Original Article

Visual outcome of Systemic Corticosteroid Treatment in Non-Arteritic Anterior Ischemic Optic Neuropathy

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Abstract

Purpose: To evaluate the visual outcome of patient with NAION treated with systemic corticosteroid. **Methods:** This non-randomized controlled clinical trial was conducted over 78 recently diagnosed patients with NAION (fewer than 14 days) in the Neuro-Ophthalmology Department of the National Institute of Ophthalmology and Hospital in Dhaka. The selection of patients was based on precise criteria for inclusion. Patients were allocated into two groups. In the A group, patients were treated with oral corticosteroid (prednisolone), with a starting average dosage of 1mg/kg of body weight daily for two weeks. After this time, the medication was tapered as 10 mg every five days for the next ten days, then 5 mg reduction every five days until it was stopped, tab. ecosprin, cap. Omeprazole and vitamin B complex. In the B group, patients were treated with tab. ecosprin, cap. omeprazole and vitamin B complex only. Best corrected visual acuity (BCVA) were measures at baseline, one month, three months and six months. **Results:** In the A group and B group, the patient's mean ages were 53.5 +/- 6.3 and 54.7 +/- 6.4 years, respectively. In the A group, 22 (57.9) were male while in the B group, 20 (50.0%) were male. In the A group, at baseline, the mean BCVA was 0.77±0.19 while in the B group, the mean BCVA was 0.75±0.13 (p=0.355). At 6th month, in the A group, the mean BCVA became 0.62±0.20 while in the B group, the mean BCVA was 0.65±0.21 (p=0.446). In relation to BCVA, the groups did not exhibit a difference of statistical significance at any time point as p>0.05. The majority of patients 50 (64.1%) remained static while 19 (24.4%) patients improved and 9 (11.5%) patients deteriorated. In relation to the final outcome, groups did not exhibit a difference of statistical significance. **Conclusion:** Oral corticosteroid does not have any additional benefit on visual outcome in patients with NAION. Additional randomized controlled trial are required to determine the efficacy of corticosteroid for the treatment of NAION.

Keywords: NAION, systemic corticosteroid, visual outcome.

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Introduction

After glaucoma, NAION is the most prevalent optic neuropathy.[1] NAION is widely believed to be multifactorial, arising from temporary hypo perfusion of the optic nerve head (ONH) due to general disruptions (such as diabetes mellitus (DM), arteriosclerosis, hypertension (HTN), nocturnal hypotension, vasospasm, or use of vasoactive drugs) that impair optic disc's self-regulatory function.[2] Another school of thought denotes NAION occurs as a result of infarction in the short posterior ciliary arteries, which are responsible for supplying the anterior region of the ONH. In an already-packed optic disc, this makes the axons swell and compartment syndrome, resulting in visual loss. There is no preference for one gender over the other and Caucasians are more likely to experience it. The usual onset of age is between 57 and 65 years old and it typically affects those

over the age of 50.[1]

The most typical NAION symptom is acute unilateral painless vision loss with sector or extensive optic nerve edema.[1] In unilateral forms, a relative afferent pupillary defect (RAPD) is present. The most prevalent visual field impairment is characterized by an inferior altitudinal pattern.[3]

There is currently no widely accepted, effective treatment for NAION. Numerous medical and surgical approaches have been suggested.[4] The effectiveness of steroid treatment has been ascribed to its ability to diminish capillary compression in the ONH by reducing edema and boosting the blood supply to ONH. Consequently, this improves the functionality of the optic nerve fibers that remain alive but are now non-functional. Several studies have provided evidence suggesting that oral systemic steroid may lead to improved visual outcomes in individuals with NAION.[5] Nevertheless, the lack of randomization in these trials undermines the strength of the results. A meta-analysis revealed that the administration of glucocorticoids led to a statistically significant enhancement in VA and VF while compared to the control group.[6] Hence, the primary goal of this research is to assess the visual outcome resulting from the administration of systemic corticosteroid therapy in patients diagnosed with NAION.

