

Study of ocular causes of convergence insufficiency

Juhi Saji^{1*}, Muhemmed Swadique², Ravi RV³

¹Optometrist, ³Ophthalmologist, Al Salama Group of Eye Hospitals, Kerala, INDIA.

²Professor of Ophthalmology, Kannur Medical College, Kerala, INDIA.

Email: juhisaji@gmail.com

Abstract

Background: Convergence insufficiency is the most commonly recognized sensory, neuromuscular and binocular dysfunction, also one of the major element in non-strabismic binocular vision anomalies. This study is to find out the ocular causes of convergence insufficiency in teenage. **Materials and Methods:** This retrospective, hospital based case study consisted of 420 eyes of 210 patients suffering non strabismic binocular vision anomalies with asthenopic symptoms, but had not undergone prior strabismic surgery or have any systemic diseases. Subjects were followed up 3 month after orthoptic evaluation to find the improvements with exercise. **Results:** 1. Muscular weakness of children in an age group of 10-20 is by their increased demand of near works 2. Accommodative problems due to uncorrected refractive errors causes convergence problems. **Conclusion:** Ocular causes of convergence insufficiency are 1. Muscular weakness 2. Accommodative anomalies -uncorrected refractive errors and asthenopia.

Key Words: Convergence Insufficiency, Accommodative Insufficiency, Excess and Spasm, Fusional Vergence Dysfunction.

*Address for Correspondence:

Dr. Juhi Saji, Optometrist, Al Salama Group of Eye Hospitals, Kerala, INDIA.

Email: juhisaji@gmail.com

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INTRODUCTION

Convergence insufficiency (CI) or convergence disorder is a sensory and neuromuscular anomaly of the binocular vision system, characterized by a reduced ability of the eyes to turn towards each other, or sustain convergence. Convergence insufficiency is a common near vision problem that, due to recent scientific research, is gaining public recognition. Convergence insufficiency disorder interferes with a person's ability to see, read, learn, and work at near (close distances). In the past, CI disorder has often gone undetected due to lack of awareness and

proper examination techniques, inadequate school screenings and irregular basic eye examination.

Non strabismic binocular vision anomalies may be classified into:

I. convergence anomalies, which includes (a) convergence insufficiency (b) convergence excess.

II. Accommodative anomalies, which includes (a) accommodative excess (b) accommodative insufficiency (c) accommodative in facility.

III. Rarely, divergence anomalies, which includes (a) fusional vergence dysfunction (b) divergence excess (c) divergence insufficiency.

CI is the most commonly recognized binocular dysfunction. This is typically an idiopathic and benign condition which represents a mismatch between a patient's visual capabilities and near point demands. Presenting symptoms may be mild to severe with a gradual onset. This may occur in elementary school, in college, or at work as a result of increased work load. The majority of CI patients will have an associated accommodative dysfunction. In some cases, presenting symptoms may be coincident with the onset of presbyopia (Reduction in the accommodative capability of the

crystalline lens, aggravating a preexisting fragile state of binocularity). CI has also been associated with reading difficulties. Some or all of the following symptoms like, double vision at near, words moving around the page, words swimming, eye strain, eye fatigue, headaches, later in the day, associated with reading and or/ computer use, blurred vision or focusing problems at near, limited concentration, avoidance of near point task, may be reported after or during extended periods of near work. Reliable measurements should be confirmed by repeating abnormal test findings or by documentation of multiple measurements confirming the same diagnosis: With receded near point of convergence greater than 6cm, immediate diplopia may be noticed when the test is repeated while a red lens is held over the eye, Exophoria is present at near, typically greater than 6 to 8 prism diopters, Near lateral phoria testing may reveal higher exophoria than predicted by the cover test, LoA positive fusional vergence based on sheard's criterion, Low AC/A Ratio, Accommodative anomaly, ie difficulty clearing plus lenses OU, low NRA or high PRA, signs of associated accommodative dysfunction are typically present. Treatment: Home /office based vision therapy, Pencil push up therapy, Visual hygiene and Spectacles.

MATERIALS AND METHODS

This is a Retrospective cross sectional study of 200 patients conducted at the Al Salama Eye hospital, Perinthalmanna at Malappuram district between 15th March 2015 to 27th July 2015 for period of 5 months. A retrospective simple random study involving active search for cases of non strabismic binocular vision anomalies patients and reported cases by consultant clinicians and optometrists of any non strabismic binocular vision anomalies patients with complaint of asthenopia, were noted.

INCLUSION CRITERIA

- Patients with complaint of asthenopic symptoms.
- Non-strabismic patients.
- Both males and females are included.

