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Original Research Article

Clinical Profile of Isolated Lateral Rectus Palsy among Adult Population

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Abstract

Background: The Abducens nerve/sixth cranial nerve, is responsible for ipsilateral abduction of the eye. The sixth cranial nerve is commonly affected because of its long intracranial course. Dysfunction of the abducens nerve can occur at any point of its transit from the pons to the lateral rectus muscle, resulting in sixth nerve palsy.

Objectives: To analyze clinical profile of isolated lateral rectus palsy among adult population and to assess the recovery pattern in isolated lateral rectus palsy among adult population.

Methodology: All adult patients diagnosed with isolated lateral rectus palsy attending Regional Institute of Ophthalmology, Department of Neuromedicine, Neurosurgery and Internal Medicine, Government Medical College, Thiruvananthapuram were included in the study after obtaining informed consent from them. A thorough clinical examination of eye including examination for head posture like face turn or head tilt or chin position change noted. Extraocular mobility, nystagmus, position of the eye and presence and amount of deviation in all cardinal positions of gaze were noted and angle of deviation recorded in prism diopter with each eye fixing; primary and secondary angle of deviation. The range and restrictions of eye movements were recorded and the under action and over action were graded 1 to 4. Neuroimaging CT scan/MRI was done in relevant cases.

Results: Twenty-one patients were evaluated during the study period. Mean age was found to be 49 years of which 57% were females and 43% were males. Microvascular ischemia (63%) was the commonest etiology, of which diabetes (43%) was the major comorbidity followed by hypertension (19%). Other causes found were trauma (14%), tuberculosis (9.5%), and tumors (9.5%) and cavernous sinus thrombosis (4.8%). 81% had full recovery after 6 months, 5% had partial recovery and 14% patients were lost for follow-up.

Conclusion: In our study the most common etiology was microvascular ischemia due to diabetes and hypertension. Isolated lateral rectus palsy usually has a benign course and majority has spontaneous recovery. It can be prevented to some extent by controlling the systemic risk factors.

Keywords: Isolated Lateral Rectus Palsy, Microvascular Ischemia, Diabetic Mononeuropathy.

Introduction

The Abducens nerve is purely a motor nerve, the nucleus of which is located in the dorsal pons, ventral to the floor of fourth ventricle and just lateral to medial longitudinal fasciculus. [1] The Abducens nerve has the second longest intracranial course. It supplies the lateral rectus, the primary action of which is abduction. The long intracranial course and proximity to major intracranial structures make it vulnerable to damage caused by ischemia, trauma, tumours, infections, inflammations etc. Isolated lateral rectus palsy can result in sudden onset of intractable diplopia. Diplopia is an exasperating symptom for the patient because of which he/she may not be able to perform even their routine activities during the initial phases. Later on, the patient adopts abnormal head postures to avoid diplopia. Another symptom with which the patient can present is acute onset of squinting. Abducent nerve palsy can occur either isolated or in association with other cranial nerves due to its closeness to these nerves especially at the brainstem, petrous apex, cavernous sinus and the orbit. Isolated lateral rectus palsy is the most common oculomotor palsy. [2,3] It usually has a benign course which may revert to normal within a few months. However, a careful evaluation should be done to identify the cause as it can be the initial presentation of a severe illness. [4] Though there are many studies related to isolated and multiple cranial nerve palsies, only very few studies are there regarding the clinical profile of

isolated lateral rectus palsy. In this study we are analyzing the clinical profile of isolated lateral rectus palsy in adult population.

Objectives of the Study

Primary Objective: To analyze the clinical profile of isolated lateral rectus palsy in adult population.

Secondary Objective: To analyze the recovery pattern of isolated lateral rectus palsy in adult population.

Materials and Methods

Methodology

A hospital based prospective observational study was conducted. All patients having isolated lateral rectus palsy attending Out-patient departments Ophthalmology, Internal medicine, Neurology and Neurosurgery specialities of Government Medical College, Thiruvananthapuram, who gave consent to participate in the study were included. The duration of the study was one year (2020-2021). Demographic data was collected. A detailed history was taken. A thorough general and systemic evaluation were done. A detailed ocular examination was done including Best corrected visual acuity, colour vision testing, strabismus evaluation, pupillary reactions and examination of anterior and posterior segments. Ancillary investigations included Prism bar cover test for primary and secondary deviations and deviation in all cardinal gazes. The range and restrictions of eye movements were recorded. Diplopia charting with Red green goggles, Hess charting, Field test were done in patients who are cooperative. Neuroimaging CT scan /MRI was done in all relevant cases. These patients were followed up for six months.

