

# Conservative management of concomitant strabismus

The aim of management for all patients with strabismus should centre around four goals: to prevent amblyopia, to alleviate symptoms, to restore binocular single vision (BSV) and to improve ocular alignment.

The conservative management options available for strabismus include observation, occlusion, optical, orthoptic exercises and the use of prisms. A summary of the options and the indications for use are available in Table 1. Some of these options can be used diagnostically and therapeutically, however, only the therapeutic options will be discussed in this article.

## Observation

The indications for observation versus active management are stated in Table 1. This option is often not thought of as a management plan but may be essential in some cases. For example, if a patient's strabismus is unstable, observation is essential before deciding on further treatment. However, they should still be regularly followed up and it should be ensured that there is no benefit to active treatment. For instance, if a young

patient's intermittent deviation begins to decompensate, treatment must be initiated. Therefore, regular orthoptic investigations should be maintained to monitor the areas stated in Table 1. Specific tests such as the Newcastle Control Score have been encouraged when observing intermittent distance exotropia (IDEX) to help decide whether surgery is indicated [1].

## Occlusion

Occlusion can be used to improve VA, relieve diplopia or to disrupt suppression. To improve VA, conventional patching of the non-amblyopic eye can be prescribed, the number of hours required is dictated by the level of vision and evidence-based practice regime suggested by Paediatric Eye Disease Investigator Group (PEDIG). For moderate amblyopia (6/12-6/30) up to two hours is suggested, whereas, up to six hours is suggested for severe amblyopia (6/30-6/120) [2,3]. In cases of eccentric fixation, prior to conventional occlusion, a short period of inverse occlusion of the affected eye may be beneficial to help break the fixation pattern. There is little evidence to suggest that inverse occlusion is effective, therefore this is not common practice. An

alternative to 'patching' is the use of one drop of atropine 1% twice weekly. PEDIG have found that atropine is equally effective for those with moderate amblyopia [4]. It is also an effective treatment for those with severe amblyopia, especially those aged three to six [5]. It is important to note that prior to any occlusion a patient should be refracted, and a sufficient period of refractive adaptation should be allowed (up to 18 weeks). Stewart et al. reported a mean improvement of 0.24 LogMAR from refractive correction alone [6].

## Optical

Besides the use of lenses to correct refractive error and hence improve VA, lenses may be used to manipulate accommodation and convergence, and improve control manifest and latent deviations. The principle of this is that convex lenses encourage relaxation of accommodation hence reducing the amount of convergence exerted, whereas concave lenses stimulate accommodation and therefore encourage extra convergence.

Convex lenses are used to treat accommodative esotropia. The full

**Table 1: A summary of conservative management options for concomitant strabismus.**

Management option	Indications	What to do
<b>Observation</b>	<ul style="list-style-type: none"> <li>Well-controlled intermittent deviation in young patients with potential risk of amblyopia</li> <li>Parent / patient refuses treatment</li> <li>Uncertainty of how best to treat, e.g. variable test results</li> </ul>	<ul style="list-style-type: none"> <li>Regular orthoptic assessments to assess the patient's VA, control of deviation (e.g. cover test, controlled binocular acuity and Newcastle control score), angle of deviation and BSV.</li> </ul>
<b>Occlusion</b>	<ul style="list-style-type: none"> <li>To treat amblyopia</li> <li>To relieve diplopia</li> </ul>	<ul style="list-style-type: none"> <li>Options include conventional patching or Atropine 1% twice weekly</li> <li>Follow PEDIG guidelines</li> <li>Allow refractive adaptation</li> </ul>
<b>Optical</b>	<ul style="list-style-type: none"> <li>To improve VA</li> <li>To improve BSV</li> </ul>	<ul style="list-style-type: none"> <li>Prescribe the full hypermetropic correction if patient esotropic</li> <li>Trial extra plus lenses (up to +3.00DS) if convergence excess suspected</li> <li>Trial minus lenses (up to -3.00DS) in intermittent distance exotropia</li> </ul>
<b>Orthoptic Exercises</b>	<ul style="list-style-type: none"> <li>To improve BSV and alleviate symptoms</li> <li>Wean out of extra lenses and prisms</li> </ul>	<ul style="list-style-type: none"> <li>For eso deviations, focus on improving negative fusional amplitudes and negative relative vergence</li> <li>For exo deviations, focus on improving convergence, positive fusional amplitudes and positive relative vergence</li> </ul>
<b>Prisms</b>	<ul style="list-style-type: none"> <li>To alleviate symptoms and restore BSV</li> </ul>	<ul style="list-style-type: none"> <li>For eso deviations, base-out (BO) prism</li> <li>For exo deviations, base-in (BI) prism</li> </ul>

