

Visual Outcome after Oral versus Intravenous Methylprednisolone Therapy for Bilateral Optic Neuritis in Adults

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Abstract

Introduction: Bilateral optic neuritis in adults is rarer than unilateral optic neuritis. The purpose of this study was to know the clinical profile and to know the visual outcome of bilateral optic neuritis in adult patients after oral versus intravenous methylprednisolone therapy. **Methods:** A retrospective review of patients with bilateral optic neuritis referred to dr.Sardjito General Hospital, Yogyakarta from 2011-2014. The data consisted of bilateral optic neuritis, unassociated with other pathologic processes. There are two groups of patients: Group A taking oral methylprednisolone 1mg/kgBB and Group B received intravenous methylprednisolone (as ONTT guideline). Visual acuity, visual field with Goldmann Perimetry, RAPD (Relative Afferent Pupillary Defect), Ishihara test and direct ophthalmoscopy evaluation were recorded and analysed in both group at baseline, 1 week, 1 month and 3 months follow up. **Results:** Nineteen women and 9 men, with age range of 18-54 years old, had bilateral optic neuritis. The majority of the patients suffered from retrobulbar neuritis (43%), papillitis (39%) and neuroretinitis (18%). The average visual acuity before treatment in Group A was 0.22 ± 0.29 and in Group B had poorer average visual acuity 0.03 ± 0.04 ($p > 0.05$). But the trend of visual recovery in Group B with visual acuity at baseline worsen, the recovery of visual acuity was faster and better at one week. After one month the visual acuity was comparable in both groups ($p > 0.05$). **Conclusions:** Visual improvement in early period of adult bilateral optic neuritis was similar after oral and intravenous methylprednisolone therapy.

Keywords: Bilateral optic neuritis, methylprednisolone therapy, visual outcome

Abstrak

Pendahuluan: Neuritis optik bilateral pada orang dewasa lebih jarang daripada neuritis optik unilateral. **Tujuan** dari penelitian ini adalah untuk mengetahui profil klinis dan untuk mengetahui hasil visual neuritis optik bilateral pada pasien dewasa setelah terapi metilprednisolon oral versus intravena. **Metode:** Kajian retrospektif pasien neuritis optik bilateral yang dirujuk ke RSUP dr. Sardjito Yogyakarta periode 2011-2014. Data terdiri dari neuritis optik bilateral, tidak terkait dengan proses patologis lainnya. Ada dua kelompok pasien: Kelompok A yang menggunakan metilprednisolon oral 1mg / kgBB dan Kelompok B menerima metilprednisolon intravena (sebagai pedoman ONTT). Ketajaman visual, bidang visual dengan Goldmann Perimetry, RAPD (Relative Afferent Pupillary Defect), tes Ishihara dan evaluasi oftalmoskopi langsung dicatat dan dianalisis pada kedua kelompok pada awal, 1 minggu, 1 bulan dan 3 bulan tindak lanjut. **Hasil:** Sembilan belas perempuan dan 9 laki-laki, dengan rentang usia 18-54 tahun, mengalami neuritis optik bilateral. Mayoritas pasien menderita retrobulbar neuritis (43%), papilitis (39%) dan neuroretinitis (18%). Ketajaman penglihatan rata-rata sebelum pengobatan di Grup A adalah $0,22 \pm 0,29$ dan di Grup B memiliki ketajaman penglihatan rata-rata $0,03 \pm 0,04$ ($p > 0,05$). Tetapi tren pemulihan visual di Grup B dengan ketajaman visual pada awal memburuk, pemulihan ketajaman visual lebih cepat dan lebih baik dalam satu minggu. Setelah satu bulan ketajaman penglihatan sebanding pada kedua kelompok ($p > 0,05$). **Kesimpulan:** Perbaikan visual pada periode awal neuritis optik bilateral dewasa serupa setelah terapi metilprednisolon oral dan intravena. **Kata kunci:** Neuritis optik bilateral, terapi metilprednisolon, luaran visual

I. INTRODUCTION

Optic neuritis is the inflammation of the optic nerve. Clinically, the patients present with sudden or subacute diminution of vision loss with ocular pain (especially on ocular movements), loss of color vision, decreased of brightness, and visual field defects as central, paracentral, arcuate, or altitudinal defects.^{1,2,3} The attack is usually unilateral in 70% of adults and bilateral in 30%.⁴

