

A Study of Etiological and Clinical Profile of Patients with LMN Cranial Nerve Palsy in a Tertiary Care Center at Thanjavur Medical College and Hospital

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ABSTRACT

Introduction: Neurological presentation with isolated/multiple cranial nerve palsy is common and its different causes incorporate infection, autoimmune, neoplastic, and inflammatory pathologies. The etiological range may rely on geographical areas. We attempted this study to investigate the clinical range and etiological profile of numerous cranial nerve palsy.

Material and methods: This planned observational study was led from January 2020 to January 2021. All the patients with cranial nerve palsy coming to the neurology OPD were taken for examinations. Essential targets were to characterize anatomical disorder/cranial nerve combinations and to set up etiology. The primary goals were to examine related components. Patients with neuromuscular junction disorder, anterior horn cell disease, myopathies, first and second cranial nerve dysfunction were excluded from the study. All patients went through an organized convention of clinical assessment, examinations, and few special examinations as per clinical protocol for analysis.

Results: Cavernous sinus was the commonest anatomical condition of different cranial nerve paralyzes and tuberculous disease was the commonest cause in this investigation.

Conclusion: 7th cranial nerve was the common isolated nerve involved with idiopathic etiology, diabetes was the most common cause overall found with third nerve involvement.

Keywords: Cavernous Sinus, Autoimmune, Neoplasm, Neuromuscular Junction, Anterior Horn Cell, Myopathy

INTRODUCTION

Isolated single/more than one LMN cranial neuropathies or disorder is a commonly encountered medical problem. The assessment of these patients is often overwhelming due to an extensive range of etiologies in addition to the capability for devastating neurologic consequences. Dysfunction of the cranial nerves can arise because of the lesion anywhere of their route from the intrinsic brainstem to their peripheral courses.¹

The afferent and efferent connections of the cranial nerves traverse through the meninges, subarachnoid space, bony structures of the skull, and superficial smooth tissues. The cranial nerve nuclei lie within the brain stem, as a result, the intra-axial pathologic system may additionally present, to begin with, the most effective cranial nerve disorder too. Therefore, many such pathologic approaches are manifested by using cranial nerve disorder.² There can be involvement of homologous nerves on the two aspects (i.e., bilateral

facial palsy) or one-of-a-kind nerves on the identical or contra-lateral aspect. In some conditions, a set of nerves is involved in a discrete anatomic vicinity constituting distinct anatomical syndrome.

Maximum of the literature regarding etiologies of single/more than one cranial neuropathies include case reviews or case series. The biggest stated retrospective collection by way of Keane had 979 instances, collected over 12 months' period.³ There had been diverse locations and reasons for cranial nerve involvement and Tumors were the most common reason, however, an extensive proportion remained idiopathic.³ vast and sequential involvements of cranial nerves point in the direction of the opportunity of malignant infiltration of meninges, however, confirmation of diagnosis might not be feasible without biopsy or earlier than post-mortem.⁴

In the Indian subcontinent, where infectious diseases are predominant, tuberculous meningitis is an important motive of cranial nerve palsies that is seen in nearly one-third of cases. The presence of cranial neuropathy is also associated with poor final results.⁵

Considering that there may be a paucity of Indian studies at the etiological spectrum of LMN cranial nerve palsy, we determined to adopt this observation with the purpose to evaluate clinical spectrum and causes of LMN cranial nerve palsies in tertiary healthcare institutions of India.

MATERIAL AND METHODS

Cross-sectional observational study was done on in-Patients of Neurology Department at Government Thanjavur Medical College and Hospital

Study subjects: Patients who are Attending Neurology opd with Symptoms and Signs of Cranial Neuropathies will be

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taken as Subjects

Inclusion criteria: All the consecutive patients of single/multiple lower motor neuron cranial palsies presenting to the neurology department were included in the studies.

