A COMPREHENSIVE ANALYSIS OF ISOLATED INFRANUCLEAR ABDUCENS NERVE PALSY IN A TERTIARY EYE CARE CENTRE

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ABSTRACT

BACKGROUND

A comprehensive analysis of the aetiology and clinical profile of isolated infranuclear abducens nerve palsy in a tertiary eye care centre.

MATERIALS AND METHODS

A hospital-based retrospective case series analysis of 90 isolated infranuclear neurogenic abducens nerve palsies. Documentation included age, gender, presenting complaints, history of diabetes mellitus, hypertension, mode of onset, progression of the disease, treatment given and recovery rate was evaluated. Detailed ophthalmic evaluation of both eyes including anterior segment examination, extraocular movements, diplopia charting and Hess charting. Thorough central nervous system examination and systemic examination was done.

Inclusion Criteria- All isolated infranuclear neurogenic lesions of abducens nerve palsy.

Exclusion Criteria- Conditions like supranuclear lesions, myasthenia, orbital inflammation and myopathies, false localising sign of abducens nerve palsy were excluded by appropriate testing and investigations.

RESULTS

Total cases were 90 patients. Mean age of presentation was between 3rd to 5th decades with male preponderance. Commonest presenting symptom was diplopia (71.1%), commonest cause being idiopathic neuritis (48%), diabetes mellitus (20%), hypertension (15%), trauma (10%) and others (7%).

CONCLUSION

In our study, isolated infranuclear abducens nerve palsy with nonspecific aetiology predominantly affecting males of 3rd to 5th decade with variable recovery rates were seen. Hence, careful clinical examination in all cases is essential with close follow up on a long-time basis.

KEYWORDS

Abducens Nerve, Hess Charting, Diplopia, Neuroimaging, Cranial Nerve Palsy.

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BACKGROUND

Isolated sixth cranial nerve palsy is one form of ocular cranial nerve palsy in which sixth cranial nerve is involved, but ocular motor nerve and trochlear nerves are not involved. Restricted ocular mobility could be the result of paralysis of the nerve supplying the extraocular muscles, pathology in the muscle, mechanical factor limiting the muscle or it may be the pathology at myoneural junction. Since, treatment for these conditions are different from one another, it becomes clinically important to differentiate them.[1] Acquired palsies are more common and the aetiology vary.[2] Anatomically, nerve palsies are divided into infranuclear (commonest), nuclear, internuclear and supranuclear (cerebral, cerebellar, brain stem and vestibular).

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MATERIALS AND METHODS

A hospital-based retrospective case series analysis of 90 cases of isolated abducens nerve palsies were done. Documentation included age, gender, presenting complaints, mode of onset, progression of the disease, treatment given and recovery rates were evaluated. The study was for a period of 18 months at a tertiary eye care centre. Follow up of all cases was carefully done at each review with the emphasis on detailed history, extraocular movements, separation of images in diplopia charting, compensatory head posture recovery along with retinoscopy, refraction, anterior segment and fundus examination. Since, diabetes was a common aetiology and

since a small group of patients were on systemic steroids, haematological evaluation of diabetic status was also done. The age of patients ranged from birth to 8th decade. The commonest age group in our study was in the 5th decade of which more than 50 percent of cases aetiology could not be pinpointed in spite of thorough clinical, neurological, neuroimaging studies. The time of reporting to our institution varied from one week to six months as many of them reported to hospitals close to them from where they were referred to our tertiary care centre. On examination, diplopia seemed to be the most disturbing symptom, which made them reach for medical attention. More than 75% of patients reported directly to an ophthalmologist. A small fraction of ear discharge patients were treated initially by E.N.T. surgeons. Head injury patients obtained immediate management from the casualty department of local hospitals.

RESULTS

Age- Of the 90 cases of isolated sixth cranial nerve palsies 76.6% of the patients were between 20-70 years.[3] In this study, the maximum numbers of isolated sixth nerve palsies were found in the 5th decade (20%).

