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A Study of Clinical and Neuroradiological Profile of Inflammatory Optic Neuropathy in a Tertiary Care Center

Gurugubelli Yamuna Rani[1], N. V. Sundarachary[2]

[1]Department of Neurology, Guntur Medical College, Andhra Pradesh, India
Email: *yammi2357[at]gmail.com*

[2]Department of Neurology, Guntur Medical College, Andhra Pradesh, India

Abstract: ***Background**: Optic neuritis is a common cause of acute onset of diminution of vision in patients presenting to the hospital. It is frequently associated with multifocal pathology such as multiple sclerosis in Western countries while more association is seen with neuromyelitisoptica (NMO) or myelitis in Asian countries. **Aims and Objectives**: To assess the clinical, neuro-radiological profile of patients with inflammatory optic neuropathy.To assess the short-term outcome of patients with inflammatory optic neuropathy. **Materials and Methods**: A prospective observational study done on 80 subjects diagnosed as inflammatory optic neuropathy. Other optic neuropathies, such as ischemic, infective, traumatic, toxic, hereditary, and compressive, were excluded from the study. All patients were treated as per treatment guidelines i.e., ONTT regimen which consisted of Injection of Methylprednisolone 1g for 3 days followed by oral prednisolone 1mg/kg body weight per day for 11 days and then tapered. Follow-ups were done at 3 months. Variables recorded include visual acuity testing, evaluation of pupils, fundus, color vision, visual field, and VEP. **Results and conclusion**: The majority of patients of optic neuritis are female with the majority belonging to middle age group (21-40 years) Diminution of vision is the most common complaint and in the majority of patients, and this is associated with periocularpain. Prolonged P100 latency is the most common abnormality seen on VEP which suggests demyelination in pathology. Demyelination in brain is seen on imaging of optic neuritis even in asymptomatic cases and MRI brain is needed in these patients for appropriate diagnosis and management. There was slightly increased frequency of retrobulbarneuritis which was different compared to other Indian studies.*

Keywords: Optic neuritis, prospective study, ONTT, multiple sclerosis

1. Introduction

The inflammatory condition of the optic nerve, of acute to subacute onset is referred to as optic neuritis (ON). It manifests as an abrupt loss of vision, which may be bilateral or unilateral and may or may not be accompanied by pain behind the eye more with ocular movements[1,2]. The majority of patients often manifest between the ages of 15 and 45[3,4]. Clinically, individuals have dyschromatopsia, relative afferent pupillary deficit, reduced perception of contrast, with impaired vision.

Although various viral, para-infectious, and post-vaccination causes as well as many autoimmune diseases like sarcoidosis and systemic lupus erythematosus (SLE) have been acknowledged as potential causes of ON, demyelinating diseases account for the majority of cases. These include multiple sclerosis (MS), neuromyelitisoptica (NMO), and myelin oligodendrocyte glycoprotein (MOG) related disease (MOGAD) in adult patients. Idiopathic conditions are the norm in instances[2,3]. Nevertheless, the most prevalent aetiology in the Western world is multiple sclerosis[4]. This research aimed to assess the clinical characteristics and visual outcomes of subjects with inflammatory optic neuropathy who were admitted to our department.

2. Observation and Results

91 eyes of 80 patients were included in this study which was conducted over a period of 18 months. The mean follow-up period was 3 months.

Table 1: Age Distribution

Age in years	Number of subjects	Percentage (%)
18-20	2	2.5
21-40	57	71.2
41-60	19	23.7
61-80	2	2.5
Total	80	100

Table 2: Sex Distribution

Sex	Number of subjects	Percentage (%)
Male	13	16.2
Female	67	83.7
Total	80	100

Table 3: Laterality

Laterality of involvement	Numberof subjects	Percentage (%)
Unilateral	69	78
Bilateral	11	12
Total	80	100

Table 4: Symptoms at presentation

Complaints	Number of subjects	Percentage (%)
Diminution of vision	80	100
Pain	51	56
Total	80	100

Table 5: Visual Acuity at presentation

Visual acuity	Total No. of Eyes	Percentage (%)
Better than 6/60	32	35.1
6/60 - HM+	46	50.5
PL+	11	12
PL-	2	2
Total	91	100

Table 6: Color vision at presentation

Color Vision	Number of eyes	Percentage (%)
Normal	15	16
Defective	56	61.5
Not possible to test	20	21.9
Total number of eyes	91	100

Table 7: Pupil at presentation

Pupil Reactivity	Number of eyes	Percentage (%)
RAPD	63	70
Sluggish	28	30
Total	91	100

Table 8: Visual field defects at presentation

Type of Field defect	Number of eyes	Percentage
Central/centrocaecalscotoma	31	34
Diffuse field constriction	18	19.7
Not possible	16	17.6
Other	6	6.5
normal	19	20.8
Total	91	100

Table 9: Fundus examination at presentation

Fundus examination	Number of eyes	Percentage (%)
Papillitis	35	38.46
Normal	54	59.34
Atrophy	2	2
Total	91	100