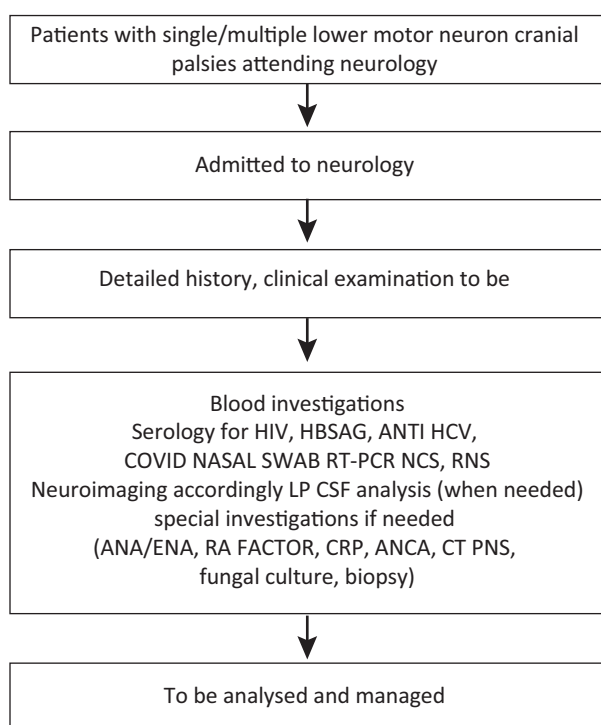
A. Exclusion criteria

First and Second Cranial Nerve Involvement, NMJ Disorders, And Muscle Disorders are Excluded.

Sample size: For observational studies, the sample size is justified.

B. Period of Study: January 2020 to January 2021

METHOD



C. Parameter analyzed: Age, sex, onset, duration, progression, side of involvement, number of cranial nerves involved, blood routine investigations, Diabetic status, Hypertension status, Nerve conduction study, MRI imaging

STATISTICAL ANALYSIS

Chi-square test – to compare the frequency/proportions between the groups with sample

>30. Pearson and spearman's correlation test – to find the strength of association between two parameters of the parametric and non-parametric distribution, respectively.

RESULTS

A. General results

Sex, Age Wise And Cranial Nerve Distribution:

Overall, out of 80 patients, 72% were males(58), 28% were females (22); the Most common gender population were males (graph-1).

Most common age group affected were 40-60 years of age of 35 numbers, followed by 20-40 years of 22 numbers, followed by 10-20 years of age of 16 numbers, followed by

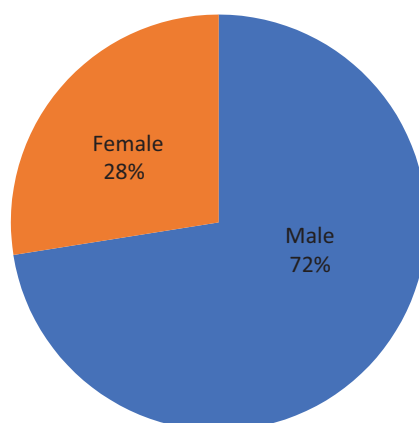
60-80 years of age of 7 numbers (graph-2).

Most common pattern of involvement was the single cranial nerve of 62% (50); followed by multiple cranial nerves of more than two 33% (26); followed by two cranial nerves 5% (4) (graph-3).

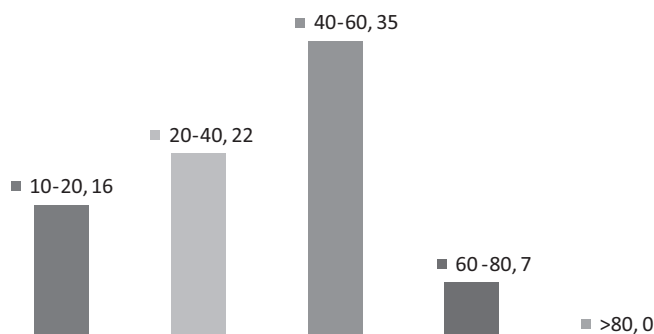
Most common cranial nerve involved was 7th of 58%(46); followed 3rd of 36% (28); 6th of 30% (24); 4th and 5th together of 20% each (16); followed by 10th of 12% (9); 9th of 10%(8); 8th of 6%(5); 11th of 5%(4); 12th of 1% (2) (graph-4).