Materials & method

This non-randomized controlled clinical trial was conducted over 88 recently diagnosed patients with NAION in the National Institute of Ophthalmology and Hospital's Neuro-Ophthalmology Department, Dhaka within the study period. Patients with glaucoma, along with other ocular, neurological, or systemic diseases that had the potential to impact visual acuity and visual field were excluded from the study. Moreover, patients with increased ESR, high serum CRP level, uncontrolled hypertension and diabetes mellitus, any previous history of NAION therapy were also excluded. After taking written informed consent, a comprehensive ocular and medical history was collected. Comprehensive ophthalmic examinations included the assessment of visual acuity in the LogMAR chart, color vision test, RAPD, intra-ocular pressure (IOP), evaluation of the anterior and posterior section using a slit-lamp, fundus photography. Routine examinations such as the assessment of blood pressure and laboratory parameters such as the CBC, CRP, blood glucose and fasting lipid profile were assessed. Patients were allocated in group A and group B. Patients in group A were treated with oral corticosteroid (prednisolone), with a starting average dosage of 1mg/kg of body weight daily for two weeks. After this time, the medication was tapered as 10 mg every five days for the next ten days, then 5 mg reduction every five days until it was stopped. They were also treated with tab. ecosprin (75mg) once daily, cap. omeprazole (20mg) twice daily and vitamin B complex once daily. In group B, Patients were treated with tab. ecosprin (75mg) once daily, cap. omeprazole (20mg) twice daily and vitamin B complex once daily only. BCVA at the baseline, one, three and six-month periods were included in the data for analysis. LogMAR chart was used to record BCVA. When a change in visual acuity of 0.3 logMAR (three lines on the Snellen chart) is considered substantial.[7]

Within the 6-month follow-up period, 10 patients were dropped out. Hence, 78 patients (Group A: 38 patients; Group B: 40 patients) completed the study. The statistical analysis was conducted using SPSS version 26 statistical software. Statistical analysis of the data was performed by Student’s t test for continuous variables (such as age, BCVA) and Chi-square and Fisher’s exact test for categorical variables (such as gender and final outcome). Here, all p-values were two sided and $p<0.05$ was considered significant.

Results:

Table I: Comparison of patients by age (n=78)

Age group (in years)	Group A (n=38)	Group B (n=40)	p value
40 to 49	7 (18.4%)	10 (25.0%)	0.164a
50 to 59	25 (65.8%)	18 (45.0%)	
60 to 69	6 (15.8%)	12 (30.0%)	
Mean ±SD	53.5 ±6.3	54.7 ±6.4	0.388b

Group A: patients treated with oral corticosteroid, ecosprin and vitamin B complex; Group B: patients treated with ecosprin and vitamin B complex. a=Chi-square test, b= Independent Sample t test.

Majority of the patients in both groups were in 50-59 years age group where the mean age of the patients were 53.5 ±6.3 and 54.7 ±6.4 years in A group and B group respectively. In relation to age, the groups did not exhibit a difference of statistical significance as p>0.05 (Table I).

Table II: Comparison of patients by gender (n=78)

Gender	Group A (n=38)	Group B (n=40)	p-value
Male	22 (57.9%)	20 (50.0%)	0.484a
Female	16 (42.1%)	20 (50.0%)	

Group A: patients treated with oral corticosteroid, ecosprin and vitamin B complex; Group B: patients treated with ecosprin and vitamin B complex. a=Chi-square test

In A group, 22 (57.9) were male while in B group, 20 (50.0%) were male. In A group, 16 (42.1%) were female while in B group, 20 (50%) were female. In relation to sex, the groups did not exhibit a difference of statistical significance as p=0.484 (Table II).

Table III: Comparison of patients by BCVA (n=78)

BCVA	Group A Mean ±SD	Group B Mean ±SD	p-value
At baseline	0.77±0.19	0.75±0.16	0.355a
At 1st month	0.75±0.17	0.73±0.15	0.666a
At 3rd month	0.65±0.17	0.68±0.14	0.413a
At 6th month	0.62±0.20	0.65±0.21	0.446a

In A group, at baseline, the mean BCVA was 0.77±0.19 while in the B group, the mean BCVA was 0.75±0.13. In 6th month, in the A group, the mean BCVA became 0.62±0.20 while in the B group, the mean BCVA was 0.65±0.21. In relation to BCVA, the groups did not exhibit a difference of statistical significance at any time point as p>0.05 (table III).