RESULTS

- Age from 5-20 years mainly school going children.
- Patients with or without any refractive errors

EXCLUSION CRITERIA

- Patients without complaint of asthenopia.
- Strabismic patients and history of strabismus.
- Age below 5 years and above 20 years.
- Amblyopic patients.
- Anisometropic patients.
- Patient with nystagmus.
- Aphakic and pseudophakic patients.
- Use of any medication that might affect accommodation and vergence.
- Patients with sinusitis and migraine.
- Children with glaucoma in one or both eyes, eyes with retina or vitreous disorders,

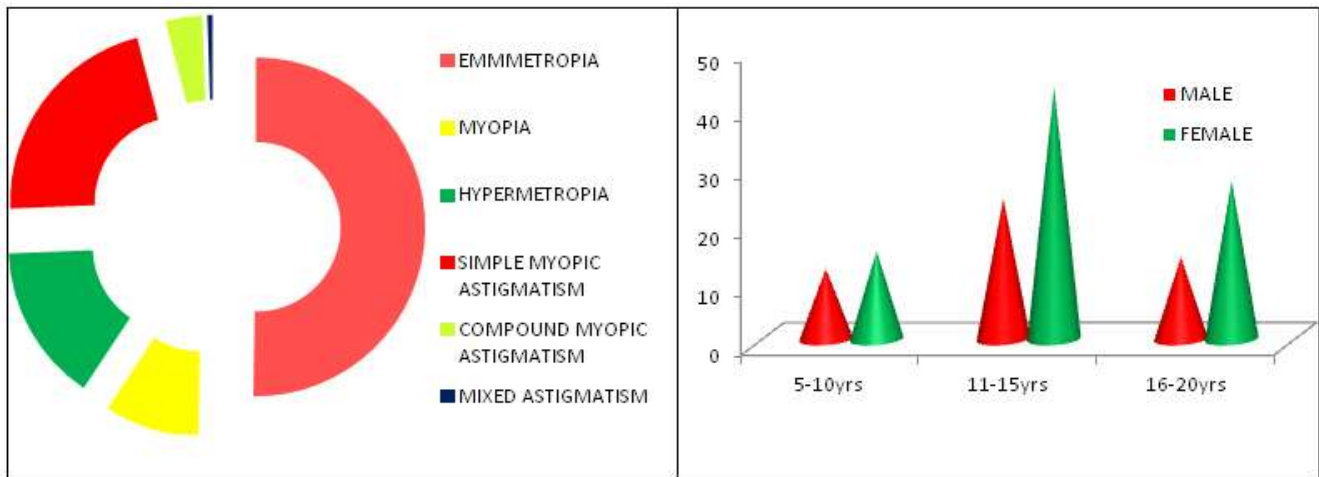
Eyes with any corneal disorders like, opaque or disfigured cornea, corneal ulcer, corneal inflammation, corneal dystrophy, corneal degeneration, keratoconus and large pterygium are excluded.

- Eyes with history of any other ocular disease or surgery are also not included in this study.
- Patient's with any systemic problems.
- Patients with any neurological problem.

Patients with asthenopic symptoms like, ocular headache, eye strain, eyepain, watering, blurring of vision while doing near works etc who came to Al salama Eye Hospital, Perinthalmanna, were included. Healthy male and female emmetropic patients ranging from 5-20 years of age, were included. All optometrists and concerned doctors in the hospital were involved in this study. Complete clinical history was taken from case reports, medication charts, and personal interviews with them, were done and noted. Disease status of the patients and other co morbid conditions were properly enquired and noted down. Medication history of patients were obtained from the patient medication slips, prescriptions and also from in-depth patient interview regarding medication or ocular surgeries. All patients underwent a complete eye examination including assessment of visual acuity (unaided, aided, and corrected).

Table 1: Analysis of NSBV Anomalies

NSBV ANOMALIES	NO OF PATIENTS
CONVERGENCE PROBLEM	139
ACCOMMODATIVE PROBLEM	102
BOTH	63
VERGENCE PROBLEMS	12
WITHIN NORMAL LIMITS	3



Graph 1: Refractive Status

Graph 2: Study of Convergence insufficiency

Graph 1 represents the refractive status of the subjects. Astigmatism was found to be the most common refractive error. Graph 2 shows that convergence anomalies are more common in the age group between 11-15 years.

DISCUSSION

This is a retrospective cross sectional study of 200 patients from Al Salama eye hospital, Perinthalmanna. The study was done to find out ocular causes of convergence insufficiency between 5 to 20 years of age. Convergence insufficiency is a common condition (Table 1) that is characterized by a patient's inability to maintain proper binocular eye alignment on objects as they approach from distance to near. There is typically an exophoria or intermittent exotropia for near, a receded near point of convergence, reduced positive fusional convergence amplitudes, and a low accommodation convergence/accommodation (AC/A) ratio. The symptoms associated with convergence insufficiency vary from mild to severe, but they are often extremely troublesome for patients with this condition, especially when associated with a small angle exotropia at the near working distance causing binocular diplopia.

CONCLUSION

The ocular causes of convergence insufficiency are as:

- Muscular weakness of children in an age group of 10-20 mainly by their increased demand of near works.
- Related to accommodative problems, as uncorrected refractive errors and

astigmatic refractive errors that causes asthenopia. (Graph 1)

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