Most common localization was extra-axial of 85% (63); followed by intra axial of 15% (11) (graph-5).

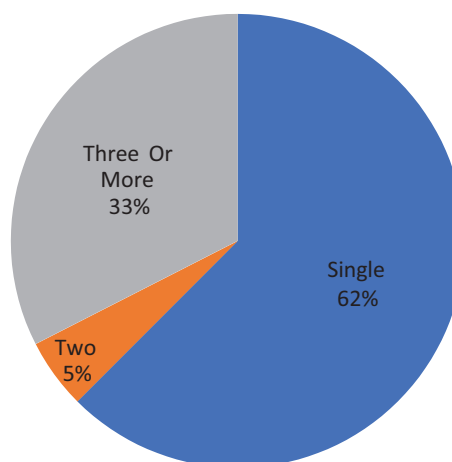
Most common etiology was idiopathic with 30% (24); followed by diabetes with its multifactorial mechanisms 21% (17); followed by ischemia 11% (9); followed by tumor



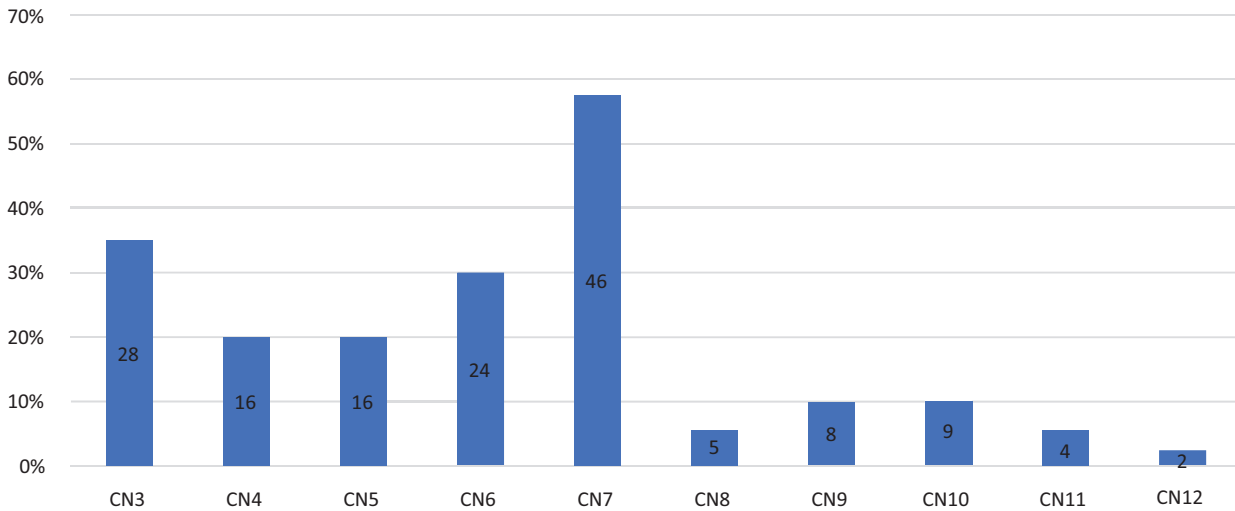
Graph-1: Sex distribution



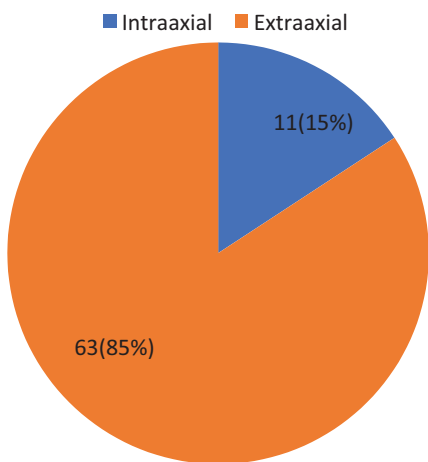
Graph-2: Age wise distribution



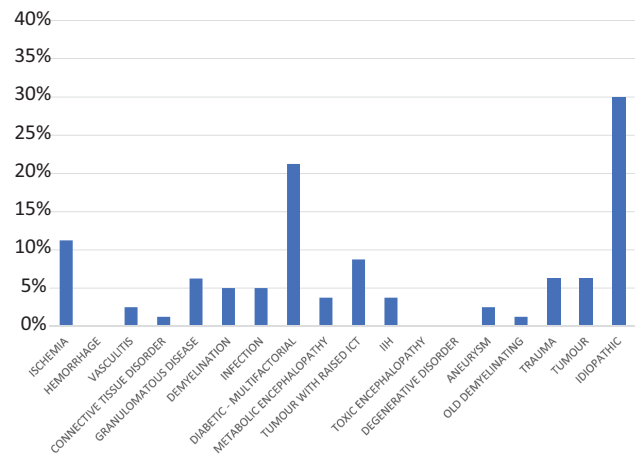
Graph-3: Number of cranial nerves involved.



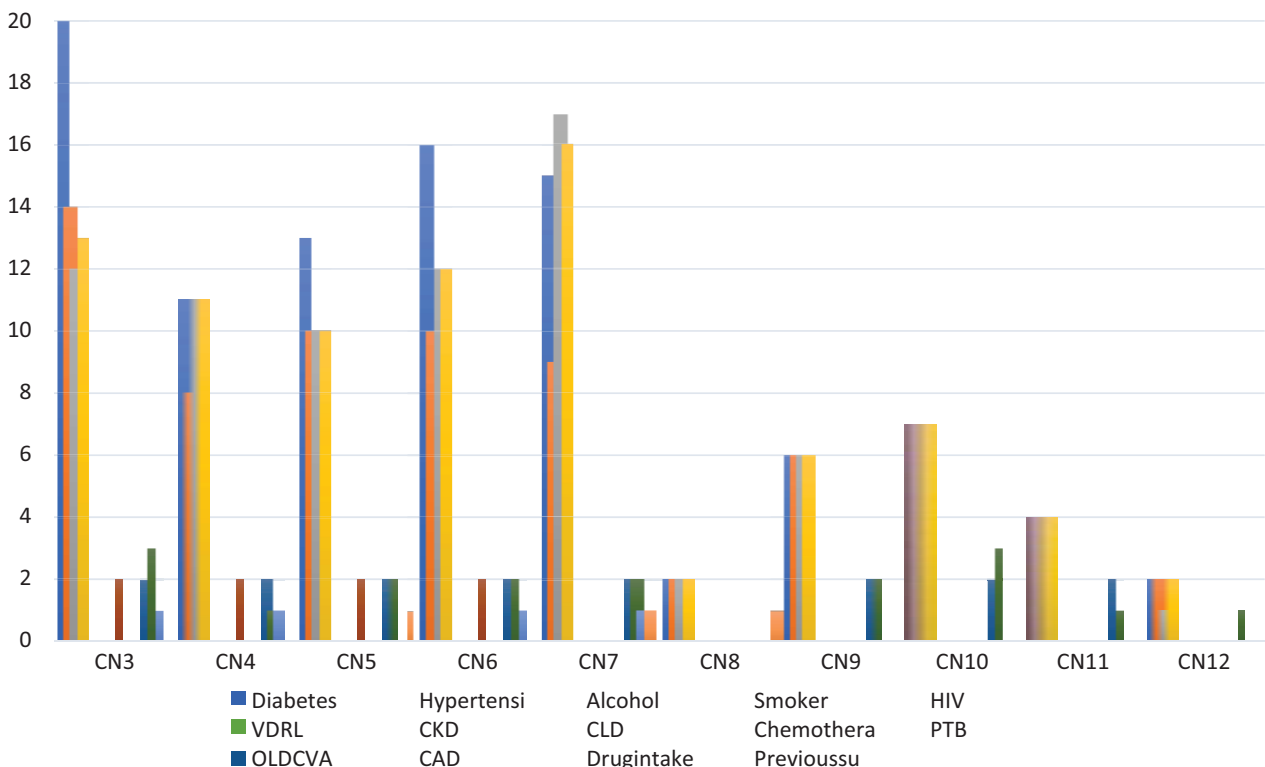
Graph-4: Cranial Nerve Distribution:



Graph-5: Intra Axial / Extra Axial



Graph-6: Most Common Etiology



Graph-7: Risk Factors

	Diabetes	Hypertension	Alcohol	Smoker	HIV	VDRL	CKD	CLD	Chemotherapy	PTB	Oldeva	CAD	Drugintake	Previous
CN3	20	14	12	13	0	0	0	2	0	0	2	3	1	0
CN4	11	8	11	11	0	0	0	2	0	0	2	1	1	0
CN5	13	10	10	10	0	0	0	2	0	0	2	2	0	1
CN6	16	10	12	12	0	0	0	2	0	0	2	2	1	0
CN7	15	9	17	16	0	0	0	0	0	0	2	2	1	1
CN8	2	2	2	2	0	0	0	0	0	0	0	0	0	1
CN9	6	6	6	6	0	0	0	0	0	0	2	2	0	0
CN10	7	7	7	7	0	0	0	0	0	0	2	3	0	0
CN11	4	4	4	4	0	0	0	0	0	0	2	1	0	0
CN12	2	2	1	2	0	0	0	0	0	0	0	1	0	0

Table-1:

CN	1-20	21-40	41-60	61-80	Grand Total
CN 3	2	7	15	4	28
CN 4	2	2	9	3	16
CN 5	1	2	10	3	16
CN 6	4	3	14	3	24
CN 7	15	16	13	2	46
CN 8	1	2	2	-	5
CN 9	1	1	3	3	8
CN 10	1	1	4	3	9
CN 11	-	-	1	3	4
CN 12	-	-	-	2	2

Table-2: Age Group Distribution

with raised ict of 9% (7); trauma, tumor without raised ict, granulomatous diseases with 7% of 5 numbers each; followed by demyelination, infection of 6% (4); followed by metabolic encephalopathy, IIH of 5% (3); followed by vasculitis, aneurysm of 4% (2); followed by connective tissue disorder of 2% (1) (graph-6).

Overall, the most common age group distribution was around 41-60 years of age; except in cn 7 where 21-49 years were most commonly affected; followed by most common age group distribution was 21-40 years; exception in cranial nerve 7 where 1-20 years were the most common group; followed by 41-60 years of age. overall 61-80 years were next in order followed by 1- 20 years (table-2). Males were most commonly affected in all the cranial nerves.

Among the number of nerves involved, 3rd, 6th, 8th, 9th, 10th cranial nerve was most commonly presented in multiple combinations followed by single. Cranial nerve 4th, 5th, 11th, presented only in multiple combinations pattern, 12th both in single as well as multiple combo pattern. whereas, 7th cranial nerve was mostly presented in isolated fashion followed by multiple combination pattern (table-3).

In the 3rd cranial nerve, the most common pathology was due to diabetes; followed by a cavernous sinus infection and tumor with raised ict, followed by Wernicke encephalopathy;

CN	Single/two/multiple	Total
CN 3	Multiple	16
	Single	11
	Two	1
	Total	28
CN 4	Multiple	16
	Total	16
CN 5	Multiple	16
	Total	16
CN 6	Multiple	19
	Single	4
	Two	1
	Total	24
CN 7	Multiple	13
	Single	32
	Two	1
CN 8	Total	46
	Multiple	4
	Two	1
CN 9	Total	5
	Multiple	7
	Two	1
CN 10	Total	8
	Multiple	7
	Single	1
CN 11	Two	1
	Total	9
	Multiple	4
CN 12	Total	4
	Multiple	1
	Single	1
	Total	2

Table-3: Number of Nerves Involved

then comes trauma, aneurysm, iih (table-4).

