourable outcome of management. Microvascular OMCNPs often resolve within weeks to months spontaneously, and management consists solely of adequate control of risk factors such as hypertension, diabetes mellitus, dyslipidaemia, alcohol, and smoking.

Higher centers which control the extra ocular movements are motor cortex, pons, midbrain, cerebellum and vestibular apparatus interlinked to visual system. Lesions anywhere in the path between the extra ocular muscles and nuclei within the orbit results in dysfunction of the ocular motor nerves. Acquired ocular motor nerve palsies can occur due to numerous factors such as vascular disease, trauma, aneurysm or intracranial tumours.⁴ In adults it is mostly attributed to micro vascular ischemia to the nerve in the background of vascular risk factors like diabetes mellitus, dyslipidemia and hypertension.⁵ Sixth and third CN are more frequently affected and recovery occurs spontaneously within 3 to 6 months.⁶

Moreover, the diagnosis and treatment of ocular motor nerve palsies differs in patients based on the age of the patients, presence of associated signs and symptoms, and characteristics of the ocular motor nerve palsies. The clinical signs and symptoms vary largely from patient to patient and so each patient should be analyzed carefully. Furthermore, to increase the chance of detecting the etiology of OMNPs, close collaboration between the different specialties such as ophthalmology, otorhinolaryngology and neurology is mandatory.

OMCNP appears to be an important manifestation of undiagnosed, poorly controlled, or neglected systemic microvascular disease in this Nigerian clinic. It is possible that poverty or ignorance may play a role in the apparent neglect of the systemic microvascular conditions in these patients. Isolated ischaemic OMCNP most often spontaneously recovers. Nevertheless, in the presence of multiple OMCNP or persistent isolated OMCNP, neuroimaging is useful in identifying the likely aetiology.

The aim of the present study was to determine the clinical presentation and document the etiological factors in patients with ocular motor nerve palsy involving 6th cranial nerve.

MATERIALS AND METHODS

The cross-sectional study was conducted at Dr D. Y. Patil Medical college, Pune from September 2020 to October 2022 and 33 consecutive patients presenting with cranial nerves were included in study from wards and opd in a tertiary care center and sample size was calculated according to win pepi method.

Inclusion criteria: -All patients with acquired ocular motor nerve palsies.

Exclusion criteria: congenital nerve palsies, Myopathies, Restriction syndromes, Supranuclear lesions, Any other nerve palsies, Patient not willing for study.

METHODOLOGY

The evaluation of the patients was done in ophthalmology OPD itself after explaining the patient the study and taking consent of the patient.

All the patients were studied carefully and a detailed history and examination taken for every patient as per attached proforma:

- Personal details: Age, Sex.
- Detailed systemic and ocular history: Detailed history regarding the incidences that preceded the onset of symptoms like trauma [trivial or severe], headache fainting attacks, numbness, etc., were taken. History of systemic illnesses like hypertension, diabetes mellitus, and seizure disorder and previous neurological involvement in any other disorders like tuberculosis, syphilis was noted specific to ocular complaints such as double vision, blurring of vision, field defects, drooping of eyelids, headache, restriction of movements etc.
- General physical examination.

- Best corrected visual acuity.
- Extra ocular movements were observed in all directions of gaze and restriction of movements were noted.
- Hirschberg test: It is also called corneal reflex test. It is performed by shining a light in the person's eyes and observing where the light reflects off the cornea.
When performing the test, light reflexes of both eyes are compared. The light reflex ideally is in the centre of the pupil if its normal. when there is deviation of eye, light reflex is not symmetrical,
15 degrees deviation: light reflex on pupillary margin
30 degrees deviation: light reflex between pupil margin and limbus
45 degrees deviation: light reflex on limbus.
- Cover and uncover test: A cover test and uncover test is an objective determination of the presence and amount of ocular deviation.
The test involves having the patient focusing on both a distance as well as near object at different times during the examination. A cover is placed over an eye which is considered normal for a short moment then removed while observing both eyes for movement. The misaligned eye will deviate inwards or outwards. The process is repeated on both eyes and then with the child focusing on a distant object.
- Prism bar cover test: is an objective measurement and the gold standard in measuring strabismus. It is used to estimate the amount of vertical and horizontal deviation and includes both manifest and latent components using prisms.
- Lid position: The upper lid covers 1/6th of the cornea (superior 2mm of limbus).
- Pupil: Pupillary involvement is always examined by checking the pupillary reflex. A defect of the pupillary reflex caused by a lesion along the pathway of either the parasympathetic supply from the Edinger-Westphal nucleus to the sphincter pupillae muscle of the iris (Adie's pupil), or the ocular sympathetic supply from the ciliospinal centre to the dilator pupillae muscle of the iris. The main sign of efferent pupillary defect is non-physiological anisocoria.
- Diplopia: diplopia means double vision.it is recorded using diplopia charting.
Diplopia chart is the record of separation of the diplopic or double images in the nine positions of gaze
- Detailed ocular examination using slit lamp
- 6th CN examination: Sixth nerve palsy is characterized by the presence of binocular horizontal double vision. Ocular ductions reveal an abduction deficit on the involved side and an incomitant esotropia that increases on attempted abduction to the side of the palsy.
- Neuroimaging of patients was done as and when required.