Age (Years)	VI Nerve Palsy
0-9	8
10-19	11
20-29	10
30-39	14
40-49	17
50-59	8
60-69	4
>70	4
Total Number of Cases	**90**

Table 1. Age Distribution

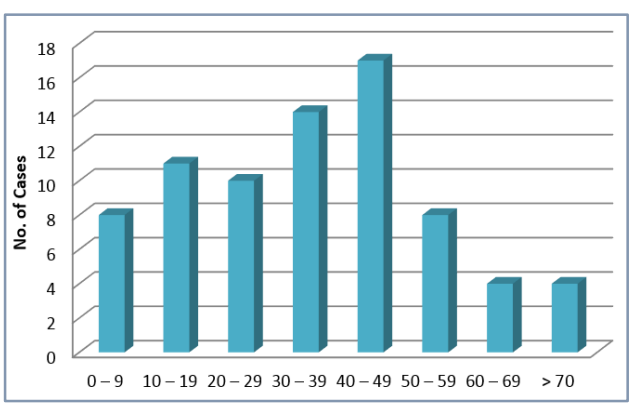

Figure 1. Age Distribution

Gender

In our study, males were more frequently affected (57.7%).[3]

Sex	VI Nerve	Percentage
Male	52	57.7%
Female	38	42.2%

Table 2. Gender

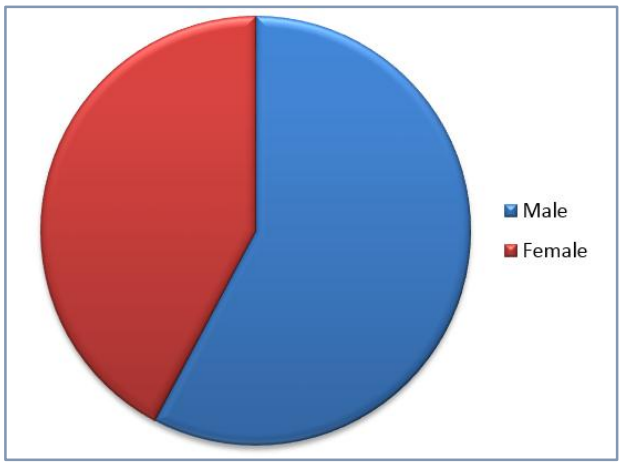

Figure 2. Gender

Laterality

From this study, it is clear that the left eye (46.6%) was more frequently involved than the right eye (44.4%) in all age groups. Bilateral involvement was seen in 8 cases (8.88%). In 50% of bilateral involvement, it was setting of comitans where a unilateral palsy caused secondary inhibitional palsy of the contralateral antagonist to yoke muscle (contralateral medial rectus).

Affected Eye	VI Nerve	Percentage
RE	40	44.4%
LE	42	46.6%
BE	8	8.88%

Table 3. Laterality

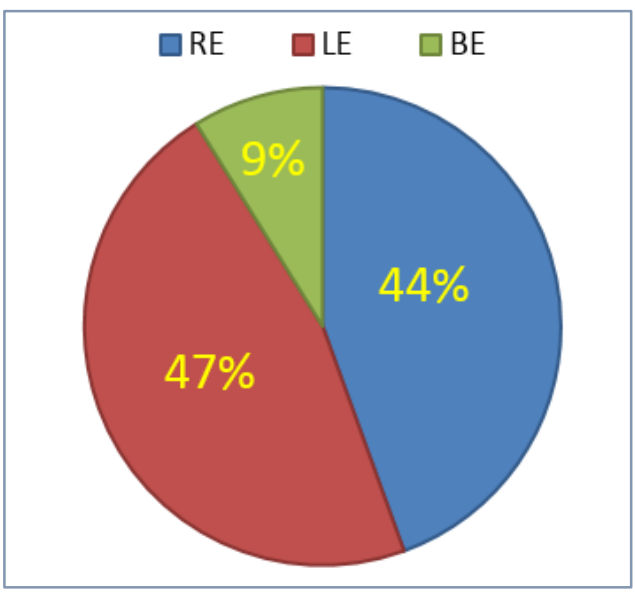

Figure 3. Laterality

Ocular and Neurological Symptoms

Commonest ocular symptom was diplopia in majority of isolated VI nerve palsies[4] followed by headache, defective vision and face turn. 91% of cases presented with above complaints within one month from the onset of symptoms.

Symptoms	Percentage
Diplopia	71.7%
Headache	11.1%
Defective Vision	6.6%
Fits	1.1%
Impairment of consciousness	2.2%
Ear complaints	2.2%

