ORIGINAL ARTICLE

Clinical Spectrum of Neuritis Optic Patients Receiving Intravenous Corticosteroid Treatments in Doctor Kariadi Hospital Semarang

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ABSTRAK

Introduction and Objective: Optic neuritis is inflammation of the optic nerve leading to sudden loss of vision that takes place over several hours or days. Corticosteroids have been widely used in the treatment of optic neuritis due to their anti-inflammatory effects. This study aimed to retrospectively review cases of optic neuritis that have been the administration of intravenous corticosteroid treatment on visual acuity.
Methods: The authors conducted a retrospective study of patients who underwent 3 days of intravenous corticosteroid therapy for neuritis optic from January 2018 to December 2018 in Kariadi Hospital. The data collected included patient demographics, onset, clinical examinations, and visual acuity.
Result: The authors included 22 eyes from 16 patients who received intravenous corticosteroid treatment for 3 consecutive days during the study period. The study found a mean age of 32,91±9,32 years (18-49 years). The mean onset was 2,36±3,07 months (0,1-12 months). Ten eyes (45,5%) had positive RAPD and five eyes (22,7%) had ocular movement pain. Thirteen patients (59,1%) had papil edema in funduscopy examination. Fourteen eyes (63,6%) had visual acuity at or below 6/60 at the time of presentation. The mean visual acuity at the time of presentation was 2,45±1,79 LogMar units (Range 0,2-5,0 LogMar units). After three days of intravenous corticosteroid treatment, the mean visual acuity was 1,81±1,42 LogMar units (Range 0,1-5,0 LogMar units). The visual acuity before and after treatment were analyzed using the Wilcoxon test and gave p=0,004 as result.
Conclusion: Treatment of intravenous corticosteroid commonly gave a better visual acuity on neuritis optic patients. There are no significant differences of onset and clinical examinations in intravenous corticosteroid treatment visual outcome.

Keywords: Optic neuritis; Corticosteroid; Visual Outcome

Abbreviations: RAPD: Relative Afferent Pupillary Defect

INTRODUCTION

Optic neuritis, or inflammation of the optic nerve, is a frequent cause of acute optic nerve injury in children and adults. Optic neuritis is also often associated with multiple sclerosis (MS), the cause of optic neuritis is protean. As a result, the prognosis and treatment of optic neuritis will vary depending on the etiology, duration, and severity of vision loss, previous injury, and the success of previous treatment. Optimal treatment for patients with optic neuritis depends on prompt recognition, appropriate diagnostic studies, and early institution of effective therapy.[1]

Optic neuritis (ON) is inflammation of the optic nerve leading to sudden loss of vision that takes place over the course of several hours or days.[2] It is an inflammation of one or both optic nerves that often results in temporary visual loss. It affects young to middle-aged adults between 16 and 55 years of age.[3] Optic neuritis typically affects women more often than men. It is second only to glaucoma as the most common acquired optic nerve disorder in persons younger than age 50.[4]

Inflammation of the optic nerve causes loss of vision usually due to the swelling and destruction of the myelin sheath covering the optic nerve. Direct axonal damage may also play a role in nerve loss in many cases.[5]

High-dose (≥1 g) corticosteroids given intravenously became standard practice after the Optic Neuritis Treatment Trial (ONTT), which compared 3 different interventions: high-dose intravenous (IV) methylprednisolone (1 g daily for 3 days), oral prednisone low dose (1 mg / kg daily for 14 days), and oral placebo; there was no IV placebo group. Based on the results of the study by Morrow et al., stated that the use of high-dose oral corticosteroids is as effective as high-dose intravenous corticosteroids for the treatment of acute optic neuritis.[6]

Corticosteroids have been used to treat acute demyelinating events for many years. Corticosteroids reduce blood-brain barrier damage, as indicated by decreased intensity, or complete resolution, of the lesions that increase their gadolinium on MRI scanning, leading to accelerated recovery from acute relapse. [7] Administration of a high-dose IV corticosteroid was not superior to the administration of a bioequivalent oral dose for the treatment of acute ON.[6]

MATERIAL AND METHODS

A retrospective study was performed on all patients who presented with optic neuritis at Kariadi Hospital that received corticosteroid intravenous treatment for 3 consecutive days from January 2018 until December 2018. The study has identified a total of 16 cases that were eligible for inclusion. Other cases were excluded from the analysis for incomplete data, neuritis optic relapse within a year and different types or dose of corticosteroid given as treatment.