STATISTICAL ANALYSIS:

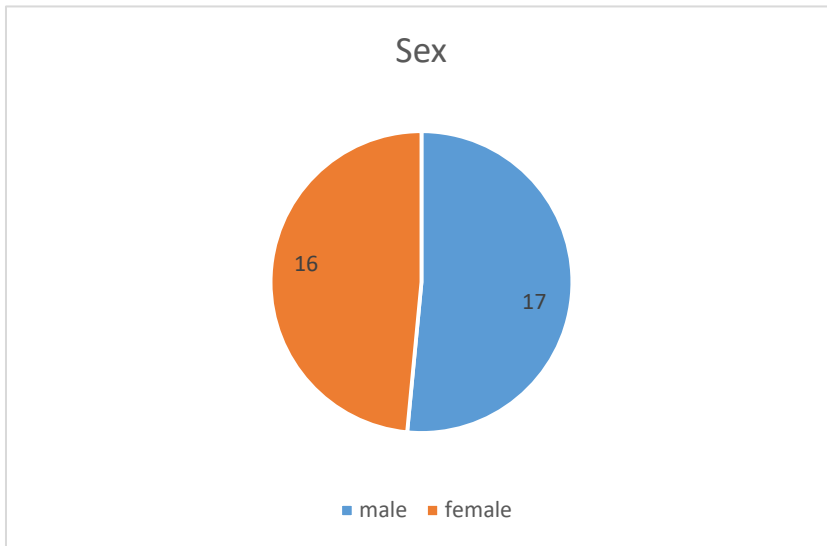
Data was entered in Microsoft Excel and Statistical Analysis was done using software Epi 7 or WinPepi. Quantitative data was summarized using mean & SD. Qualitative data was summarized using proportions. Appropriate tests of statistical significance such as Chi square, t test and paired t test were used.

ETHICS COMMITTEE CLEARANCE

Ethics committee clearance was obtained before start of study. Written and informed consent was taken from all patients before undertaking the study

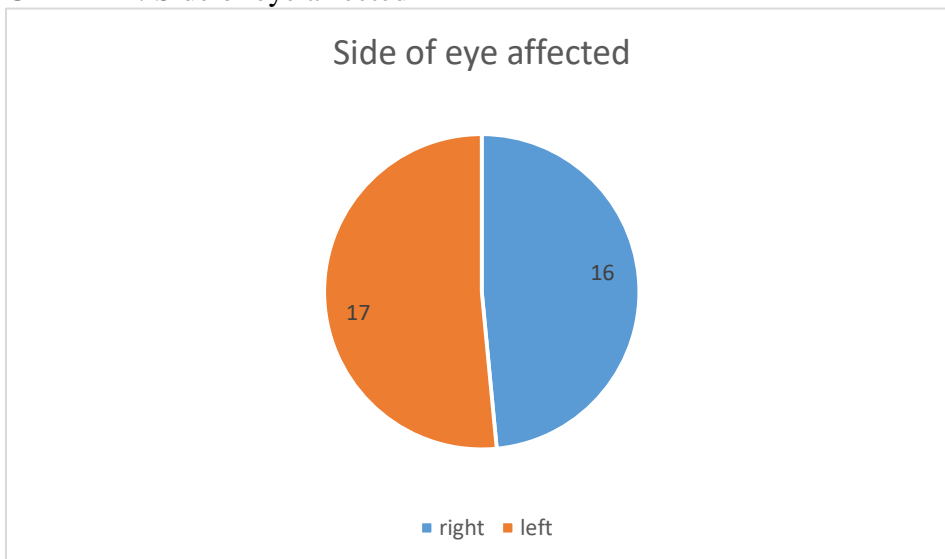
RESULTS

GRAPH 1: SEX OF THE PATIENTS



The Mean±SD age of the patients was 50±15.7 years and the range was 11-78 years. Majority of the patients were males (51.5%), followed by females (48.5%).

GRAPH 2: Side of eye affected



Left side was affected among 51.5%, while 48.5% had their right side affected.