In the 4th cranial nerve; the most common pathology was cavernous sinus infection followed by tumor with raised ict;

CN	Etiology	Total
CN 3	Aneurysm	2
	IIH	2
	Infection	4
	Ischemia-CVA	1
	Metabolic encephalopathy	3
	Multifactorial-diabetes	8
	Old demyelination	1
	Trauma	2
	Tumour	1
	Tumour with raised ICT	4
	Total	28
CN 4	Aneurysm	1
	IIH	2
	Infection	4
	Metabolic encephalopathy	3
	Multifactorial-diabetes	1
	Tumour	1
	Tumour with raised ICT	4
	Total	16
CN 5	Granulomatous disorder/ vasculitis	2
	Infection	4
	Ischemia-CVA	3
	Metabolic encephalopathy	1
	Multifactorial-diabetes	1
	Tumour	3
	Tumour with raised ICT	2
	Total	16
CN 6	Aneurysm	1
	Granulomatous disorder/ vasculitis	2
	Idiopathic	1
	IIH	3
	Infection	4
	Metabolic encephalopathy	3
	Multifactorial-diabetes	4
	Tumour	1
	Tumour with raised ict	5
		Total
CN 8	Ischemia-cva	1
	Old demyelination	1
	Tumour	2
	Tumour with raised ICT	1
	Total	5
CN 9	Ischemia-cva	4
	Tumour	1
	Tumour with raised ICT	3
	Total	8
CN 10	Ischemia-cva	4
	Tumour	2
	Tumour with raised ICT	3
	Total	9
CN 11	Ischemia-CVA	1
	Tumour	1
	Tumour with raised ICT	2
	Total	4
CN 12	Ischemia-CVA	1
	Tumour with raised ICT	1
	Total	2

Table-4: Etiology

CN	Intraaxial/Extraaxial	Total
CN 3	Extraaxial	23
	Intraaxial	5
	Total	28
CN 4	Extraaxial	13
	Intraaxial	3
	Total	16
CN 5	Extraaxial	12
	Intraaxial	4
	Total	16
CN 6	Extraaxial	21
	Intraaxial	3
	Total	24
CN 7	Extraaxial	44
	Intraaxial	2
	Total	46
CN 8	Extraaxial	3
	Intraaxial	2
	Total	5
CN 9	Extraaxial	4
	Intraaxial	4
	Total	8
CN 10	Extraaxial	5
	Intraaxial	4
	Total	9
CN 11	Extraaxial	3
	Intraaxial	1
	Total	4
CN 12	Extraaxial	1
	Intraaxial	1
	Total	2

Table-5: Intra axial/ extra axial

followed by metabolic encephalopathy, then comes diabetes; aneurysm.

In the 5th cranial nerve- the most common pathology was cavernous sinus infection; followed by post circulation stroke; followed by tumor with raised ict

In the 6th cranial nerve; the most common pathology was tumor with raised ict, cavernous sinus infection; diabetes, followed by iih, metabolic encephalopathy, followed by vasculitis, aneurysm.

In the 7th cranial nerve, the most common pathology was idiopathic; followed by diabetes, followed by trauma, tumor, followed by iih, post circulation strokes, and vasculitis

In the 8th cranial nerve; the most common pathology was tumor-cp angle; followed by stroke and demyelination.

In the 9th, 10th cranial nerve, the most common pathology was due to ischemia – posterior circulation strokes, followed by tumor.

In the 11th cranial nerve, the most common pathology was tumor followed by ischemia; In the 12th cranial nerve, both ischemia and tumor were equally involved.

Most Common Localisation For All The Cranial Nerves Was Extraaxial Lesion Followed By Intraaxial; Where As In 9th And 12th Cranial Nerves, there were equal distribution of pathology (table-5).

DISCUSSION

Maximum of the preceding literature concerning single/more than one cranial nerve palsies is either from the western nations or is in the form of case collection and case reviews.^{3,8} The etiological spectrum of more than one cranial nerve palsies is probably exclusive in a developing country like India.