The diagnosis of optic neuritis was made clinically based on acute or subacute vision loss history in one or both eyes with one or more of the following findings: pain on eye movement, optic nerve swelling, relative afferent pupillary defect (RAPD, dyschromatopsia, magnetic resonance imaging (MRI) supporting finding and no other identifiable cause. Demographic and clinical information collected for each patient included age at onset, gender, onset of vision loss, RAPD, pain on eye movement and funduscopy examination. Abnormal magnetic resonance imaging (MRI) was defined by the presence of one or more T2-hyperintense lesions on brain MRI.

Bilateral optic neuritis was defined as, both eyes involved simultaneously or within 4 weeks of each other, and recurrent optic neuritis was diagnosed when the repeat attack affected one or both eyes after an interval of more than 4 weeks. This is similar to the criterion used for the diagnosis of 2 demyelinating episodes or attacks in MS patients.[8]

Corticosteroid that was chosen as treatment for neuritis optic patient in this study is methylprednisolone 1000mg intravenous per day divided into four times intravenous injections a day for three consecutive days. The intravenous treatment was followed by oral methylprednisolone 1mg/kg/day after 3 days. The visual acuity post-treatment analyzed in this study is after 3 days of intravenous corticosteroid treatments.

Patients were grouped on the basis of improved visual outcome and not then compares for various clinical parameters. An Excel spreadsheet was designed to collect the data and statistical analysis was performed using the SPSS 15. Qualitative data were expressed as percentage and quantitative data were expressed as mean±standard deviation or median and range. Data with parametric distribution were analyzed with the Wilcoxon test and those non-parametric distribution were analyzed using the Chi-square or Fisher exact test. A p-value of <0.05 was taken as statistically significant.

RESULTS

The study included 16 patients (22 eyes) who had been diagnosed with neuritis optic in Kariadi Hospital and received intravenous corticosteroid treatment for 3 consecutive days. The mean age of the study patients was 32,91±9,32 years (18-49 years). There were 2 males (12,5%) and 14 (87,5%) females. The data of causes for optic neuritis in this study were limited because the only source was from a medical record, for a few that were available such as Multiple Sclerosis (MS) and Systemic Lupus Erythematosus (SLE), and for other cases were isolated idiopathic. Infection cause was already being screened and ruled out before corticosteroid intravenous treatment administered.

Table 1. Clinical Features of Patients with Optic Neuritis

Variable	F	%	Mean ± SD	Median (min–max)
Gender				
Male	5	22,7		
Female	17	77,3		
Age			32,91 ± 9,32	29 (18 – 49)
Onset (month)			2,36 ± 3,07	0,85 (0,1 – 12)
RAPD				
Positive	10	45,5		
Negative	12	54,5		
Pain with ocular movement				
Positive	5	22,7		
Negative	17	77,3		
Eye involvement **Unilateral**	10	45,5		
Bilateral	12	54,5		
Funduscopy				
Disc Edema	13			
Visual Acuity				
Improved	13	59,1		
Not improved	9	40,9		

A review of past medical conditions revealed no significant ophthalmic disorder, injuries, or illness and there is no family history of ophthalmic disease. Some patients were under other medication for other medical conditions. One patient under medication for Human Immunodeficiency Virus (HIV), two patients with SLE, Three patients with MS, and one patient undergoing pregnancy during treatment. We have consulted the medical condition to the related division such as internal medicine, neurology, and obstetric gynaecology, before administering intravenous corticosteroid treatment.