Sample Size

$$N = \frac{(Z\alpha)^2 PQ}{d^2}$$

The sample size calculated was 36.98 approximated to 37. Since our study was conducted during the Covid pandemic (2020-2021), only 21 cases could be included in the study.

Statistical Analysis: The data was entered in Microsoft excel sheet and statistical analysis was done using the statistical software SPSS version 20.

Results

A total of 21 patients with isolated lateral rectus palsy were included in the study. The actual sample size calculated could not be attained in our study due to Covid 19 restrictions.

The following table shows the distribution of age group of the patients (Table-1)

Table 1: Age Distribution of the Patients

Age Group (in Years)	Patients	%
21 -30	3	14.3
31 -40	2	9.5
41 -50	6	28.6
51 -60	4	19.0
61 -70	5	23.8
71 -80	1	4.8

In our study 28.6% patients belonged to the age group of 41 – 50 years with a mean age of 49.48 with a standard deviation of 14.24.23.8% were from the age group 61- 70 years and 19% in the age group 51 – 60 years. 14.3% were between 20 – 30 years and patients between 31 – 40 years contributing to 9.5%. There was only one patient from the age group 71 – 80 years (4.8 %).

Out of 21 patients 9 (43%) were males and 12 (57%) were females. (Table-2, Figure-1)

Table 2: Showing the gender distribution.

Sex	No: of patients	%
Male	9	43
Female	12	57
Total	**21**	

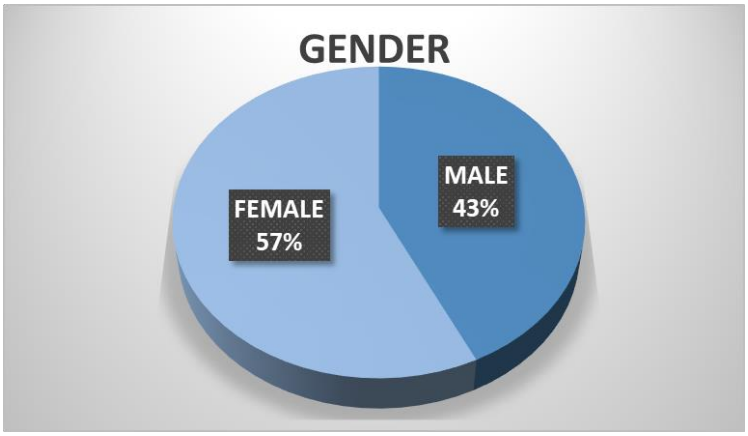

Figure 1: Gender distribution

19 patients (91%)had unilateral lateral rectus palsy out of which 62% had involvement of the right eye; 29% had involvement of the left eye. 2 patients (9%) had bilateral palsy (Table-3, Figure -2)

Table 3

Right eye	Left eye	Both eyes	Total
13	6	2	21

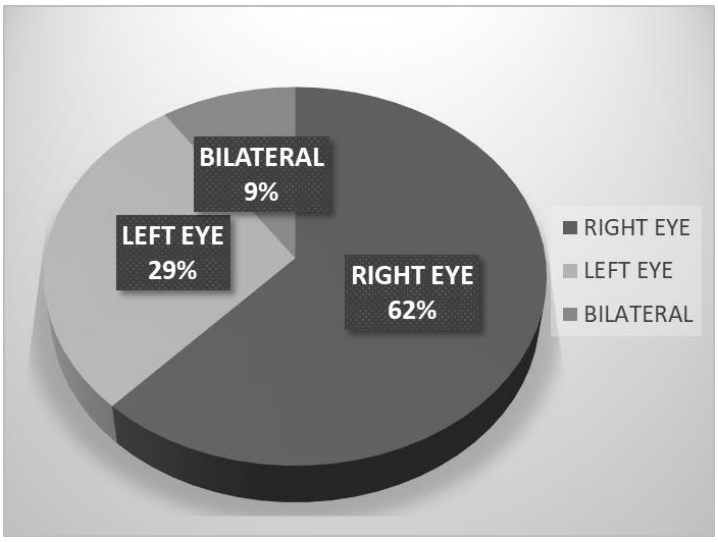

Figure 2.