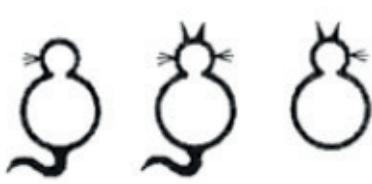


Figure 1: A cat stereogram (used to improve relative vergence) and dot card (used to improve convergence).

hypermetropic correction should be prescribed, where tolerated, to determine if BSV can be restored (fully accommodative esotropia). If the angle is reduced, but BSV is not achieved, the use of extra plus lenses (up to +3.00DS) should be explored. In cases of convergence excess esotropia (CXS) the patient will become binocular. This is due to patients with CXS having a high accommodative convergence / accommodation ratio (AC/ A). For CXS patients, bifocals can be prescribed and have been shown to be an effective short- to medium-term management option for establishing good BSV. In the long- term some patients can be weaned out by orthoptic exercises whilst others may progress to surgery. In cases of consecutive exotropia, reducing the strength of the hypermetropic/convex spectacles may possibly result in a satisfactory outcome, as more accommodation and convergence can be exerted.

Concave lenses (of up to -3.00DS) can be used in IDEX's to achieve control of a manifest deviation and hence restore / maintain normal BSV. Over time the strength of the concave spectacles can be reduced if the patient can control their deviation, and if they cannot the patient may go on to have surgery. To help patients achieve better control orthoptic exercises might be prescribed in conjunction with concave lenses to help improve convergence and negative fusional amplitudes. Authors have suggested trailing minus lenses in all IDEX types with poor control, however, Kushner suggested that they work best in those with a high AC/A [7].

### Orthoptic exercises

Orthoptic exercises can be used to improve control, alleviate symptoms, or to wean patients out of lenses or prisms. They can only be used in patients who are able to appreciate physiological diplopia. Options include convergence exercises (e.g. pen convergence and dot card), improving fusional amplitudes (e.g. homemade prism bars) and improving relative vergence (e.g. bar reading or stereograms). Suppression is a contraindication for exercises, anti-

suppression can be undertaken but the safety of this is questionable. There is little evidence base to support the use of exercises, especially in the management of esotropic deviations but good outcomes can be achieved [8]. Success will be affected by the level of patient compliance and appropriate patient selection.

The focus in esotropic deviations is on improving negative fusional amplitude (using base in prisms) and negative relative convergence (using distance stereograms or bar reading). Such exercises can be used to wean patients with fully accommodative and convergence excess esotropias' of out extra lenses that are not necessary to improve vision. The patient needs to be cooperative and able to attend the clinic regularly, have a deviation <20PD and a refractive error <+3.00DS/1.00DC [9].

The aim of orthoptic exercises in exotropic deviations is to improve convergence, positive fusional amplitudes (using base out prisms) and positive relative convergence (using near stereograms). For esophoric and exophoric patients' exercises may be used to improve control and relieve asthenopic symptoms (e.g. frontal headaches, ache behind eyes and diplopia), and the same pre-requisites apply. It is important to tell patients to relax their eyes after completing the exercises as spasm of the near reflex can be caused by overzealous use.

Alternate occlusion is an emerging therapy used in IDEX without a fixation preference. This is an anti-suppression exercise with an aim to remove suppression present under binocular conditions and improve binocular vision. However, there is a lack of evidence to prove that alternate occlusion is an effective treatment. The use of alternate occlusion is therefore uncommon in the UK.

### Prisms

Fresnel prisms may be used to help restore and maintain BSV in children with late-onset strabismus, or decompensating latent deviations who experience diplopia. They are cut out and stuck onto a pair of spectacles (plain lenses if patient does not

wear spectacles) with the apex of the prism orientated in the direction of the deviation. Fresnel prisms are often used in the short-term with progression to surgery, however, they can be incorporated into spectacles for a more long-term option if surgery is contraindicated. Alternatively, orthoptic exercises can be used to improve control whilst prism strength is reduced gradually. It is important to remember if the deviation is particularly large, prisms may not be suitable as they may blur the patients VA and thus prevent BSV.

### Conclusion

Conservative management options include: observation, occlusion, optics, orthoptic exercises and prisms. They are a feasible alternative or adjunct to strabismus surgery, but may not be suitable for all patients. Patients/parents should be carefully selected and consulted about their management choice. Their ocular condition should be monitored once treatment is commenced and therapy should be altered if necessary. The success of therapy is largely based upon suitable patient choice and the level of compliance. Further research is required in specific areas, such as the use of alternate occlusion in intermittent distance exotropia.

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