Tabel 2. Acuity Pre and Post Treatment

Logmar	Snellen	Visual Acuity Pre	Visual Acuity Post
0.3 - better	6/12 or better	2	2
<0.3 - 1	<6/12-6/60	5	5
<1 – 1.3	<6/60-3/60	2	4
<1.3 – 1.77	<3/60-1/60	5	6
<1.77	<1/60	8	5

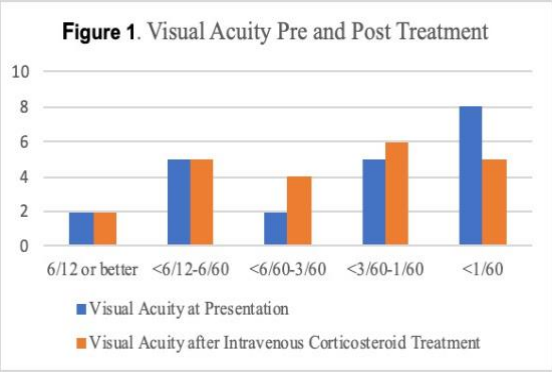

Figure 1. Visual Acuity Pre and Post Treatment

The clinical features of the patients are summarized in Table 1. The mean visual acuity at the time of presentation was 2,45±1,79 LogMar units (Range 0,2-5,0 LogMar units). Thirteen patients (59,1%) had papil oedema in funduscopy examination. Fourteen eyes (63,6%) had visual acuity at or below 6/60 of the Snellen Chart at the time of initial presentation. Five patients had no perception of light at presentation. Overall, the visual acuity loss was severe in majority of our patients. Papil oedema was present in 13 patients. Six patients had atrophy papil and the remaining patients had normal fundi (retrobulbar neuritis). The presentation is bilateral in 6 (37,5%) patients. Four (66,67%) of these patients with bilateral presentation had papil oedema.

Table 3. Subgroup Analysis of Neuritis Optic Patients (n=22 eyes)

	Improved Visual Acuity (n=13 eyes)	Not Improved Visual Acuity (n=9 eyes)	P value
Gender (M/F)	3/10	2/7	1,000 (Fischer's Exact Test)
Age	35,54 ± 9,38	29,11 ± 8,28	0,114 (Independent T-test)
Onset	0,7 (0,1 – 6)	1 (0,23 – 12)	0,086 (Mann Whitney Test)
RAPD(+/-)	5/8	5/4	0,666 (Fischer's Exact Test)
Ocular Movement Pain(+/-)	2/11	3/6	0,609 (Fischer's Exact Test)
Oedema Papil	10	3	0,074 (Chi Square Test)

All these patients were given intravenous methylprednisolone 1000mg/day for three consecutive days followed by oral metil prednisolone (1mg/kg/day). This was according to the treatment guidelines of Optic Neuritis Treatment Trial where all neuritis patients are given steroids after the baseline investigations rule out an infective etiology.

After three days of intravenous corticosteroid treatment the mean visual acuity was 1,81±1,42 LogMar units (Range 0,1-5,0 LogMar units). The visual acuity improved in 13 eyes. 2 patients from 16 patients had recurrence with the median period of reccurence was 2 months (1-3 months).

MRI was done in 15 patients (93,75%). MRI showed lesions suggestive multiple sclerosis in 2 patients, and neuritis optic in 5 patients.

Table 4. Analysis of visual acuity

Visual Acuity	Median (min–max)	p
At Presentation	2 (0,2 – 5)	0,004*
After Treatment	2 (0,1 – 5)	

* Significant (p < 0,05)

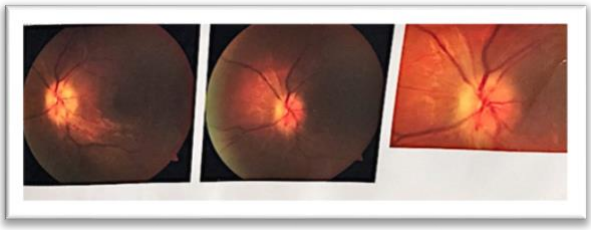

Figure 2. Fundus Image of a Case of Papilitis

DISCUSSION

In this series, we retrospectively reviewed the medical records of optic neuritis patients, and found 16 patients fitting the eligibility criterion. The female to male ratio in our study patients was 4.33. This is consistent with the female preponderance in adult optic neuritis studies.[9,10,11] The study found a mean age of 32,91±9,32 years (18-49 years). It also consistent with neuritis optic studies that found it typically develop in patients between the ages of 20 and 40.[11] Wilhelm et al too reported the mean age at onset is 36 years; it is rare in persons under 18 or over 50.[10] The age of presentation and female preponderance noted in the present study was similar to that reported by the ONTT and other studies.