Bilateral optic neuritis is usually thought to affect children, often follows a viral syndrome, and is not typically associated with subsequent multiple sclerosis.² In contrast, in adults simultaneous bilateral acute optic neuritis has been considered rare particularly in individuals without known systemic inflammatory or autoimmune disorders.⁴ Adult onset optic neuritis is typically unilateral and is commonly linked to multiple sclerosis.⁵ The majority of patients (95%) recover spontaneously with a visual acuity of 20/40 or better within a year after an attack; but some have a lasting visual deficit.³ Contrast sensitivity of the affected eye is found last to recover. Vision recovery is significant regardless of the treatment.³ Few reports describe the clinical course, recovery, and outcome after treatment with steroid therapy.⁴

This study was aimed to compare steroid therapy given by oral versus intravenous route, about the time course of visual recovery, during a one week until 3 months follow up for bilateral optic neuritis in adult patients.

II. METHODS

We performed a retrospective review of patient records and who presented with acute bilateral optic neuritis in the Ophthalmology Department dr.Sardjito General Hospital, Yogyakarta during 3,5 year period from January 2011 to June 2014. Patients were included if they presented with new onset of

acute bilateral visual loss diagnosed as bilateral optic neuritis and the age >18 years.

Exclusion criteria included known multiple sclerosis, previous optic neuritis or myelopathy, known systemic disorders associated with optic neuropathy, use of medications related to toxic optic neuropathy, known uveitis, or known systemic or intracranial neoplasm.

Visual function testing was performed for each eye at baseline and at the follow up of one week, 1 month, and 3 months. Visual acuity was assessed with wall projected Snellen letter charts and the results expressed in decimal notation. Perimetry was performed on Goldmann bowl projecting manual kinetic perimeter. Colour vision deficits were recorded using Ishihara colour plates. The presence or absence of pain with extraocular movement was documented.

The patients are divided into 2 groups. Group A received oral methylprednisolone 1mg/kgBB for about 1 weeks followed by gradual tapering depending on the clinical course, whereas Group B received intravenous methylprednisolone (1gr per day followed by 11 days of low-dose oral methylprednisolone as ONTT guide followed by a gradual tapering depending on the clinical course.

Outcome measure and statistical analysis

The visual acuity are measured at the baseline, one week, one month and three months follow up after receiving therapy: oral methylprednisolone (Group A) or intravenous methylprednisolone (Group B).

We analysed the visual acuity for the worsen eye at the baseline, determined by the visual acuity and standard deviation. We compared the baseline to one week, one month and three months follow up after receiving therapy using Kruskal-Wallis test. The examination results for one eye only, the worsen eye, because the baseline visual

acuity loss strongly correlated with the visual acuity in the fellow eye.

III. RESULT

Twenty-eight patients suffering from bilateral optic neuritis were included in this study. Mean duration of the onset symptoms at arrival was 14 days. Mean patients age was 35.3±10.7 years (age range 18-54 years). Nineteen patients (68%) were females, nine patients (42%) were males. Twelve patients (43%) (Group A) received oral methylprednisolone (1mg/kgBB) for one week then tapered off. Sixteen patients (57%) (Group B) received intravenous methylprednisolone based on ONTT guideline.

The majority patients (43%) had neuritis retrobulbar, 39% had papillitis and 18% had neuroretinitis (Table 1).

Table 1. Characteristics of patients admitted with adult bilateral optic neuritis diagnoses over 3.5 years period (January 2011- June 2014)

Total patients	28 pts, 56 eyes
Age (years, Mean±SD)	35.3± 10.7
Sex	
Male	9 (32%)
Female	19 (68%)
Duration of onset to arrival (days, Mean±SD)	14 ± 12.5
≤ 1 week	12 (43%)
1 week – 2 weeks	9 (32%)
2 weeks – 1 month	2 (7%)
≥ 1 month	5 (18%)
Diagnosis	
Neuritis retrobulbar	12 (43%)
Papillitis	11 (39%)
Neuroretinitis	5 (18%)
Type of steroid (methylprednisolone) therapy	
Oral (Group A)	12 (43%)
Intravenous (Group B)	16 (57%)

For the eye with worsen vision at baseline, the average visual acuity (in decimal notation) before treatment in Group A (oral MP therapy) was 0.22 ± 0.29 and in Group B (intravenous MP therapy) had poorer average visual acuity 0.03±0.04. This

difference was not statistically significance (p>0.05). But the trend of visual recovery in Group B with visual acuity at baseline worsen, the recovery of visual acuity was faster and better at one week period. After one month the visual acuity was comparable in both groups (p>0.05).