Regarding the aetiology, majority of the patients (42.9%) were found to have diabetic mononeuropathy, followed by hypertension which constituted about 19% of the patients. 14.3% (3 patients) of the nerve palsy was due to traumatic brain injury. 9.5% patients had intracranial space occupying lesions and 9.5% with tuberculosis also presented as isolated lateral rectus palsy. One patient (4.8%) with fungal sinusitis found to have isolated lateral rectus palsy was diagnosed with cavernous sinus thrombosis.(Table-4, Figure-3).

Table 4: Showing the aetiology of lateral rectus palsy

Aetiology	Frequency	Percentage
Diabetes Mellitus	9	42.9%
Hypertension	4	19%
Tuberculosis	2	9.5%
Trauma	3	14.3%
Tumour	2	9.5%
Cavernous Sinus Thrombosis	1	4.8%

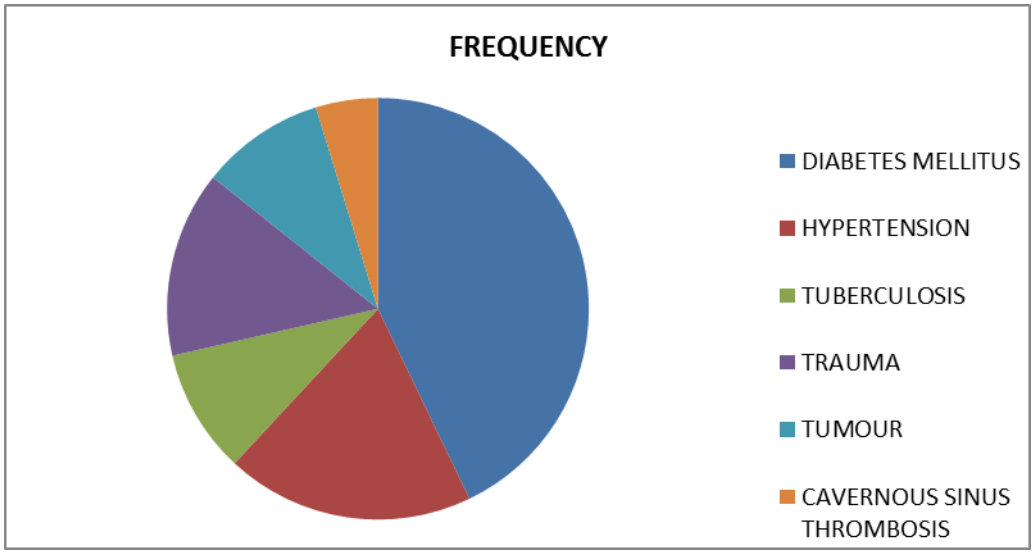

Figure 3.

The primary deviation was around 30 PD in 6 eyes (28.6 %) with lateral rectus palsy. 25 PD in 5 eyes (23.8 %), 35 PD in 4 eyes (19 %). 14.3% (3 each) had 20 PD and 40 PD primary deviation. Table-5, Figure-4)

Table 5. Deviation in Prism dioptres

Primary deviation in PD	Frequency	%
20	3	14.3
25	5	23.8
30	6	28.6
35	4	19
40	3	14.3

17 eyes (80.9 %) with isolated sixth cranial palsy recovered spontaneously within a period of six months from the onset of their symptoms. One patient (4.8 %) had residual muscle paresis at the end of six months. 3 eyes (14.3 %) were lost to follow up.(Table-6, Figure-5)

Table 6. Pattern of recovery

Pattern of recovery	Frequency	Percent
Recovered	17	80.9
Not Recovered	1	4.8
Lost to follow up	3	14.3

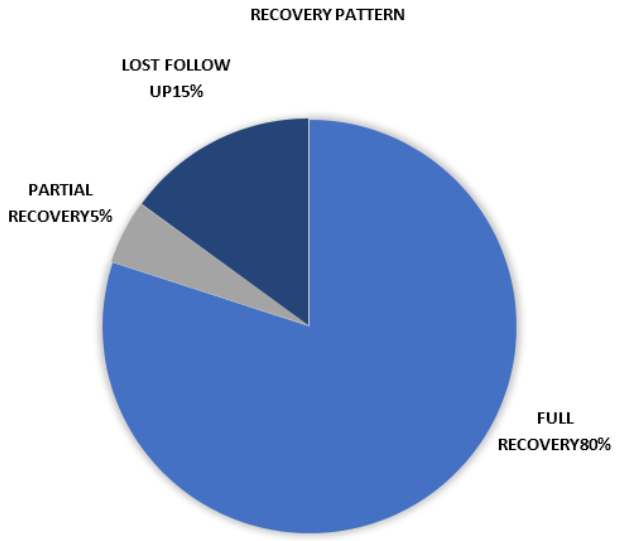

Figure 5.

