



Review

# Binocular vision and refractive surgery

Alison L. Finlay\*

*Department of Optometry and Visual Science, City University, London EC1V 0HB, United Kingdom*

---

## Abstract

Binocular status can have an effect on the outcome of refractive surgery. Some accommodative deviations and anisometropia can be managed effectively. Fully accommodative esotropia has been successfully treated in young patients but the outcome can be less predictable in older patients. High anisometropes are usually unaffected by the change in aniseikonia following refractive surgery but there are exceptions. Failure to recognise and appropriately classify a binocular vision anomaly pre-surgically can result in symptoms that are difficult to manage post-operatively. Refractive surgery producing a binocular vision anomaly where there was none pre-operatively is less common. I present a review of the literature discussing the relationship between binocular vision anomalies and refractive surgery, illustrating the findings with published reports of successful and unsuccessful binocular postoperative outcomes. I argue that predicting the binocular outcome should be considered pre-operatively for every refractive surgery patient.

© 2007 Published by Elsevier Ltd on behalf of British Contact Lens Association.

*Keywords:* Binocular vision; Refractive surgery; Heterophoria; Heterotropia; Aniseikonia; Cyclotorsion

---

## Contents

1. Refractive surgery as a treatment for a binocular vision anomaly . . . . .	77
1.1. Esotropia or esophoria . . . . .	77
1.1.1. Fully accommodative esotropia . . . . .	77
1.1.2. Convergence excess esotropia . . . . .	77
1.1.3. Constant Esotropia with an accommodative element (partially accommodative) . . . . .	77
1.1.4. Exotropia or exophoria . . . . .	78
1.1.5. Aniseikonia . . . . .	78
2. A pre-existing binocular vision anomaly affecting the results of refractive surgery . . . . .	79
2.1. Torsion . . . . .	79
3. Refractive surgery causing a BV problem . . . . .	79
4. Exacerbating a BV problem . . . . .	80
4.1. Comitant heterophoria . . . . .	80
4.1.1. Esophoria . . . . .	80
4.1.2. Exophoria . . . . .	80
4.1.3. Vertical deviations . . . . .	80
4.2. A switch in ocular dominance . . . . .	80
4.3. Monovision . . . . .	80
5. Comitant heterotropia . . . . .	80
5.1. A constant deviation . . . . .	80
5.2. An intermittent deviation . . . . .	80

---

\* Tel.: +44 7870 727188.

*E-mail address:* [a.finlay@city.ac.uk](mailto:a.finlay@city.ac.uk).

6.	Incomitant deviation . . . . .	81
6.1.	Constant . . . . .	81
6.2.	Intermittent . . . . .	81
6.3.	Monovision . . . . .	81
6.4.	Torsion . . . . .	81
6.5.	Binocular diplopia post-refractive surgery . . . . .	81
7.	Pre-operative assessment of refractive surgery patients . . . . .	82
8.	Summary . . . . .	82
	References . . . . .	82

The relationship between ametropia and binocular single vision can be critical to the successful, asymptomatic outcome of any refractive correction, whether it is an external appliance or surgery. Relatively small modifications to a refraction can resolve problems with binocular single vision for some, whereas it can create problems for others. For the majority of patients the binocular apparatus is robust enough to cope with changes to the refractive status but this is not true for everybody. Relief of symptoms can be difficult when a change in correction affects binocular comfort. With spectacles and contact lenses similar considerations apply [1] but subsequent modification of the correction is much easier with these forms of refractive correction than following refractive surgery. In patients with an underlying binocular condition it would be an advantage to be one step ahead of the situation by having a full pre-operative assessment of the binocular status, as in these cases the accuracy of the correction can be critical.

## 1. Refractive surgery as a treatment for a binocular vision anomaly

### 1.1. Esotropia or esophoria

A convergent deviation of the visual axes may or may not be associated with a refractive error. The term accommodative esotropia refers to a group of manifest deviations that are affected by the accommodative status of the patient; the deviation will be reduced by a hypermetropic correction or exacerbated by a myopic correction.

#### 1.1.1. Fully accommodative esotropia

Hypermetropes that have a convergent deviation without their refractive correction, but binocular single vision when fully corrected.

The specifics of the definition can vary slightly.

1. A fully accommodative eso deviation is orthophoric with glasses and either esophoric or esotropic without glasses.
2. A fully accommodative esotropia has binocular single vision with glasses (orthophoria or heterophoria) but has a manifest esotropia without glasses. This is the definition used in UK.

In theory, an optimal hypermetropic correction should produce an asymptomatic binocular response, whether the

correction is via spectacles, contact lenses or refractive surgery, and indeed Dvali et al. [2] achieved a binocular outcome in 21 of 24 hyperopic children. Surprisingly this does not always appear to be the case. Logic would suggest that in a presbyope, who no longer has any measurable accommodation, the angle of deviation would depend little on the refractive correction. Practical experience does not necessarily support this prediction, with presbyopes sometimes remaining esotropic without their glasses and having binocular single vision with their correction. Gunton et al. [3] reported such a case, a 68-year-old. Pre-operatively the mean spherical correction was R +7.50 L +8.50 add +2.50. Esophoric with his prescription and esotropic without. Following cataract surgery, with an implant correcting his refractive error, his post-operative mean spherical prescription was R plano L +0.50 but with a 25 $\Delta$  esotropia that later needed correcting with a squint operation.

#### 1.1.2. Convergence excess esotropia

Defined as an accommodative esotropia with a high accommodative convergence to accommodation (AC/A) ratio. In practice, this refers to a group of patients who are normally but not invariably mildly hypermetropic. When wearing their optimal distance correction they are binocular for distance fixation. Whenever they accommodate they become esotropic. Most commonly the esotropia is only detectable on near fixation when viewing a detailed target. If the need for accommodation is removed, by using a +3.00DS addition on top of their full distance prescription, then viewing a target at 33 cm they maintain binocular single vision. Not all 'near esotropias' are so influenced by accommodation but when they are, refractive surgery will not affect the AC/A ratio. These patients are unlikely to have a full binocular outcome without the use of an 'add' or subsequent squint surgery.

#### 1.1.3. Constant Esotropia with an accommodative element (partially accommodative)

The definition of a partially accommodative esotropia can vary.

1. An eso deviation is retained with the full hypermetropic deviation, but becomes larger without the correction. This deviation may be esophoric or esotropic.
2. In UK the term has been superseded by the more longwinded but descriptive 'constant esotropia with an

Download English Version:

<https://daneshyari.com/en/article/2697164>

Download Persian Version:

<https://daneshyari.com/article/2697164>

[Daneshyari.com](https://daneshyari.com)