Table 2. Visual field examination at baseline

Visual Field	Day of visit	
	Group A (n=12)	Group B (n=16)
Normal	-	-
Mild depression	-	-
Moderate depression	-	-
Severe depression	8.3%	-
Central scotoma	16.6%	18.75%
Secocentral scotoma	8.3%	18.75%
Paracentral remnant	-	12.5%
Arcuate/altitudinal defect	-	18.75%
Blind spot enlargement	25%	-
Could not be assessed	41.6%	31.25%
Total	100%	100%

Table 3. Other examination at baseline in both groups

Ishihara test	19 pts
Could not be assessed	10 (53%)
Dyschromatopsia	5 (26%)
Normal	4 (21%)
Periocular pain in ocular movement	28 pts
Pain	7 (25%)
No pain	21 (75%)
Relative afferent pupillary defect RAPD	28 pts
Yes	10 (36%)
No	18 (64%)
Optic nerve condition	
Group A	
Oedema	6 (50%)
Normal	6 (50%)
Group B	
Oedema	11 (69%)
Normal	5 (31%)

Group A: oral methylprednisolone

Group B: intravenous methylprednisolone

The visual acuity of worsen eye showed a dramatic improvement in intravenous group compared with those in oral group. Pre treatment VA < 6/60 in intravenous group was 87,5%, in oral group was 58,3%. VA > 6/60 after 1 week therapy in intravenous group was 85,7% and in oral group 54,6%. But, this difference was not statistically significant in one week period and one month period. And after three months, visual acuity was difficult to analysed because only

small number of subject came in three months follow up.

Visual field examination at the baseline recorded as follow: in the Group A and B there is 41.6% and 31.25% patients that couldn't be assessed because of poor visual acuity. Other visual field defects in Group A: blind spot enlargement 25%, central scotoma 16.6%, secocentral scotoma 8.3% and severe depression 8.3%. Other visual field defects in Group B: arcuata/altitudinal defects 18.75%, secocentral scotoma 18.75%, central scotoma 18.75% and paracentral remnant 12.5%.

Other examination finding included Ishihara test, periocular pain in ocular movement, RAPD and optic nerve condition. Dyschromatopsia couldn't be assessed in 53% patients because of very poor vision, dyschromatopsia found in 26%, and 21% was normal. Periocular pain in ocular movement was found in 25% patients. Relative afferent pupillary defect (RAPD) positive was found in 36% patients. Optic nerve oedema was found 50% in Group A and 69% in Group B.

Table 4. Mean visual acuity at the baseline and follow up in both groups

Mean VA	Group A	Group B	p
Day 0	0.22±0.29	0.03±0.04	0.398
D+1 week	0.32±0.31	0.45±0.28	0.231
D+1 mos	0.59±0.38	0.66±0.20	0.787
D+3 mos	0.68±0.29	1	0.134

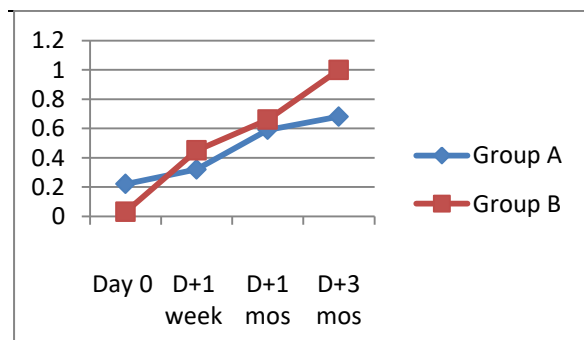


Figure 1. Mean visual acuity at the baseline and follow up in both groups

IV. DISCUSSION

This study showed a female preponderance (68%), different with other study of optic neuritis that found male preponderance.⁴ Patients were within age range 19-54 years. It was within the same age range with other study that found in aged range 18-64 years.⁴ The majority patients (43%) had neuritis retrobulbar, 39% had papillitis and 18% had neuroretinitis. This was different with other study of optic neuritis. Shresta, *et.al.* was found that the most common type of optic neuritis in unilateral optic neuritis was papillitis (74,2%), retrobulbar (22,6%) and neuroretinitis (3,2%).⁵