Table 1: Prevalence of diabetes, HTN and RTA

DM	Sixth nerve	
	n	%
Yes	5	20
No	20	80
HTN		
Yes	11	44

No	14	56
RTA		
Yes	3	14
No	22	86

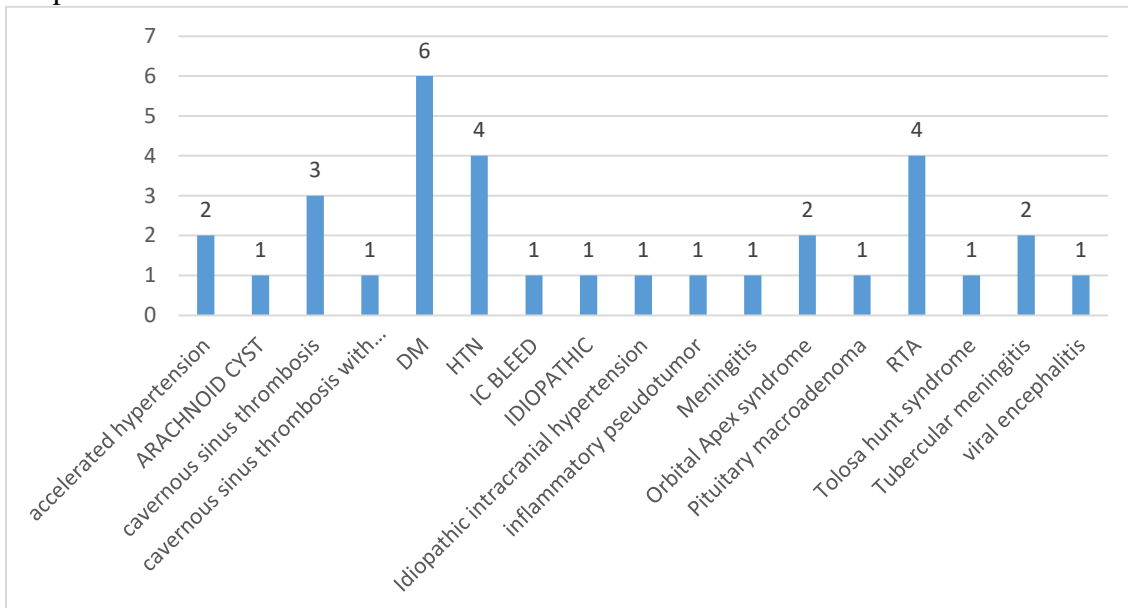
Diabetes was prevalent 20% sixth nerve palsy patients. Hypertension was prevalent 44% among the sixth nerve palsy patients. RTA was prevalent among 14% of sixth cranial nerve palsy.

Table 2: MOST COMMON ETIOLOGY OF ALL NERVES

Nerve	Most Common Etiology	Percentage
6 th	Hypertension	16
	Diabetes Mellitus	16

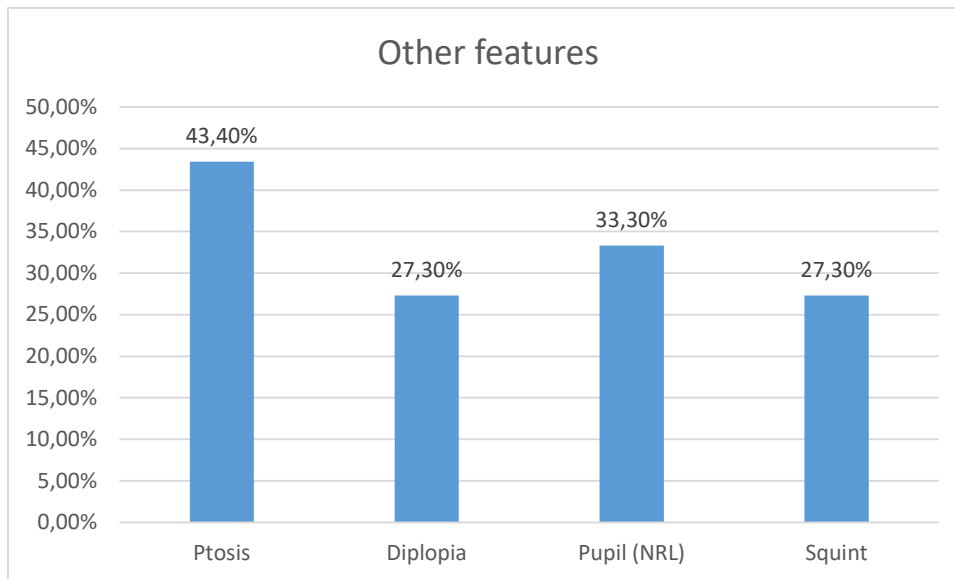
RTA was the most common in 6th nerve and hypertension (16%) were found as majority among the sixth nerve palsies.

