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Original research article

Visual function after optic neuritis therapy

Madhuri G Patil
Assistant Professor, Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research, L.B. Nagar, Hyderabad, Telangana, India

Corresponding Author:
Madhuri G Patil

Abstract
Background and Objectives: In order to research the visual function, therapeutic response, and visual prognosis in patients with optic neuritis who visit the ophthalmology clinic.
Methods: 94 eyes were assessed as part of this prospective study, which was conducted over a 13-month period and followed up on for three months. After therapy, visual function was evaluated.
Results: The median log MAR visual acuity at baseline was 1.51 and decreased to 0.8 at the one-month follow-up in 74% of the eyes, while other visual functions such as colour vision, central fields, brightness sensitivity, and red desaturation also showed statistically significant improvements. The mean age was 40.0 years, and males predominated (55.6%).
Conclusion: Following treatment, visual function showed good improvement. In our investigation, concomitant demyelination in association with this study.
Keywords: Optic neuritis, visual function, visual acuity, colour vision

Introduction

Optic neuritis is a demyelinating, inflammatory, or infectious condition that affects the optic nerve. It is distinguished by an abrupt loss of vision, frequently accompanied by pain that lasts for several hours or days, and is then gradually restored. Women are impacted more frequently than men. The majority of cases are idiopathic, and multiple sclerosis can potentially be a factor. It is the demyelinating condition that causes optic neuritis most frequently. Infectious, parainfectious, inflammatory, paravaccinative, and immunological responses are additional common reasons [1, 2].

Optic neuritis can show as sudden unicular vision loss, which is frequently accompanied by pain that gets worse with eye movement (associated with multiple sclerosis). RAPD is virtually always present in unilateral situations. In affected eyes, a variety of field abnormalities including dyschromatopsia are visible. Within the first month, vision normally starts to recover. It gets better without the use of steroids. Atypical optic neuritis features prominent swelling of the optic nerve along with haemorrhages and retinal exudates but no pain. Patients with atypical neuritis symptoms are less likely to develop multiple sclerosis [2, 3].

The likelihood of developing multiple sclerosis rises after an episode of optic neuritis. In the absence of multiple sclerosis sign, optic neuritis is referred to be monosymptomatic, idiopathic, or as a clinically isolated syndrome. The first symptom of optic neuritis is visual loss, ocular discomfort and Dyschromatopsia. Retrobulbar optic neuritis is the most prevalent cause of decreased vision coupled with pain during eye movements. The superior and medial recti's origins cause tractus against the optic nerve sheath at the orbital apex which cause pain. (Whitnall's supposition) [3, 4].

Colour perception, contrast sensitivity, and visual field are some additional characteristics of vision that are impacted. Patients with optic neuritis may have a variety of visual field abnormalities, including quadrantic, altitudinal, diffuse depressive, and centrocaecal scotomas. Optic neuritis is not fully recovered. Corticosteroids, which are the mainstay of treatment, fasten the recovery of vision. According to some studies, there is little to no improvement in the visual outcome even after six to twelve months post treatment. A Pulse therapy of 500 mg of methylprednisolone was administered intravenously for 3 days conseceutively. After that, 11 days of oral steroid therapy at 1 mg per kilogramme of body weight were administered [4, 5].

Optic Neuritis Treatment Trial provides the foundation for the gold standard treatment for this condition. In order to test the effectiveness of corticosteroids, 455 individuals were enrolled between 1988 and 1991. The effectiveness of corticosteroid therapy for acute optic neuritis and the link between optic neuritis and multiple sclerosis were both examined by ONTT [5].

Material and Methods

To assess the visual result, treatment response, and visual function in patients with optic neuritis, a prospective case study of observation was conducted. 88 patients and 94 eyes were subjected to the investigation from June 2022 to May 2023 at Department of Ophthalmology, Kamineni Academy of

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Medical Sciences and Research, L. B. Nagar, Hyderabad, Telangana, India.

Inclusion criteria

1. **Age range:** 16 to 65.
2. Visual field or acuity loss, with or without pain, lasting one month.
3. Bidirectional versus unilateral.
4. Fundus adjustments.
5. Field errors.

Exclusion criteria

1. Age 16 or elder.
2. Visual loss due to compressive, toxic, metabolic, vascular, inherited neuropathies.
3. An optic neuritis episode that occurred in the afflicted eye previously.
4. All patients gave their informed consent.