Although the presentation and severity of visual loss in our cases of bilateral optic neuritis was dramatic, recovery was good to excellent in both group patients. The bilateral vision loss typically improves with corticosteroid therapy without additional immunomodulatory therapy and good visual recovery is anticipated even after gradual withdrawal of therapy.⁴

Visual field defect that found in our study were: central scotoma, secocentral scotoma, blind spot enlargement, paracentral remnant, arcuata/altitudinal defects and severe depression. But most patients couldn't be assessed the defect at the baseline, because of poor visual acuity. Finding from the ONTT showed variable visual field deficits that included focal and diffuse deficits; central, centrocaecal, altitudinal, arcuate and nasal step defects and even hemianopic defects.⁶

Several studies have assessed acute corticosteroid treatment for optic neuritis. Results of the ONTT showed no improvement in visual acuity at 6 months after 3 days of high dose intravenous methylprednisolone followed by 11 days of low-dose oral prednisolone versus placebo, although visual recovery was faster.³ Patients taking standard-dose (1mg per kg) oral

prednisolone did not differ from those who taking placebo in visual outcome.³ In this study, the average visual acuity before treatment in Group A (oral MP therapy) was 0.22 ± 0.29 and in Group B (intravenous MP therapy) had poorer average visual acuity 0.03 ± 0.04 . But this difference was not statistically significance ($p > 0.05$). If we compare the trend of visual recovery, Group B with visual acuity at baseline was worsen, the recovery of visual acuity faster and better at one week. After one month the visual acuity was comparable in both groups ($p > 0.05$). And after three months, visual acuity was difficult to compare, because only small number of subject came in three months follow up.

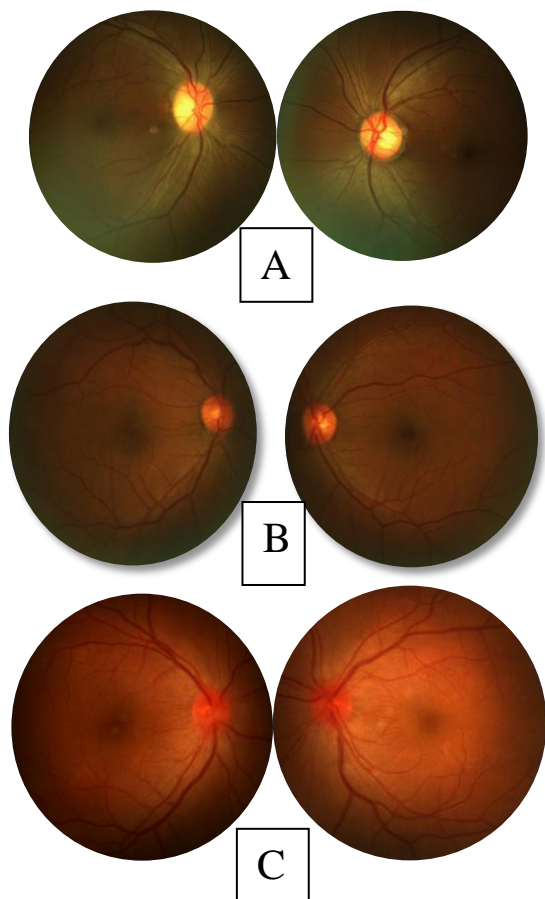


Figure 2.
A. Photograph of a 34-years-old woman with bilateral retrobulbar neuritis, VA baseline RE NLP, LE 6/20
B. Photograph of a 51-years-old man with bilateral papillitis, VA baseline RE 5/60, LE 6/60
C. Photograph of a 25-years-old woman with bilateral neuroretinitis, VA baseline RLE 3/60

V. CONCLUSIONS

Acute bilateral optic neuritis in adults occurs quite often than previously thought. The bilateral vision loss typically improves with corticosteroid therapy both in oral methylprednisolone group or intravenous methylprednisolone group with the same result in one week and one month. But, intravenous methylprednisolone can be considered in patients with worsen visual acuity at baseline, because the recovery of visual acuity showed faster and better at the early period..

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