Vision at presentation was poor in most patients with fourteen eyes (63,6%) having a visual acuity of 6/60 or lesser. The

vision loss as well as the recovery was similar in males and females. Visual recovery was good for 7 eyes (31,8%) gaining a visual acuity more than 6/60, but only 2 eyes (9.09%) gaining a visual acuity more than 6/12. The mean LogMar visual acuity improved significantly from was 2,45±1,79 LogMar units to 1,81±1,42 LogMar units after three days of intravenous corticosteroid treatment (p=0,004). Wang et al reported Within the follow-up period 26 of 31 eyes (83.9%) with idiopathic ON attained visual acuity of 6/12 or better with (38.7%) recovering to 6/6 or better and only one eye ending with less than 6/60 visual acuity.[12] Saxena et al examined the clinical profile and short-term visual outcome of all forms of optic neuritis received treatment in the form of 200mg of dexamethasone in 150 ml of 5% dextrose solution given intravenously over 30 min for three consecutive days. The patients were examined and followed up for a mean period of 10 months. The median logMAR visual acuity of 99 eyes improved significantly from 1.6 ± 0.8 to 0.2 ± 0.6, though only 64% of eyes achieved a final visual acuity of 20/40 or more as against 94% in the Optic Neuritis Treatment Trial.[13]

Bilateral involvement was seen in in 6 (37,5%) patients and compares to 16%-35% reported in other studies in Asia, whereas an African study has reported it to be as high as 80%.[12] Four (66,67%) of these patients with bilateral presentation had papil oedema. In our study 59,1% of the eyes had Papilitis as the presenting feature (Figure 2). Saxena et al reported a significant deviation from the ONTT report is the increased frequency of papillitis, which was 53.5% in the their study as compared with 35.3% in the former. The above figures suggest that papillitis is as common as retrobulbar neuritis, if not more frequent, in the Asian population.[13]

Recurrence was noted in 3 eyes within a year. None of those patient with recurrence showed lesions suggestive of MS. One of the patients has additional HIV condition. MRI of 5 patients showed lesions suggestive of MS and already treated together with internal medicine. According to ONTT study even as many as 15 years after the initial optic neuritis attack, that the initial MRI result, if abnormal with white matter abnormalities, was the single most important predictor of the future risk of MS.[14] But the risk of MS is difficult to predict in this study because of a shorter follow-up. A Long-term study needed to know the risk of MS.

Analysis of factors such as gender, age, onset, RAPD, ocular movement pain and oedema papil showed no correlation with visual acuity outcome (Table 3). Chuenkongkaew W et al retrospectively evaluated 81 patients in Thailand and the visual outcome was found to be better for those who received the steroid therapy early (within 8 days of onset of neuritis). Their study supports the need for early treatment and contradicts the results of the Optic nerve treatment trial[15]. While previous study mentioned that absence of retro-orbital pain has been shown to result in a poorer visual outcome as compared to patients with retro-orbital pain[16]. According to Du Y et al disc swelling is another important parameter which has been evaluated as a prognostic marker for visual outcome. They studied a series of bilateral optic neuritis cases and concluded that the presence of bilateral disc swelling predicted a negative visual outcome.[17] All of those study used more than 3 days visual acuity post treatment to analysed various clinical parameter. In this study, comparison of median visual acuity at presentation and after 3 days of corticosteroid intravenous treatment was analysed using Wilcoxon test and gave significant *p*-value (*p*=0,004) (Table 4).

However, oral medication may be more convenient, minimizing travel to the infusion center, especially for those living in rural areas. Additionally, other previous studies have shown that oral administration

is preferred by people with MS. The use of oral administration is also more cost effective.

CONCLUSION

Treatment of intravenous corticosteroid commonly gave a better visual acuity on neuritis optic There are no significant differences of onset and clinical examinations with intravenous corticosteroid treatment visual outcome.

DISCLAIMER

There is no conflict of interest, financial or otherwise about this study.

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