

REVIEW

Strabismus in the primary care community

South African optometrists **Donovan Savage** and **Michele Hlava** show how the Volk EyeCheck has helped them accurately detect strabismus in a range of patients of different ages

A common childhood disorder that we frequently see in our behavioural/developmental practice is strabismus (squint). Strabismus is a common disorder of ocular alignment that affects 2-4% of children.¹ Strabismus may affect older children and adults. Binocular vision is the use of both eyes simultaneously in such a manner that each retinal image contributes to the final percept.² If the eyes are misaligned, binocular vision will not exist.

Strabismus is a misalignment between the two eyes (the two eyes do not look at the same place at the same time). The brain receives two different images from the eyes which will lead to diplopia (double vision) and confusion. This creates havoc with the patient's ability to trust what is seen and this will have a negative impact on their visual function. With time, the brain will adapt and learn to ignore the image from the deviated eye which will lead to sensory adaptations such as suppression and amblyopia.

Amblyopia is now recognised as a syndrome of visual processing abnormalities.³ Recent studies have shown amblyopia is not a monocular condition but rather a binocular condition.³ Amblyopia presents as a reduced visual acuity in one eye that is not correctable and there is no apparent pathology present. Sensory adaptations require time to develop and the longer the time, the deeper the adaptation and the harder it is to break it down. It is important to make an early diagnosis of strabismus to maximise our ability to rehabilitate visual function and reduce the risk of sensory adaptations such as suppression and amblyopia to occur.

From the ages of two to five years there is significant growth and development within the visual system.² Most children with strabismus present before school age with the average onset being one to four years old. The sooner we detect strabismus in



FIGURE 1 Assessing the light reflex on the cornea

children, the sooner we can formulate treatment options to improve the condition and allow normal visual development. The primary treatment goal is to prevent amblyopia, to achieve binocular function and functional depth perception. The secondary goal will be to achieve better cosmesis.

TESTS USED DURING OUR ROUTINE TO DETECT STRABISMUS

The cover test objectively determines the presence and quantifies the amount of ocular misalignment. To accurately assess the direction and amount of ocular deviation is largely dependent on the skill of the clinician. It is a difficult test to perform on an unco-operative child. It is difficult to detect small angles (microtropia) less than eight prism dioptres.

The Hirschberg test is a quick screening test to determine the presence of strabismus by assessing the alignment of the eyes. The clinician objectively assesses the light reflex that forms on the cornea (figure 1). The clinician needs to determine if there is a relative difference in the corneal reflex between the two eyes. The most appropriate formula to use is $1\text{mm} = 22$ prism dioptres.⁴ Accuracy is limited to the skill of the clinician and it is difficult to assess a small difference of 0.5mm.

These objective tests rely on the skill of the clinician; there is always a chance for human error. Variations in results can occur between different clinicians. In a study to assess the accuracy of a group of strabismologists applying the Hirschberg test they found that 'each participant underestimated at least one patient by at least 10 prism dioptres'.⁵

VOLK EYECHECK

The Volk EyeCheck (VEC) is a handheld digital diagnostic gathering measurement tool that captures and displays external eye measurements quickly and accurately. We have recently added the VEC to our pre-test routine with assessing children. It is as easy as taking a photo and anyone can be trained to use it. The



FIGURE 2 The Volk EyeCheck is helpful with unco-operative subjects

CASE STUDIES ENCOUNTERED IN PRACTICE

Case study 1

A father brought in his four-year-old daughter for an evaluation and his chief complaint was that he has noticed that her right eye is squint and it has been that way since birth. He reported that he has noticed that her right eye turns inward. There was no history of strabismus in the family. Her father reported that this is her first eye evaluation.

Whilst her results from the VEC confirmed no manifest deviation in primary gaze, in secondary gaze there was (figure 3). On further assessment, the cover test and Hirschberg test confirmed no manifest deviation on primary gaze. It was only when I performed motilities that I understood what the father had seen as a squint. While following a moving target to the left along the horizontal meridian, her left eye was noted to get 'stuck' centrally, ie did not continue to abduct. Her right eye continued to move to the left and it was at this point that her father interrupted to say 'see there it is, the right eye is squint'. It was at this point that I was able to diagnose Duane's syn-



drome and was able to explain to her father what was actually happening with his daughter's visual status.

Case study 2

A 17-year-old young lady came in for her annual eye evaluation. She did not have any major complaints except that she had run out of contact lenses and needed to order some new contact lenses. We determined her prescription to be the following:

OD: -7.50/-300x180 Visual Acuity 6/9-

OS: -8.00/-3.00x180 Visual Acuity 6/9-

She was not able to achieve 6/6 visual acuity. The cover test and the Hirschberg test showed no eye movement or deviation. The VEC determined that she had a small manifest deviation of 10 prism dioptres (figure 4). This new evidence gives us a clue on why she is not be able to achieve 6/6 visual acuity. Due to the visual acuity being equal in both eyes we now suspect that she has a small alternating strabismus with anomalous correspondence.



software analyses the data instantaneously to provide us with detailed measurements of the external eyes.

The VEC is an automated Hirschberg test and is able to accurately and consistently provide us with accurate measurements of the amount of manifest deviation present. The patented 'off-centre' flash technology significantly increases sensitivity for detecting strabismus. It is easy to use on unco-operative children to help support other objective testing methods (figure 2).⁶ An output report is generated that we can print out to help us explain to parents about their children's visual function and health. **Donovan Savage and Michele Hlava are optometrists based at Michele Hlava Optometrists, Somerset West, South Africa and have no commercial interest in the Volk EyeCheck. visualtherapy.co.za**

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