Table 4. Symptoms - Ocular and Neurological

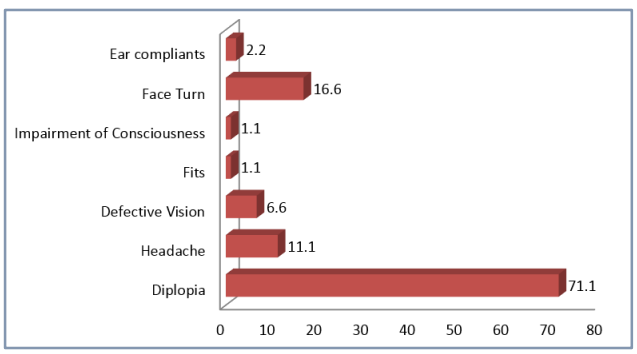

Figure 4. Symptoms -Ocular and Neurological

Aetiology

The aetiology of isolated VI nerve palsies could be determined in 42 cases (46.6%). In 48 patients (53%), specific aetiology could not be determined.[5,6,7] Of the 90 cases, more than 53% belonged to the nonspecific neuritis.[5,6] Most of the patients were males. They did not have an identifiable cause even after relevant investigations and neurological examinations. 13.3% had diabetes mellitus as the aetiologic factor.[6,7] The age group of diabetic patients ranged from 35 to 60 years. There were 8 males and 4 females. In 30% of the patients in this group, cranial nerve paralysis was the initial manifestation of diabetes mellitus. Of the 12 cases with diabetes mellitus, 3 had diabetic retinopathy in both eyes. It was followed by hypertension in 10 patients (9%). Both were present in 2 patients.[8] Following trauma, 7% developed sixth nerve palsy.[9] It was more frequent below the age of 40 years. Most commonly, it was due to automobile accidents. Following fever, 8 patients developed VI nerve palsy. In one patient, the cause was CSOM.

Aetiology

Cause	Number of Patients
Congenital	1
Trauma	7
Post infection	4
Diabetes	12
Hypertension	10
CSOM	1
Idiopathic	48
Tumour	2
Demyelination	1
TB meningitis, acute encephalitis	2

Table 5. Aetiology

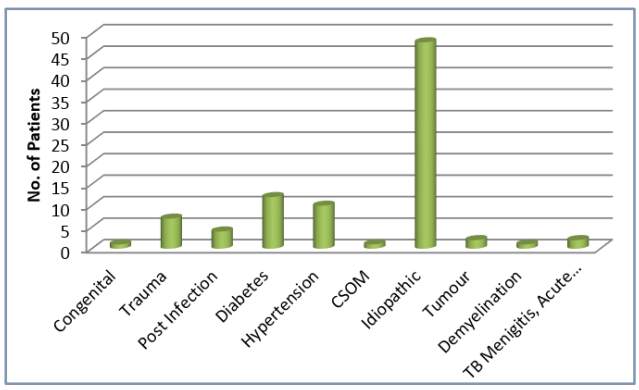

Figure 5. Aetiology

CT Scan

Computerised tomography was abnormal in 12 patients and magnetic resonance imaging was abnormal in 2 patients. These investigations were very helpful in the diagnosis of compressive lesions such as tumour and head injuries.[7]

Treatment

In this study, we treated the patients depending on their aetiology and symptoms. Patients were placed under observation.[9] Only in 30% of patients who complained of diplopia were advised to use occlusion to avoid diplopia.[9] Many patients surprisingly learned to ignore diplopia by adapting compensatory head posture.

Almost, all patients received neurovitamins as a supportive therapy along with specific therapy. Patients with diabetes were sent to the diabetologists and placed under strict glycaemic control by oral hypoglycaemic agents, parenteral insulin or both. They were periodically checked for their plasma glucose level. 90% recovered completely in 3 to 4 months from the onset.

Patients with systemic hypertension were advised to take antihypertensive treatment along with neurovitamins. 85% recovered completely in 3 months.

53.3% of nonspecific neuritis groups were advised to take systemic steroids.

(T. Prednisolone 1 mg/kg) after excluding diabetes, fungal infection and other contraindications to steroid therapy (e.g. peptic ulcer), 80% recovered completely, 11% partially recovered and 9% did not recover in 3 months.

Two patients were sent to otolaryngology for management. One patient, who had CSOM and mastoiditis, underwent mastoidectomy.

Fifteen patients were referred to neurology and neurosurgery departments. Of these, 3 patients had intracranial tumour. In two patients, tumour was removed by neurosurgeons. Patients with head injury were advised to consult neurosurgeons. Management was done by neurosurgeons along with our treatment. These 7 patients received oral steroids (T. Prednisolone 1 mg/kg) and neurovitamins.

Recovery

All the patients with specific neuritis and paralysis due to diabetes and hypertension showed complete recovery or partial recovery in 3 to 4 months.[7] The best recovery rate

was in the vascular group (diabetes and hypertension) followed by undetermined cases (85%). The average time for recovery in VI nerve palsies ranged from 8 to 16 weeks. Worst recovery rates were seen in trauma cases (4 cases - no recovery, 2 cases - partial recovery and 1 case - complete recovery).