We observed that the seventh cranial nerve is the isolated most common cranial nerve involved, followed by 3rd and 6th then coming 4th, fifth cranial nerves observed by others. Idiopathic- stylomastoid foramen, superior orbital fissure, cavernous sinus, orbital apex, the base of the skull have been the order of anatomical localization within the extra-axial involvement of cranial nerves. Posterior circulation strokes followed by brainstem demyelination have been the maximum commonplace causes and localization within the intra axial involvement of cranial nerves. A number of the multiple cranial nerve combination involvement, the biggest collection of more than one cranial nerve palsies was published with the aid of Keane.³ within Keane's series, the maximum common cranial nerve involved was also the abducens (VI) and the most common site become cavernous sinus. but the study through Keane become retrospective and included patients with neuromuscular junction disorders, brainstem syndromes, and cranial nerve palsies as a part of generalized neuropathic procedures like Guillain-Barre syndrome.³

Multifactorial reason by way of diabetes was the most common etiology in our study, in contrast to western literature where tumor became reported to be the maximum common reason for multiple cranial neuropathies. This becomes expected, as the prevalence of diabetes is lots better in growing countries like India, in comparison to the evolved ones, followed by Hypertension, Alcoholism and Smoking, Ischemic Etiology for all the Cranial Nerves. Similar findings had been highlighted via Bhatkar and co-workers.⁹ Tuberculous and fungal infections were the maximum not unusual infections encountered in our study.

Tuberculous meningitis is a not unusual purpose of a couple of cranial nerve palsy in India. The examination by way of Sharma and co-employees observed that cranial nerve involvement became found in 38% instances of tuberculous meningitis, with about 10% having more than one cranial nerve involvement.⁵ The fungal infections encountered in our examination generally offered with orbital apex, superior fissure, and cavernous syndromes; mucormycosis became the most common fungal infection determined in our study. Bhatkar et al. stated 24.6% cases of fungal contamination, aspergillosis being the most common cause.⁹ Bilateral involvement and speedy onset vision loss have been seen more in fungal infection compared to other aetiologies, additionally proven by way of Chua et al.¹⁰ Imaging findings in patients with fungal infection showed para-nasal sinusitis, multiple focal regions of bony destruction, heterogeneous signal intensity and contrast enhancement of orbit, nasal sinuses, and cavernous sinus. several studies were cited in

the literature concerning radiological findings in CNS fungal infections.^{11,12}

Tolosa Hunt syndrome, diagnosed by way of ICHD-III standards⁷ was seen in eleven% of our cases. This frequency became decrease compared to the previous case series.^{3,9} Tolosa Hunt syndrome is an essential cause of painful ophthalmoplegia, however, the etiology remained unknown.¹³ In our study, all six patients had MRI abnormalities, like those mentioned in advance^{14,15} strong gadolinium enhancement of cavernous sinus wall with or without focal narrowing of ICA inside the cavernous sinus. Two out of six sufferers had kind 2 diabetes mellitus. Such co-lifestyles have been mentioned in current case reviews.¹⁶

Metastasis observed with the aid of schwannoma was the maximum not unusual tumors (benign/malignant) main to more than one cranial neuropathies in our study. in Keane's series,³ schwannoma become discovered to be the most common tumor, whilst inside the cavernous sinus syndrome series of Bhatkar et al.,⁹ Metastasis changed into more common than the primary tumor.

For some of the lower cranial nerves, the most common combination becomes the IX, X, and XII cranial nerves. Out of the six cases, 3 had been of tumors (one case every of pontine glioma, jugular schwannoma, and nerve sheath tumor extending from craniovertebral junction to C2 vertebra). Common reasons for lower cranial nerve palsies include vascular, stressful, neoplastic, iatrogenic, and infective.¹⁷ Additionally, trauma, vasculitis, which is a commonplace group of problems supplying with multiple cranial neuropathies, was also encountered in our study. A bigger study would substantiate all the various companies of issues that can be pronounced in literature.

CONCLUSION

Therefore, to finish, amongst more than one cranial neuropathies, cavernous sinus syndrome and orbital apex syndrome have been the most common anatomical pattern of involvement, and infections which include tuberculous and fungal were the most common reasons for cranial nerve palsy in our collection. Bigger studies with long-term follow-up are needed in India to evaluate the causal association. despite exhaustive workup, an etiological prognosis can't be reached in each case.¹⁸⁻²⁰

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