Result

94 eyes from 88 patients with optic neuritis were included in the study. When treated with steroids, our patient's visual function parameters quickly recovered compared to how they were before treatment.

Table 1: Visual acuity

Visual acuity	Baseline	1month
6/6-6/18	18(19.1)	44(60.3)
6/24-6/60	12(12.7)	14(19.2)
6/60-3/60	35(37.2)	10(13.7)
<3/60	29(30.8)	4(7)
Total	94	72

Table 2: Log mar vision

Log mar vision	N	Median (Snellen's Equivalent)	Mean (SD)	Min-Max	P-Value
Baseline	94	1.51(4/55)	1.34(0.84)	0 – 3.2	-
2 weeks	90	0.36(4/12)	0.65(0.65)	0 – 2.9	<0.001
1 month	73	0.2(8/10)	0.52(0.78)	0 – 2.9	<0.001

Table 3: Fundus parameters

Fundus at baseline	Fundus at 1month		Total	P-value
	Normal	Abnormal		
Normal	7(9.7)	3(4.16)	10	0.180 (Using McNemar's test)
Abnormal	10 (13.8)	52(72.2)	62	
Total	17	55	72	

Table 4: Colour vision

Colour vision at baseline	Colour vision at 1 month		Total	P-value
	Normal	Abnormal		
Normal	9 (75)	3 (25)	12	0.0035 (Using McNemar's test)
Dyschromatopsia	55(91.6)	5 (8.4)	60	
Total	64(88.8)	8 (11.12)	72	

Table 5: Central field

Central fields at baseline	Central fields at 1 month		Total	P-value
	Normal	Abnormal		
Normal	5(100.0)	-	5	<0.001 (Using McNemar's test)
Abnormal	28(41.8)	39(58.2)	67	
Total	31(43.1)	41(56.9)	72	

Discussion

Inflammation of the optic nerve is known as optic neuritis and it is typically idiopathic in origin. In the normal course of optic neuritis, spontaneous recovery happens within a week, however it might occasionally take longer. In India, it was uncommon to see the typical cases of multiple sclerosis-related optic neuritis. Numerous research has been done that show how optic neuritis and multiple sclerosis are related. Prior to ONTT, Jain *et al*. noted that the clinical profile of optic neuritis in India differs from that of the population in the West. Understanding visual function following treatment for optic neuritis in South India is the goal of our investigation. The Optic Neuritis Treatment Trial, which helped to shape

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our understanding of the disease, first investigated the use of corticosteroids in the treatment of optic neuritis. All of the participants in our study received oral steroids (1 mg/kg body weight) for 2-6 weeks at decreasing doses after receiving intravenous methyl prednisolone 1 gramme once daily for 3 days. The study included 88 patients with ages ranging from 20 to 64 (mean 40.0), with 47 men and 41 women. Involvement was seen unilaterally in 78 cases and bilaterally in 10 subjects [6, 7].

83 individuals between the ages of 15 and 58 were included in a study comparable to this one by Rohit Saxena *et al*. Of these, 67 cases involved unilateral involvement and 16 cases involved bilateral involvement. With a mean age of 31.8 years and a range of ages from 18 to 46, ONTT included 457 patients. In our study, males were more frequently impacted (53.4%) than females. In a related study, 67% of the participants were men, according to Jain *et al*. 77% of the patients in ONTT who were affected were female. In our study, 91.8% of participants had vision impairment (90 out of 98 eyes), 12.5% had headaches (11 out of 98 eyes), 20.4% had dyschromatopsia (20 out of 98 eyes), and 29.6% had pain during eye movement. Jain *et al*. discovered in their study that 33.3% (7 out of 42 patients) reported pain during eye movements. In ONTT, pain was evident in 162 of 295 eyes with papillitis and 93% of 295 eyes with retrobulbar neuritis [8, 9, 10].

