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ORIGINAL RESEARCH ARTICLE

A COMPARATIVE EVALUATION BETWEEN MEGADOSE INTRAVENOUS DEXAMETHASONE AND INTRAVENOUS METHYL PREDNISOLONE IN THE TREATMENT OUTCOME OF OPTIC NEURITIS

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ABSTRACT

To compare the efficacy of intravenous methylprednisolone and intravenous dexamethasone for the treatment of optic neuritis in terms of visual recovery and side-effects and to evaluate the clinical profile of optic neuritis patients admitted in BPKLCOS. 60 patients of acute idiopathic typical optic neuritis presenting to our centre were included in this prospective, randomized comparative study. Study population was randomly divided into two groups. Group I received intravenous dexamethasone 200 mg once daily for three days and Group II received intravenous methylprednisolone 500 mg/twelve-hourly for three days followed by oral prednisolone for 11 days. Optic neuritis was found to be common in the age group of 21 to 30 years with female preponderance. The most frequent mode of presentation was abrupt loss of vision. Retrobulbar optic neuritis dominated the study group. Both groups were age and sex-matched. The mean presenting visual acuity in group I was 0.065±0.59. The mean presenting visual acuity in group II was 0.1±0.15. On day 90 of steroid therapy, visual acuity improved to 0.98±0.073 in Group I and 0.88±0.16 in Group II (p=0.23). At three months, there was statistically significant improvement in both groups in terms of colour vision, contrast sensitivity and Goldmann visual fields as well but difference between the two groups was statistically insignificant. Intravenous dexamethasone is an effective treatment for optic neuritis, which is comparable to intravenous methylprednisolone. However, larger studies are required to establish it as a safe, inexpensive and effective modality for the treatment of optic neuritis.

Key words: *Dexamethasone, Intravenous methylprednisolone, Optic neuritis.*

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INTRODUCTION

Optic neuritis is known to improve without treatment though it may also result in long-lasting defects in visual acuity and abnormalities in contrast sensitivity, color vision, stereopsis, light sensitivity, visual fields, pupillary responses, optic disc appearance and visual evoked potentials.[1,2] The treatment of optic neuritis has always been controversial regarding the use of steroids.[3]

Intravenous megadose steroids help towards an early recovery of vision and offer some advantage in preventing recurrence and development of multiple sclerosis.[2] Intravenous dexamethasone has been widely used post-transplant surgery and in dermatological and rheumatological diseases by oral route as well as in long duration intermittent pulse therapy.[5,6] Dexamethasone is a highly selective glucocorticoid with fluorination at C9 and methyl group at C16.[7] It is a cheaper treatment option with fewer side effects and is easier to administer as compared to methyl prednisolone.[8]

This study was carried out to compare the efficacy of intravenous dexamethasone and intravenous methyl

prednisolone on visual recovery as well as to evaluate their side effects.

AIMS AND OBJECTIVES

To prepare clinical profile of optic neuritis cases and compare the efficacy of treatment with intravenous dexamethasone and intravenous methylprednisolone

RESEARCH METHODOLOGY

Study design: A hospital based prospective randomized comparative study.

Study period: 18 months:January 1st 2009-June 30th 2010

Inclusion criteria:

All cases of optic neuritis presenting to the OPD and Neuro-Ophthalmology clinic of BPKLCOS and receiving treatment in TUTH.

Exclusion criteria:

- Patients who received some form of treatment elsewhere.
- Patients who were not treated as per the treatment protocol.
- Patients who refused to participate in the study.
- Visual loss due to trauma/traumatic optic neuropathy
- Patients not completing the follow up during the study period.

METHODOLOGY:

Patients were randomized into two groups for treatment with systemic corticosteroids by block randomization.

Group I: Patients in group I received intravenous dexamethasone 200 mg (in 150 ml 5% dextrose solution) given over one and a half to two hours once a day for three days.

Group II: Patients in group II received intravenous methylprednisolone 500mg/twelve-hourly (in 150 ml 5% dextrose solution) given over one and a half to two hours for three days followed by oral prednisolone for 11 days.

Visual acuity was assessed using snellen Chart (at a distance of 6m). Colour vision was recorded using Ishihara Pseudoisochromatic colour vision plates. Contrast sensitivity was recorded using Pelli-Robson chart at 1m. Goldman visual field using Goldman perimeter for both the eyes were done.

The patients in both groups were examined every day during the institution of treatment and later at one week, one month and three months. Data were recorded on a pre-designed proforma.

Data processing and analysis:

Useful data were entered in computer database for statistical analysis. Microsoft Excel version 2007 and SPSS version14.0.1software were used for this purpose. In this study,P value <0.05 was considered statistically significant.

RESULTS

A total of 60 patients were included in the study. The patients were divided into two groups of 30 each, group I received Dexamethasone therapy while Group II received Methylprednisolone therapy.