Table 10: VEP findings at presentation

VEP Findings	Number of eyes	Percentage (%)
P100 prolonged	87	95.6
Absent Wave form	4	4.3
Total	91	100

Table 11: MRI Brain Findings

MRI Brain	Number of subjects	Percentage(%)
Demyelinating	6	7.5
No demyelination	74	92.5
Total	80	100

Table 12: Visual Acuity at 3 months post treatment

Visual acuity	Total No. of eyes	Percentage (%)
Better than 6/60	88	97
6/60 - HM+	1	1
PL+	2	2
PL-	0	0
Total	91	100

Table 13: Color vision at 3 months post-treatment)

Color Vision	Number of eyes	Percentage (%)
Normal	59	64.83
Defective	30	32.9
Not possible to test	2	2
Total number of eyes	91	100

Table 14: Pupil at 3 months post-treatment

Pupil Reactivity	Number of eyes	Percentage (%)
RAPD	2	2
Sluggish	16	17.5
Normal	73	80.5
Total	91	100

Table 15: VEP at 3 months post treatment

VEP	Number of eyes	Percentage (%)
P100 Prolonged	30	32.9
Absent waveforms	0	0
Normal	61	67.1
Total	91	100

Table 16: CSF analysis

CSF analysis	Number of subjects	Percentage
Increased protein	41	45
CSF pleocytosis	14	15.3
Oligoclonal bands	3	3

3. Discussion

This is a hospital-based observational study. Idiopathic causes account for the vast majority of instances. Although demyelination is believed to be the most prevalent etiology in Western literature, the incidence of MS is reported to be low in India and the rest of Asia. Moreover, various studies from Southeast Asia have documented differences in the etiology, clinical presentation, and prognosis of ON compared to the Western population.

In this study, 80 patients were included after diagnosis on the basis of history, clinical examination and investigational workup. These patients underwent neuroimaging to detect intracranial and orbital pathology, VEP to detect electrophysiological profile, and lumbar puncture to check for demyelinating etiology. After the complete workup, patients were distributed in groups based on age, sex, symptoms, clinical signs and neuroimaging and electrophysiological study. Hemogram, total leucocyte count, differential count, ESR, MantouxandChest X-ray was obtained in each case and were normal.

Parameters of study:

Age: Eighty patients have been included in our study. 71.2% of patients were between age group of 21-40 years. Most common age group affected was 18-60years. Mean age was 34.87±9.2 years which was morecompared to the study of Saxena et al which showed mean age of 27.6±8.8 years(15-58 years) while the ONTT study showed the age group 18-46 years as the most common age group.

Sex: Total of 67 were females and 13 were males. There was female preponderance with female to male ratio of 5.1:1. This was higher than ONTT[14]Which showed female to male ratio of 3:1. Another study by Saxena[1] et alshowed female to male ratio of 2.2:1, Sreenivasuluetal study showed female to male ratio 1.3:1, Shatriah[3] et al study of Malaysia showed female to male ratio of 2.1:1 while Jain[4] et al showed the contrasting feature of male to female ratio 2:1.

Laterality: Unilateral involvement is common compared to bilateral involvement. In the present study, eleven subjects (12%) had bilateral eye involvement at presentation. It is less compared to 16%-35% reported in other studies conducted by Wong LC et al and Lim S A et al. In another series by Bradley and Whitty, only 7% of the eyes were involved simultaneously.

Etiology: CSF oligoclonal bands with suggestive imaging findings of Multiple sclerosis were detected in 3 subjects whereas Brain imaging suggestive of Multiple sclerosis was seen in another three subjects. Neuromyelitisoptica was detected in 6 subjects evidenced by serum aquaporin 4 antibodies positivity out of which one had a prior attack. 2 subjects were diagnosed as Chronic Relapsing Inflammatory Optic Neuritis which was a diagnosis of exclusionwith history of multiple recurrences and high steroid dependence. One subject was a known case of Systemic lupus erythematosus with ANA positivity on treatment. Rest of the cases were presumed to be isolated optic neuritis of either idiopathic origin or could be a part of clinically isolated spectrum of MS which needs further follow-up.

Symptomatology: The most common complaint was visual loss (100%), followed by ocular pain (56%) Overall, painless visual loss was there in 35 patients (44%). Pain on ocular movement was observed in varying percentages of patients in different studies like 92.2% in Saxena[1,2] et al and 31.7%. in Shatriah[3] I et al. The Optic Neuritis Treatment Trial reported 92% of patients experienced pain. 56% of the patients Studied by Wakakura[8] M et al in Japan reported ocular or periocular pain and more than 40% of patients in a Chinese study had symptoms of pain during the attack.

Visual acuity: In the present study, most of the eyes had very poor visual acuity at presentation. In 11 eyes (12%) visual acuity was reduced to perception of light and in 2% perception of light was absent. Our study revealed that 64.5% had visual acuity of 6/60 or worse. Studies by Saxena R showed 92 out of 99 eyes (93%) presenting with VA <20/40 and 37 eyes (37.3% of eyes) had VA <20/200. Jain IS[4]showed 51 (75%) eyes with visual acuity reduced to Counting finger less than 1 meter at the onset. while a study done by Shariah et al of Malaysia showed 73% had visual acuity of 6/60 or worse. C.sreenivasulu[13] et alstudy showed that 86% of patients had partial loss of vision while 14% had complete loss of vision. At 3 months follow up after treatment, recovery of acuity better than 6/60 was noted in 97% of subjects. This is comparable to ONTT which showed visual recovery in 90%.