In other investigation done by Majid *et al*. observed that 12 individuals experienced unpleasant eye movements. The baseline visual acuity was worse in the majority of the eyes. In 15 (19.5%) eyes, the visual acuity was 6/24 or better at the 1-month follow-up. The visual acuity of 45 (58.4%) eyes was 6/18–6/6. Similar to this, Pedro *et al*. found 52.4% improvement in visual acuity in 18 out of 35 eyes at a later time. 56.86 (87.8%) of the 98 eyes out of 98 showed RAPD. At the beginning, 12 (12.2%) eyes were normal. At the beginning, the optic disc was normal in 15 eyes, but 44 eyes had disc edoema, 20 eyes had temporal pallor, and 20 eyes had hyperemia. Additionally, two eyes had splinter haemorrhages. According to ONTT, 35% of people had enlarged optic discs. According to Nikoskelainen *et al*., the optic disc was normal in 46% of cases, hyperemic/blurred in 20%, disc edoema in 23%, and temporal pallor in 11%. In our study, 65.3% of patients had papillitis, and 34.7% had retrobulbar neuritis. Similar to this, Saxena *et al*. reported that 46.5% of people had retrobulbar neuritis and 53.5% of eyes had papillitis. Baseline visual fields could only be conducted in 48 eyes due to poor vision in the remaining 50. Centrocaecal scotoma was the most prevalent field defect, occurring in 22 (22.7) eyes. In our study, 7.8% of participants experienced superior and inferior field defects, generalised visual field constriction, and superior field loss. Altitudinal field defect, which is frequent in NAION but can also occur in ON, was present in one patient in our study at baseline. Similar to what ONTT revealed, the most common baseline field defects were altitudinal field defects in 23.4% of eyes, 8.3% central or centrocaecal scotoma, and 48.2% diffuse loss. According to Jain *et al*., central scotoma was found in 19.1% of eyes, followed by concentric contraction in 25% of eyes [11, 12, 13].

Ishihara charts were used to document cases of dyschromatopsia. 86 (87.8%) of the baseline eyes had abnormal results. It was typical for 12 (12.2%) eyes. 53 (68.8%) of the eyes had improved after one month. 24 people, or 31.2%, showed no improvement. In their investigation, Jain *et al*. revealed that dyschromatopsia had also recovered along with vision. In their study, Saxena *et al*. 48 found that 60.6% of participants had improved colour vision. At a one-month follow-up, Vimala *et al*. found that the dyschromatopsia had improved. (Mean Log Mar improved from 9.14 at baseline to 18.57) Out of 98 eyes, 83 had aberrant brightness sensitivity at baseline; the majority of these individuals had impaired eyesight, making it impossible to do the test. Out of 77 eyes, 43 (55.8%) exhibited improvement during a one-month follow-up. Testing brightness showed to be more accurate in making the diagnosis than other methods. Red desaturation: 86 of the 98 baseline abnormal eyes were red. Out of 77 eyes that were followed up on after a month, 43 eyes improved. Brightness Sensitivity and Red Desaturation are two crucial factors that we used in our study to evaluate visual function. Similar to this, Almong *et al.'s* study revealed greater desaturation in ON. In our investigation, only 3 cases of demyelinating lesions were detected using neuroimaging, indicating a low incidence of MS in South India [14, 15, 16].

According to ONTT, MS-related demyelinating alterations were present in 37.5% of cases (8 out of 32), while in contrast, they were present in 48.7% of patients (203 out of 417). Additionally, it said that the chance of MS was 25% if the baseline MRI was negative and 50% if an incident of optic neuritis occurred. In their investigation, Saxena *et al*. reported that 4 cases of MS and 12 cases of demyelinating lesion. According to Jain *et al*., southern India has a lower incidence of MS than northern India [17].

Conclusion

The median age is 40.0 (12.9) years, with a range of 20 to 64 years. 79.6% of cases presented unilaterally. 20.4% of individuals presented bilaterally. In our analysis, men are slightly more prevalent than women. The most common symptoms in our study were blurred vision, followed by pain when moving the eyes. The visual acuity had significantly improved. Retrobulbar neuritis (34.7%) and papillitis (65.3%) were the two most frequent presentations. Following therapy, visual abilities such as central fields, colour vision, brightness sensitivity, and red desaturation significantly improved. In 3 patients, neuroimaging revealed demyelination. 3.9% of patients were seemed to be unusual and in need of additional monitoring and research. In our analysis, demyelinating illness associated with ON was less

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frequent. Following treatment for optic neuritis, visual function showed good improvement. In our study, concomitant demyelination was less common.

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