AGE

Age of the patients ranged from 15 to 62 years in group I while 10 to 60 in group II.

Gender

22 patients were male while 38 were female. Both group I and II have equal representations in the form of 11 males and 19 females.

Clinical diagnosis:

40%(n=12) patients in group I were diagnosed as papillitis; 60%(n=18) were diagnosed as retrobulbar optic neuritis.

In group II, 50%(n=15) were diagnosed as papillitis, 46.6%(n=14) as retrobulbar optic neuritis and 3.3%(n=1) patient was diagnosed to have neuroretinitis at presentation.

Visual status:

At presentation in group I, two eyes had no light perception (NPL) at all, nineteen eyes had less than 3/60 vision and eighteen eyes had vision of 6/24-6/60. At subsequent follow ups, the visual acuity showed improvement in all patients so that at the end of three months follow up, all forty two eyes had a vision of 6/6-6/18. The p value was <0.001 at each subsequent follow up which was statistically significant. 14.2% (n=6) eyes had vision of 6/6, 16.6% (n=7) eyes had vision of 6/9, 35.7% (n=15) eyes had vision of 6/12 while 33.3% (n=14) eyes had vision of 6/18 in Group I at 3 months follow up.

In group II, two eyes were NPL at presentation, twenty eyes had vision of less than 3/60, one eye had vision of 5/60-3/60, fourteen eyes had vision of 6/24-6/60 and three eyes had 6/6-6/18 vision. All patients showed improvement in visual acuity so that at the end of three months follow up, all forty eyes had a vision of 6/6-6/18. The p value at each follow up was less than 0.001 which was statistically significant. In Group II, 17.5% (n=7) eyes had vision of 6/6, 12.5% (n=5) eyes had vision of 6/9, 35% (n=14) eyes had vision of 6/12 and 35% (n=14) eyes had vision of 6/18 at 3 months follow up.

While comparing the p value between group I and II, it was 0.14 at pretreatment period. At first week, first month and 3rd month follow up, it was 0.59, 0.43 and 0.36 respectively, which means the p value is statistically insignificant. Hence Dexamethasone and Methylprednisolone have equal efficacy in the outcome of the visual acuity upto 3 months follow up.

Colour vision at presentation and on subsequent follow ups:

Among the study population, in group I twenty two eyes had normal colour vision, ten had abnormal colour vision while in rest ten eyes colour vision could not be done because of poor visual acuity. At the end of three months after treatment with intravenous dexamethasone, 95.2%(n=40) of the eyes in group I had normal colour vision .

In group II, nine eyes had normal colour vision, eleven eyes had abnormal colour vision while colour vision testing could not be done in twenty eyes because of poor visual acuity. After treatment with intravenous methylprednisolone, colour vision showed improvement in all eyes so that at the end of three months follow up,97.5%(n=39) of the eyes had normal colour vision while one eye had abnormal colour vision.

Contrast sensitivity:

The patients who had very poor visual acuity could not be tested for contrast sensitivity.

The p value at each follow up is significant in each group suggestive of recovery of contrast sensitivity from previous records.

The p value when comparing Dexamethasone with Methylprednisolone was statistically insignificant between the two groups on day 7, 30 and 90. Pretreatment p value was 0.639, 0.203 at 1st week, 0.388 at 1st month and 0.640 at 3rd month follow up.

Visual field changes:

Pretreatment visual fields could be charted in only 25eyes in group I and 19 eyes in group II. Visual field defects seen in group I were central scotoma in 7 and cecocentral scotoma in 15 eyes, whereas in group II, central scotoma and cecocentral scotoma was seen in 10 eyes and 5 eyes respectively. At 3 months follow

up in group I, 80.95% of the eyes showed normal visual fields while central scotoma persisted in 2 eyes, cecocentral scotoma in 4 eyes, paracentral scotoma in 1 eye and diffuse constriction of the visual field in 1 eye.

At 3 months follow up in group II, 82.5% of eyes had normal visual fields. Central scotoma and cecocentral scotoma persisted in 3 eyes and 2 eyes respectively. Paracentral scotoma and diffuse constriction of visual fields were seen in one eye each.

DISCUSSION

This hospital based prospective comparative study was carried out at B.P. Koirala Lions Centre for Ophthalmic Studies (BPKLCOS) and Tribhuvan University Teaching Hospital (TUTH) from January 1st 2009 to June 30th 2010(18 months) to evaluate the treatment outcome of optic neuritis cases with intravenous Dexamethasone and intravenous Methylprednisolone and compare their efficacy and side effects in the treatment outcome of optic neuritis.

We had female preponderance. The study done by Bista S et al (2007) also showed female preponderance with 54% female and 46% males in the study.[9] A study done by Tandon R. et al (2006) in R.P. centre for Ophthalmic sciences showed 75% males and 25% females which does not match with the sex ratio of our study.[10] The study done by Wang et al (2001) in Singapore showed that 61.3% were males and 38.7% were females.[11] The probable reason for female preponderance in our study could be due to the fact that there are more female than male in the whole population of Nepal as shown by the latest census of our country.