Trauma Recovery

Full Recovery	1
Partial Recovery	2
No Recovery	5

Table 6. Recovery

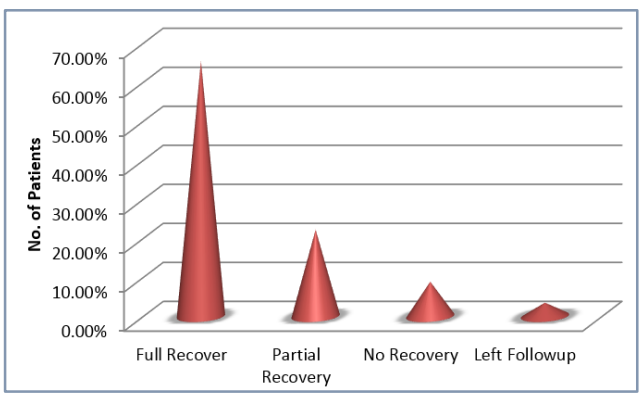

Figure 6. Recovery

DISCUSSION

Cranial nerve palsies possess diagnostic and therapeutic problems for the ophthalmologists. The acquired cranial nerve palsies in this study were compared with the studies conducted by Rucker C.W. 1958, 1966, Rush and Younge 1981, Richard, Jones and Younge 1992 to analyse the prevalence of various aetiology and general recovery pattern of sixth nerve palsies.[10]

Richard, Jones and Younge in 1992 Mayo series had suggested a more aggressive work up in those younger than 19 years as they are less susceptible to vascular disorder and are more likely to have tumour or sustain trauma. As per the study conducted on 4298 cases of ocular motor paralyses by Richards, Jones and Younge from Mayo Clinic in 1992, the largest group of nerve palsies was due to undetermined cause and most frequently affected nerve was sixth nerve. VI nerve is more affected maybe because of its long intracranial course with bends.[10] In this study, nonspecific neuritis forms the major cause of sixth nerve palsy.

Gender Distribution

In this study, there is slight preponderance of male patient (57.7%) when compared with series by Rush and Richards, Jones and Younge in (1992)[10] where it was 52% and 54%, respectively. It may be due to early approach of male patient for treatment and hormonal protection in females.

Presenting Symptoms

In this study, diplopia forms the commonest presenting symptom in 64 of 90 patients. A study by Kubatko- Zielinska et al in 1995, diplopia was the presenting symptom in 90% of sixth nerve palsies. In this study, diabetes mellitus is the commonest general systemic disorder associated with sixth cranial nerve palsy (13.3%), next is systemic hypertension (11%). In this study, the incidence of diabetes was less compared to nonspecific causes. Sixth nerve palsy due to raised intracranial tension is a non-localising sign. Trauma is also common in younger age groups due to increased risk of automobile accidents in these age groups.

Laterality

In this study, left eye was affected more (46.4%) than the right eye (44.4%) with 8 cases (8.88%) of bilateral involvement. According to the study conducted by Berlit P. et al, it was frequent on left (52%) with 10% bilateral involvement.[11] According to the study of Keane JR, this was almost equal.

Recovery

In this study, 65.5% recovered fully in 3-6 months, 22.2%[12] recovered partially and no recovery in 8.88%.[13] Study conducted by King A.J. et al, it was (78.4%). In this study, patients who did not recover had serious problems like tumour (or) trauma.

CONCLUSION

From this study of 90 patients of isolated infranuclear sixth cranial nerve palsies, it is concluded that;

1. Sixth nerve palsies were widely distributed in all age groups. Maximum incidence seen in 4th and 5th decades.
2. Commonest presenting symptoms were diplopia and headache.
3. In this study, males were more commonly affected than females (57.7%).
4. Left eye was more frequently affected (46.6%). Both eye involvement in (8.88%).
5. Among the systemic diseases causing nerve palsies, diabetes mellitus is most common diseases followed by hypertension.
6. Head injury ranging from trivial to severe was the main cause in young adults (mostly due to road traffic accidents) from 25 years to 40 years.
7. In 48 patients, no specific cause could be made out.
8. Nonspecific neuritis (53%) is most common cause of isolated sixth nerve palsy.
9. Patients with vascular lesions belonged to the older age group while patients with trauma belonged to the younger age group.
10. Noninvasive procedures like CT and MRI proved invaluable in the diagnosis of selected patients.
11. Patients due to nonspecific neuritis or due to microangiopathy lesions secondary to diabetes, hypertension recovered well within 3-5 months.
12. If the patients were followed for a longer period, it might be possible to find out specific aetiology in those patients classified as nonspecific neuritis.

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