Pupil Reactivity: Pupillary reactivity to light is abnormal in all patients at presentation. Relative afferent pupillary defect (RAPD) is seen in 70% of eyes and sluggish pupil in 30%. At 3 months post treatment, RAPD was detected in only 2% of cases and sluggish in 17.5%. At end of 3 months 80% had normal pupillary reflex.

Colour vision: All patients had a defective colour vision and contrast sensitivity at the time of presentation in the study by Foroozan[12], R et al. In our case 61.5% eyes had impaired colour vision and in the rest it could not be assessed due to poor vision. It improved to 32.9% pat 3 month follow up.

Visual field: In our study central / centrocecalscotoma is seen in 34%of patients**.**The most common finding on visual field observed by Shatriah et aIwas a paracentralscotoma. Wakakura[8] found centroceacal defect in 12.5% of patients while 37% showed a diffuse depression. Diffuse depression was documented as the highest by Lim[7] et al, Jain et al, Chang[11] YC. In our study, in patients in whom automated perimetry was possible a majority of patient showed a diffuse depression. However, automated perimetry could not be done in all cases due to poor vision, which is a limitation in our study.

Fundus examination: In present study 91 eyes were examined for fundus.35 eyes (38.4%)showed papillitis whereas 54 (59.34%) eyes showed normalfundus or retrobulbar neuritis and 2 eyes showed atrophy which was recurrent attack. Study done by Saxena[1,2] et al of AIIMS showed 53.5% patients had papillitis and 46.5% patient had normal fundus.Study of Shatriah[3] et al showed 65% patients had papillitis. Jain[4] et al study showed 55.8% of patients showed papillitis on fundus examination.In contrast toabove findings, C.Sreenivasulu[13] et alstudy showed 26.7% patient have papillitis,ONTT study showed 65% normal fundus orretrobulbar neuritis. After 3 months follow up, disc pallor is noted in subjects with papillitis than retrobulbar neuritis.

VEP Study: In this study VEP was done in 80patients. 87 eyes (95.6%) showedprolongedP100 latencies in VEP,12 eyes (4.8%) had associateddecreased amplitude, while 4 eyes(4%) had absent waveform. While a study done by C.Sreenivasulu[13] et al of Kurnool showed 65% of patients had prolonged P100 latencies, SuhaMihail Al Ejailatet al of UK showed 90% of patients had prolonged latencies on VEP study. In present study 23%patients had decrease amplitude which was comparable to 28% of patients with decreased amplitude in a study done by SuhaMihailAlEjailat et al of UK. P100 latencies prolongation improved at 3 months with persistent prolongation seen in only 32.9% eyes on follow-up.

MRI Brain and Orbit: In this study, 80 patientsunderwent MRI Brain and orbit including whole spine whenever necessary. Intracranialdemyelination was seen in6 patients while rest MRI brain showed no evidence of demyelination. This is very less compared tostudy done by Saxena[1,2] et al study showed 37.5% patient showed intracranial demyelination.C, Sreenivasulu et al of Kurnool showed 38% of periventricular white matter intensities. While SuhaMihail Al Ejailat et al of UK showed 28 percent of demyelinating lesions. MRI orbit showed abnormal with increased signal intensity of optic nerve or intracanalicular fluid rim gadolinium enhancement in all affected eyes in present study while a study done by Kuppersmith et al showed 95% MRI orbital abnormality. MRI brain revealed demyelinating changes in 6 subjects out of which only 3 subjects revealed positive oligoclonal bands in cerebrospinal fluid.Previous Indian studies showed multiple sclerosis in 37.5% in Saxena[1]R et al (2014),124.1% in Saxena[1,2] R et al (2010), 7.14% in Jain[4] I S et al, 2.5% in Tandon R et al.

4. Conclusion

Optic neuritis is a common cause of acute onset of diminution of vision in patient presenting to hospital. It is frequently associated with multifocal pathology such as multiple sclerosis in western countries while more association is seen with neuromyelitisoptica (NMO) or myelitis in Asian countries. Thus, patients need thorough clinical, radiological as well as electrophysiological

evaluation. Majority of patients of optic neuritis are female with the majority belonging to middle age group (21-40 years) Diminution of vision is most common complaint and in majority of patients and this is associated with periocularpain. Prolonged P100 latency is the most common abnormality seen on VEP which suggests demyelination in pathology. Demyelination in brain is seen on imaging of optic neuritis even in asymptomatic cases and MRI brain is needed in these patients for appropriate diagnosis and management.There was a slightly increased frequency of retrobulbarneuritis which was different compared to other Indian studies. But our study showed that the incidence of RBN was similar to ONTT study. This indicates that RBN is also commonly seen in the Asian population.

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