

Study of the surgical management of esotropia  
with high accommodative  
convergence/accommodation ratio

Thesis

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## Introduction

Esotropia with high accommodative convergence/accommodation (AC/A) ratio is a condition characterized by an esotropia which is greater for near fixation than for distance fixation. It was first described by Donders in 1864. (1)

To be significant, the difference between near and distance fixation should be greater than 10 prism dioptres (10 PD) and that this difference remains after full hypermetropic correction with single focus lenses. (1)

In this group of patients excessive convergence in response to an accommodative demand is the cause of a greater esotropia for near than distance. (2)

Costenbader (2) described a group of patients with a low AC/A ratio who had a remote near point of accommodation, their poor accommodation requires them to exert excessive accommodative effort resulting in near esotropia, this uncommon condition has been called hypoaccommodative convergence excess esotropia and it is not included in this study. (2)

### Optical management:

Bifocals have been used since the 19th century (3) and remain a popular option in the management of children with high AC/A ratio.

They are viewed by many ophthalmologists and orthoptists as a "tried, tested, and safe" management option, the difficult issue is the practicality of bifocal wear in childhood, even alert, intelligent, and motivated 45 years old sometimes find it difficult to cope with their first pair of bifocals, the instinctive chin-down head posture adopted when viewing near objects needs to be reversed, the blur in downgaze is disturbing and may interfere with daily activities such as walking down the stairs, the position of the bifocal segment needs to be high, preferably bisecting the pupil in the primary position, a flat top design is best, and the glasses need to be fitted securely to prevent slippage, all these requirements are often impossible to achieve lastingly in children since the nose offers little support for these bulky glasses. (3)

The bifocal, moreover, becomes effective only at one third of a meter, leaving intermediate and closer distances inappropriately corrected. (3)

## Surgical management:

The surgical management of patients with esotropia that is significantly greater at near than distance represents a challenging problem, when considering surgical management, these patients can usefully be categorized into two groups after wearing glasses with full cycloplegic refraction. (4)

### **Group A**

These patients have binocular vision maintained at distance fixation with or without a microtropia. When patients fix on a near accommodative target they have an esotropia (intermittent or constant). The potential for recovery of high grades of stereopsis may exist in some of these patients. (4)

### **Group B**

These patients have a manifest esotropia at distance (which may or may not be intermittent) with a larger constant esotropia at near when fixing on an accommodative target. These patients, when aligned surgically, may demonstrate some degree of binocular vision, but in many, binocular vision is minimal or absent. (4)

### **Surgical goals**

There are a number of outcome objectives in the surgical management of convergence excess esotropia:

1. Alleviate the patient's symptoms (diplopia, aesthenopia, cosmetically unacceptable esotropia)
2. Eliminate the need for bifocal glasses
3. Maintain or improve sensory binocularity
4. Reduce the near deviation to a level that enables control by the patient's motor fusion reserves without detrimentally altering the distance angle.

For group A patients with good control in the distance, all of the surgical goals are possible. For group B patients the likelihood of achieving optimal outcomes are generally much less and the likelihood of postoperative symptomatic overcorrection or undercorrection are greater. (4)

## Purpose of the study

In cases of esotropia combined with a high AC/A ratio two methods of surgical therapy are possible: recession of the medial recti and retroequatorial myopexy of the medial recti.

Our aim is to answer the question whether retroequatorial myopexy alone, recession of the medial recti alone, or combination of both are appropriate methods of reducing the strabismic angle at near and distant fixation to values under 10 PD and near-distant disparity to less than 10 PD to form the basis for single binocular vision without bifocals.

## Patients and methods

Patients are grouped according to the surgery done into three groups:

### Group A:

Fifteen patients will undergo bilateral medial rectus retroequatorial myopexy 12 – 14 mm from the insertion of the medial rectus.

### Group B:

Fifteen patients will undergo bilateral medial rectus recession (according to augmented formula).

### Group C:

Fifteen patients will undergo bilateral medial rectus recession (according to augmented formula) and bilateral medial rectus retroequatorial myopexy 12 – 14 mm from the insertion of the medial rectus.

The augmented formula used in this study states that:

The target angle is an average between near deviation without correction and distant fixation with full hypermetropic correction (average between the largest angle and the smallest angle).

All the patients will undergo the following before surgery:

1. Informed consent about the procedure and all the possible complications
2. Full history (personal, past and family history)
3. Full ophthalmological examination (lid, conjunctiva, anterior segment, posterior segment and special comment on the ocular motility)

4. Full cycloplegic refraction with atropine sulphate 1% eye drops for three days before examination.
5. Angle of deviation and the near distance disparity with and without glasses.
6. Patient's sensory binocular single vision measurement by using titmus stereo-acuity and worth four-dot test

All the patients will undergo the following for 3 months after surgery:

1. Angle of deviation and near distance disparity with and without glasses.
2. Patient's single binocular vision measurement by using titmus stereo-acuity and worth four-dot test

Follow up period will be at least 3 month and all the patients will be operated upon in Ain Shams university hospitals.

### Inclusion criteria:

1. Near-distance disparity of at least 10 PD
2. Failed bifocal treatment

### Exclusion criteria:

1. Near-distance disparity less than 10 PD
2. Previous strabismus surgery
3. Hypoaccommodative convergence excess esotropia
4. Infantile esotropia
5. follow up period less than 3 months

## References

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