Age of the patients in group I ranged from 15 to 62 years and 10 to 60 years in group II in our study. The p value was 0.620 between group I and II. Hence both the groups were age and sex matched. Study done by Tandon R. et al (2006) showed the mean age group to be 30.510±10.6 years.[10] The mean age group in our study was 30.07±12.76 years in group I and 31.97±14.05 years in group II. The mean age group in total study population was 31.02±13.41 years. A similar comparative study done by Mehrotra A. et al (2007) showed the mean age group I to be 31.2±10.1 years and group II to be 26.6±11.5years.[12] Optic Neuritis Treatment Trial (1992), a multicentric study showed age range of the patients between 18 years to 46 years.[13] Study done by Wang et al (2001) showed that mean age was 39.1 years and age range from 11 to 67 years.[11]

Unilateral optic neuritis, 63.3% (n=38) dominated our study group. In total retrobulbar neuritis was the more common presentation though in group II papillitis was diagnosed in 50% of the cases while retrobulbar neuritis in 46.6%. Study done by Wang et al (2001) in Singapore reported 80.8% of cases as unilateral and 19.2% of the cases as bilateral.[11] The ONTT (1992) study showed retrobulbar neuritis in 66% of the cases.[13] However, a study done by Tandon R. et al (2006) reported papillitis in 50% of the cases, retrobulbar neuritis in 42.5% and neuroretinitis in the rest of the population.[10]

The study done by Mehrotra A. et al (2007) in All India Institute of Medical Sciences also show similar results with no difference in visual acuity improvement between patients receiving intravenous Dexamethasone and intravenous Methylprednisolone.[12] In our study, there was significant improvement in visual acuity in all the patients enrolled for study. Similarly, a study done by Tandon R. et al(2008) showed significant improvement in visual acuity at the end of three months follow up.[10] Study done by Wang et al (2001) showed that the steroid treated patients had significant improvement in vision in 6 months follow up.[11]

A study done by Tandon R. et al (2006), had normal colour vision in 75% of the cases after administration of Dexamethasone at 3 months follow up period, 14.28% had partial colour deficiency and 10.72% had absolute colour deficiency.[10] The ONTT (1992) showed that most persons show mixed red-green and blue-yellow colour defects.[13] Blue yellow defects tend to be slightly more common in the acute phase of the disease, with slightly more red green defects at 6 months. Person may shift defect type over time. It concluded that optic neuritis is not characterized by selective red green defects. Colour defect type cannot be used for the differential diagnosis of optic neuritis.

A study done by Mehrotra A. et al (2007), which compared the efficacy of Dexamethasone with Methylprednisolone also found similar results. There was no significant difference in the relative improvement of contrast sensitivity in that study.[12] A study done by Tandon R.et al (2006), showed statistically significant improvement in contrast sensitivity at the end of 3 months which also matches with our study.[10]

Study done by Mehrotra A.et al (2007) had normal visual field in 81.8% of the patients who received intravenous dexamethasone at the end of 3 months follow up; the remaining 19.2% patients had residual central scotoma. Among the patients who received methylprednisolone in that study, 90% had normal visual field at the end of 3 months with only 10% of the patients having persistent central scotoma. Before treatment, all eyes had abnormal visual field in that study.[12] A study conducted by Tandon R.et al (2006) showed normal visual fields charted by Goldmann in 75% of the eyes at the end of 3 months while persistent centrocecal and paracentral scotomas were found in 14.28% and 10.72% eyes respectively.[10]

Six months follow up result in ONTT (1992) showed that all four vision test results (visual acuity, colour vision, contrast sensitivity and visual field) were highly intercorrelated at baseline and at six months. At baseline, contrast sensitivity had the highest prevalence of abnormality, but all vision tests were so often abnormal that differences were not clinically relevant. At six months, when visual recovery had occurred, contrast sensitivity was most often abnormal. It concluded that the high intercorrelation of four vision tests suggests that optic neuritis affects a broad range of visual functions. Among non visual acuity tests contrast sensitivity proved to be a particularly practical and sensitive indicator of visual dysfunction.[13]

While comparing dexamethasone and methylprednisolone, recovery in visual parameters was similar till three months of follow up. In a study carried out in cases of multiple sclerosis (Wray SH 1997), dexamethasone and mega-dose methylprednisolone were equally efficacious in promoting recovery.[14] Dexamethasone costs six times less than methylprednisolone so dexamethasone can be considered as an alternative for treatment of optic neuritis in our country.

CONCLUSION

Intravenous dexamethasone is as effective as megadose intravenous methylprednisolone. Therefore, Dexamethasone can be considered as an alternative to methylprednisolone for treatment of optic neuritis.

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