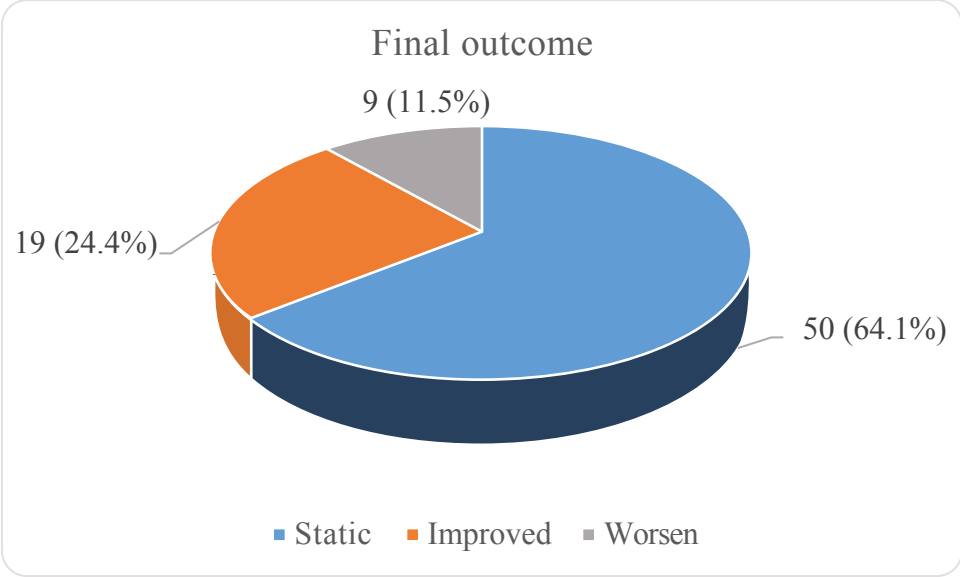

Figure I: Distribution of patients by final outcome after six months (n=78)

After six months of treatment, the majority of patients 50 (64.1%) remained static while 19 (24.4%) patients improved (BCVA 0.3 logMAR increased) and 9 (11.5%) patients deteriorated (BCVA 0.3 logMAR decreased) (figure I).

Discussion

NAION is a frequently encountered optic nerve disorder in the field of ophthalmology. The use of corticosteroid therapy in the treatment of NAION continues to be a subject of intense controversy and discussion within the field of ophthalmology.[2]

This non-randomized controlled clinical trial was conducted over 78 recently diagnosed patients with NAION (fewer than 14 days) in the Neuro-Ophthalmology Department of the NIO&H in Dhaka. The objective of this research was to assess the visual outcome of the patients diagnosed with NAION who underwent treatment with systemic corticosteroid. Patients were assigned into two groups. In A group, patients were treated with oral corticosteroid (prednisolone), cap. omeprazole, tab. ecosprin 75mg and vitamin B complex. In B Group, patients were treated with tab ecosprin 75mg, cap omeprazole and vitamin B complex once daily only. Examinations were carried out at the baseline, one, three and six-month intervals.

NAION is the most frequent nonglaucomatous optic nerve condition in adults over the age of 50.8,9 The majority of the patients in this study was in 50-59 years age group which was consistent with other studies.[1,10]

Though NAION has no gender preference,1,8 a slight male predominance was observed in the present study which was in accordance to some previous studies.[10,11,12]

At the end of six moth, both groups were comparable regarding visual acuity. However, the prospective cohort study of Hayreh and Zimmerman[5] suggested that NAION eyes treated with systemic corticosteroids during the acute phase had a considerably better probability of improvement in visual acuity and visual field than the untreated group. The case study of Takayama et al.[13] found beneficial effect of steroid in NAION. In contrast, other studies failed to demonstrate any favorable effects of high-dose systemic steroid therapy on visual and outcomes in NAION patients.[10,11, 14,15]

In the group A, 26.3% of patients improved and 65.8% patients remained static while in the group B, 22.5% of patients improved and 62.5% patients remained static. Regarding the final outcome, no obvious distinction between the

groups was found. In the prospective study of Vidović et al.,[16] corticosteroid therapy resulted in recovery in 65% of patients, no change in 30% of patients and deterioration in 5% of patients. Overall, majority of patients remained static while one fourth patients (24.0%) improved after six months of treatment. According to certain research, 13% to 42.7% of patients recover 3 lines of acuity or greater.[3,7,12] This range covered a wide range of variation. This might be due to the fact that visual improvement depends on several factors such as age,[17] duration of disease,[5] presence of systemic vascular diseases[18].

Conclusion

It is evident from the present study that oral corticosteroid does not have any additional benefit on visual outcome in patients with NAION.

Limitations of the study

Patients were not randomized to receive corticosteroid treatment. Subjects were not homogenous.

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