Graph 3: Other associations



Majority of the patients had a visual acuity of 6/9 (15.2%) and 6/24p (12.1%).

GRAPH 4: VISION OF PATIENTS



Among the patients 43.4% had ptosis, 27.3% of the patients had diplopia and squint, 33.3% of their pupils not reacted to light.

In this study, patients presenting with features of ocular motor nerve palsies was examined thoroughly, any patient with underlying vascular aetiology was observed for a minimum of three months, following which there was a recovery in patients; if any patient showed no improvement in features, they were subjected to neuroimaging.

DISCUSSION

Extraocular muscles are innervated by the 3rd, 4th, and 6th cranial nerves which control ocular movements. These often present as diplopia, drooping of lids, deviation of eyes, and defective vision. As these often present initially to the ophthalmologist, knowledge of the etiology and presentation of various ocular palsies is important to decide on further investigations to reach a diagnosis and manage the condition. Multiple causes such as trauma, vascular disease, intracranial tumors, or aneurysm can result in palsy of these nerves. Various studies have shown differing etiology and affected nerve distribution. These may differ with the clinical settings and geographic distribution.⁷

The mean age of the patients in the present study was 50 ±15.7 years. This was similar to the study conducted by Sujatha N et al.⁸ which was 51.37±14.39 years. In the study conducted by K. Haridev Kumar et al.⁹ the mean age of patient was 55.8 years, which was slightly higher whereas in the study conducted by Venatesh K SK et al.¹⁰ was 42.65% years. In the current study majority of the patients were males 51.5% followed by females 48.5%. Similar finding was noticed in the study conducted by K. Haridev Kumar et al.⁹ where 63% patients were males.

While in the study conducted by Murthy LR et al.¹¹ female preponderance was noticed 64% which was in contrast to the findings of the present study. The present study noticed that left side of eye was affected more among patients 51.5%, while 48.5% had their right side of eye affected. Similarly left side of eye was affected more than the right eye in the study conducted by Sujatha N et al.,³ left (62%) > right (34%). Among patients with ocular motor nerve palsies, the present study showed the most commonly affected nerve to be their sixth cranial nerve affected 75.8%. In accordance with this study, K. Haridev Kumar et al.,⁹ reported 6th nerve palsy 36% as the most commonly affected nerve. Similarly, Khadse R et al.¹² reported 6th nerve palsy 38.7% as the most commonly affected nerve. In a study conducted outside India by Tiffin et al.¹³ VICN palsies contributed most of the cases (57%), followed by IV CN palsies (21%), III nerve palsies (17%) and multiple palsies (5%), which was comparable with the current study.

The prevalence of hypertension and diabetes were 27.3% and 33.3%, respectively in the current study. This finding was similar to the study conducted by Khadka S et al.,¹² sixty three out of 167 (37.7%) patients who had known co-morbidities, the most prevalent was hypertension 16.8% followed by diabetes 15%. Ramappa R et al.¹⁴ reported diabetes (60%) as the most common cause of ocular motor nerve palsies followed by trauma (23.4%) which was similar to the present study. Sujatha N et al.,¹⁵ reported vascular aetiology (34.67%) as the most common cause followed by trauma (29%) and tumour (13%).

Ramappa R et al.,¹⁴ reported ptosis 66.7% as the most common clinical feature followed by pupillary involvement 35% which was in accordance with our study. Moreover, our study reported 66.7% patients of their pupils reacted to light while 33.3% not reacted to light. LR et al.,¹¹ reported the most common clinical features as ocular deviation 72% followed by ptosis 44%, diplopia 32%, and visual impairment 14%. K. Haridev Kumar et al.,⁹ reported double vision in 58%, followed by ptosis 18%, other least common symptoms such as defective side vision, diminution of vision etc.

In most of the studies it was observed that the most common clinical symptoms were ptosis, diplopia, ocular deviation, visual impairment which was similar with our study. Therefore, current study is comparable with studies conducted across India and outside India. The minor differences in prevalence of clinical features may be due to differences in socio demographic profile, study settings, sample size and different time period when the studies were carried

CONCLUSION

Abducens was the most commonly involved nerve while trauma was most common etiology our study. The most common cause for cranial nerve palsy was vascular i.e diabetes and hypertension. Therefore, early diagnosis and proper management of these systemic diseases can prevent ocular motor nerve palsies and its complications. Our study evaluated ptosis, diplopia, visual impairment, complete ophthalmoplegia, ocular deviation as some of the most common causes for ocular motor nerve palsies. Vascular risk factors were even found in non-vascular causes of nerve palsy. Demyelination was also found to be a cause of 6th nerve palsy. Hence to reach an etiological diagnosis, investigations should be tailored to each according to clinical findings and provisional diagnosis.

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