Clinical

Binocular vision case studies

Part 3 - Answers

Based on last week’s presentation, Sosena Tang explains the differential diagnosis, further investigation and best management of a case with little manifest expression.

Further investigations

The suspected diagnosis is microtropia. The patient is asymptomatic with an unnoticed small-angle esotropia which has presented in late childhood.

There is mild amblyopia in the right eye with associated anisometropia. Microtropia is more commonly congenital and there is usually a family history of ametropia and/or strabismus. There is also usually some level of binocular vision as demonstrated by the presence of stereopsis. Initially, a cycloplegic refraction should be carried out to confirm the refraction. The following should be considered to confirm the diagnosis:

● Cover test – with the refraction in place, this can reveal a small-angle heterotropia or no movement. In a special case of non-fixation syndromes, there can be an apparent heterophoria movement on the last uncover

● Amblyopia – This can be diagnosed using a pinhole and after refraction

● Suppression – Using the 4∆ base-out test, an idea of whether there is a suppression scotoma may be gained. When the prism is held in front of the suppressing eye, no movement may be seen. The reliability of this test has been questioned recently and is no means definitive. In older patients, they may also be able to describe the scotoma that appears, by reading letters adjacent to fixation more easily. An Amsler grid may also be used

● Fixation – Use of a Visuscope or ophthalmoscope (with gratricule target) to examine if the fovea or ex-foveal point is used for fixation

● Abnormal retinal correspondence – This may be investigated with Bagolini-striated lenses or one may be placed over the suspected deviated eye. In harmonious abnormal retinal correspondence (HARC), the streak seen by one eye should be seen passing through the spot light. In unharmonious abnormal retinal correspondence (UHARC), the streak and the spot light do not cross. The large ‘OXO’ test on the near Mallett unit can be used

● Stereopsis – This is absent or reduced. Tests which measure central stereopsis (Titmus circles or Landolt) may achieve higher scores than those measuring peripheral stereopsis (TNO).

Aetiology and classifications of microtropia

A microtropia is a small-angled strabismus of no greater than 10∆ with certain distinctive features (Table 1). Lang first described it in 1966 and there is still debate over its classification. Microtropia can arise as a primary condition or secondary to surgical intervention of a large-angled strabismus.

Microtropia is a slightly unusual case of strabismus, as the strabismus develops secondary to foveal suppression caused by uncorrected anisometropia. In most types of strabismus, it is the motor anomaly that triggers the development of suppression.

In the development of microtropia, it is believed that during the critical period the fixation reflex does not develop. This is due to the blurred image at the fovea, caused by an anisometropic uncorrected refractive error. As a result, an ex-foveal point is used. This eccentric fixation occurs under monocular conditions and if the angle of eccentric fixation is the same as the angle of strabismus then no movement will be detected during cover test. This is known as HARC and is often termed a microtropia ‘with identity’. If there is a difference between the angle of eccentric fixation and angle of strabismus as in cases of UHARC, then movement will be seen. The eye is using different ex-foveal points for fixation during monocular and binocular viewing conditions. This is a microtropia ‘without identity’.

If one considers the hierarchy of normal binocular single-vision (BSV), the best level would involve bifoveal fixation with normal motor and sensory fusion. In the presence of some interruption to the system such as a poorly compensated heterophoria, there may still be single vision with normal retinal correspondence, but potentially foveal suppression, fixation disparity and reduced stereoaucuity. If the interruption was greater such as in anisometropia, this can lead to the development of a small angle strabismus. As a result a microtropia with HARC may be considered as a lower form of ‘BSV’.

The next possible scenario would be an even lower level of binocular vision, where there was UHARC.

Differential diagnosis of microtropia with identity

Microtropia with identity will have a similar presentation with monocular amblyopia caused by anisometropia. Both will present with reduced VA in the eye with the greater refractive error and no apparent movement on cover test. The differences are highlighted in Table 2. One differentiating feature to remember is strabismic eyes are generally affected by the ‘crowding phenomenon’ of letters on a line (morphoscopic acuity) compared with single letters (angular acuity).

TABLE 1

Clinical features of microtropia

<table>
<thead>
<tr>
<th>Diagnostic</th>
<th>Non-diagnostic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small angle 1-10∆</td>
<td>Variable size of strabismus</td>
</tr>
<tr>
<td>Amblyopia (at least 1 line difference)</td>
<td>Foveal or non-foveal fixation</td>
</tr>
<tr>
<td>ARC</td>
<td>Angle of anomaly may or may not be same as angle of eccentric fixation</td>
</tr>
<tr>
<td>Eccentric fixation</td>
<td>Anisometropia (greater than 1.5D)</td>
</tr>
<tr>
<td>Foveal scotoma</td>
<td>Movement on cover test</td>
</tr>
<tr>
<td>Peripheral fusion</td>
<td>Reduced or absent stereo-acuity</td>
</tr>
</tbody>
</table>
Management

Patients with microtropia generally are asymptomatic and cosmetically good. Those that present under the age of five will need refractive correction of any anisometropia and occlusion. In this case study, the child should have a cycloplegic refraction and wear this Rx for full-time wear. The effect of this on her amblyopia should be examined. She should then be considered for occlusion and referred as necessary. Surgery is rarely indicated as bifoveal fixation is rarely achieved.

When to refer

Referral is indicated where amblyopia treatment is required and decompensation of the control of the microtropia has occurred. These patients can respond well to treatment, often obtaining near equal visual acuities in both eyes, normal retinal correspondence and near normal stereo-acuity. Some can subsequently develop a decompensated heterophoria on top of their microtropia, with associated symptoms. These may need referral and would require conventional treatment for decompensating heterophoria.

Summary

Microtropia is a small angle strabismus often presenting later in childhood. It is accompanied by anisometropia, mild amblyopia, eccentric fixation and HARC. There may be no movement on cover test in cases of HARC. Microtropia accounts for about 3 per cent of all those presenting with strabismus. In most cases, the management is conservative and does not require surgery. The primary treatment may be to correct any presenting anisometropia and amblyopia.

References:

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