Discussion

This study about the clinical profile of isolated lateral rectus palsy was done over a period of one year during the covid pandemic(2020-2021).A total

of 21 patients were included in the study. Out of 21 patients 9 (43%) were males and 12 (57%) were females with a slight female preponderance. In our study of 21 adult patients with isolated lateral rectus palsy, the maximum number of patients belonged to the age group of 41 – 50 years with a mean age of 49.48 with a standard deviation of 14.24 followed by the age group 61 – 70 years. In a retrospective, population-based case series study conducted by Sanjay V. Patel et al found that higher frequency of palsy in 7th decade of life. [5] In our study, 62% of patients had disease in right eye, in 29% left eye was involved. There were 2 patients (9%) with bilateral lateral rectus palsy. The most common etiology of sixth nerve palsy in our study group was microvascular disease (61.9%), which was diagnosed on the basis of a history of diabetes or hypertension and the absence of other underlying cause, and this correlation is highly significant as tested by Pearson Chi Square test has a p value of < 0.001 and it is consistent with most of the previous studies. Of vascular causes, diabetic mononeuropathy was the most common aetiology (43%), followed by hypertension (19%). In the study by Erdal Y et al the most common etiology was microvascular, of which incidence of diabetes mellitus was significantly higher. [6] Tamhankar et al found that microvascular ischemia was the predominant cause of isolated third, fourth and sixth nerve palsies. [7] Traumatic brain injury constituted around 14 % out of which one was bilateral l.2 patients (9.5%) had intracranial neoplasms, metastatic multiple myeloma and clival metastasis in lung carcinoma and the latter presented with bilateral lateral rectus palsy. One patient who presented with isolated lateral rectus palsy was found to have cavernous sinus thrombosis following fungal sinusitis. [8]

Out of 21 patients, 17 patients had complete recovery (80%) by 6 months, 1 had partial recovery (5%) 3 people had lost to follow up (15%). Most of the vascular, infectious and inflammatory aetiologies had complete recovery by 6 months. Around 85% eyes with a primary deviation of < 40 PD recovered at the end of 6 months followup. Thus, the degree of insult at presentation in the form of primary deviation is a very good predictor of the pattern of recovery from sixth nerve palsy ($p<0.001$). According to Christopher Elder et al, complete recovery rate over 6 months for isolated abducens palsy has been reported to be as high as 73 %, with 88 % of palsies completely recovering from trauma, 62 % from vascular, and 40 % from neoplastic or aneurysmal causes. [9] In the study by King AJ et al 78.4% of patients experienced spontaneous recovery of their palsy, 36.6% recovering by 8 weeks and 73.7% by 24 weeks. [10] A similar study by Shin Yeop et al showed a recovery rate of 86% in isolated sixth nerve palsy. [11]

In this study all cases with microvascular etiology showed either complete or partial recovery in 6 months, but the recovery is poor if the lesion is due to trauma especially head injuries. There was no discrepancy if the palsy was total or partial and age and sex had no correlation with the recovery pattern.

Limitation

The limitation of our study is the relatively lesser number of cases as it was conducted during the Covid pandemic when there were strict regulations.

Conclusion

In this study the maximum number of patients belonged to the age group of 41 – 50 years with a mean age of 49.48. Most common cause was found to be of microvascular etiology of which diabetic mononeuropathy was the commonest. There was no significant influence of the duration or severity of diabetes or hypertension on the clinical course of the disease. 80% of the patients had complete recovery spontaneously by 6 months. Most of the vascular, infectious and inflammatory aetiologies had complete recovery by 6 months. The age at presentation, and sex has no influence on the speed of recovery in patients with isolated sixth nerve palsy. However, the primary deviation of <40 PD is a strong predictor of the recovery pattern. Considering the relatively younger age group of the patients who are affected in this study, control of comorbidities like diabetes and hypertension may help in preventing such vascular insults in later life to some extent.

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