

Efficacy of Citicolline in Treatment of Amblyopia as an Adjunct to Patching



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Abstract

Aim: To study the effectiveness of the addition of citicolline to patching in the treatment of amblyopia in the age group of 4-12 years.

Materials and methods: A randomized controlled trial, which included 30 patients who were randomly divided into two groups. Both the groups received patching therapy for 6 months or till plateau was reached. Then in phase 2, group I received citicolline plus patching and group II continued to receive only patching.

Outcome measures: Outcome was measured by the visual acuity using snellens chart every month till 6 months when citicolline was added to one group and the visual acuity was recorded 2 monthly.

Results: No significant difference was found in the mean visual acuities in these two groups in first 6 months or till plateau was reached. After starting citicolline in one group for the initial two months, there was no significant difference in the visual acuities in these two groups, at the respective intervals. However, four months onward, up to 12 months, there was a significant difference in the visual acuities in these groups. The result was the same in younger patients (< eight years of age) as well as in older patients (> eight years of age). After starting citicolline the improvement in group I was significantly more than that in group II, at two months and onward, at the respective intervals.

Conclusion: The improvement in visual acuity with citicolline plus patching was significantly more than that with patching alone.

Introduction

Amblyopia is the most common cause of monocular visual impairment in children, young, and middle-aged adults [1]. There is a consensus that amblyopia can be effectively treated in young children [2-4]. Although there has been, in the past, a general belief that treatment beyond a certain age is ineffective, it has been conclusively proved that 'age' is no bar, for the success of the treatment of anisometropic amblyopia [5]. Some believe that a treatment response is unlikely after the age of six or seven years, while others consider the age of nine or ten years to be the upper age limit for successful treatment [6-10]. However, there are many studies involving older children and adults with amblyopia, responding to treatment with patching [11-24].

Occlusion therapy with patching of the sound eye has been the conventional treatment. However, there are many studies stating the effectiveness of some pharmacological agents in the treatment of amblyopia - citicolline is one of them [25,26].

Citicolline (cytidine-5-diphosphocholine) activates the biosynthesis of structural phospholipids in the neuronal cell membranes, which results in increased levels of neurotransmitters, and thus, has neuroprotective effects [27]. It has also been shown to improve the learning and memory

performance. There are few animal studies that have reported the enhancement of dopaminergic neurotransmission in the brain with citicolline (exogenous cytidine-5'-diphosphocholine). A study aimed at determining whether citicolline (50 mg/kg., twice daily) could influence retinal catecholamine levels in adult male Albino rabbits, has reported that, compared to vehicle-treated controls, citicolline-treated animals displayed a significantly higher retinal dopamine concentration and a tendency toward an increase in adrenaline concentration, while the noradrenaline concentration remained unchanged [28].

Materials and Methods

- Patients in the Age Group of 4 To 12
- Not Having any other Ophthalmic Morbidity
- Not Having Any Allergy to Citicolline

The following tests were conducted:

- Complete refractive status of both eyes
- Cover test/uncover test for the amount of squint and type of squint, added vertical or oblique deviation

- C. Alternate cover test
- D. Extraocular movements
- E. Prism cover test
- F. Forced duction test as per the case, local or general anesthesia
- G. Direct ophthalmocopy for eccentric fixation in strabismic amblyopia
- H. Observation of result on initial patching therapy in strabismic cases.
- I. Color vision testing.

Following this, the patching therapy was started in both groups. The patients were followed at one month intervals and visual acuity was recorded. If there was no improvement in the visual acuity for three consecutive followups, then a plateau was considered. It was approximately corresponding to the maximum correction that could be achieved with patching. Once a plateau was achieved, second part of study was started.

Group I received citicoline in addition to continued patching. The doses of citicoline were 250 mg BD (for patients below five years) and 500 mg BD (for patients above five years). Group II continued to receive only patching. Dosage was continued for 45 days then gap of 15 days and then 2 more such cycles. Visual acuity was calculated at 2 monthly interval.

Results

No significant difference was found in the mean visual acuities in these two groups in first 6 months or till plateau was reached. After starting citicoline in one group for the initial two months, there was no significant difference in the visual acuities in these two groups, at the respective intervals. However, four months onward, up to 12 months, there was a significant difference in the visual acuities in these groups. The result was the same in younger patients (< eight years of age) as well as in older patients (> eight years of age). After starting citicoline the improvement in group I was significantly more than that in group II, at two months and onward, at the respective intervals.

Discussion

Drawbacks of study include not being a double blind trial and having just 30 patients. The present multicentric study was carried out to find out the effectiveness of the addition of citicoline to the conventional patching therapy for the treatment of amblyopia. This study has suggested that addition of citicoline, even after maximum improvement with conventional patching was achieved, can further improve the visual acuity.

Citicoline primarily acts by increasing the synthesis of phosphatidylcholine, the primary neuronal membrane phospholipid, thus enhancing the production of acetylcholine. Oral citicoline administration increases the plasma levels of choline and cytidine, the building blocks used to restore neuronal membrane integrity [32]. It is also postulated that

citicoline facilitates the preservation of sphingomyelin, which promotes signal transduction in nerve cells [33].

Citicoline may significantly impact the brain-remodeling activity. A study in rats has shown that citicoline treatment significantly increases the length and branch points of the dendrites, increasing the overall surface area occupied by neurons, which leads to an increased efficiency of sensory information processing. This mechanism of activity may potentially account for a significant portion of citicoline's neurorestorative functions [34].

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