

Vision Screening in Alaska: Experience with Enhanced Brückner Test

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INTRODUCTION

Most Alaskan children see their scenic state well. However, a few children have vision threatening conditions. It is my goal to detect and treat all such young Alaskans as soon, and as thoroughly, as possible.

Children are not easily screened for visual disorders. They are often not able to verbalize symptoms. They frequently don't sit still. They object to close bright lights shining in their eyes. Some verbal children with monocular visual disabilities have learned to cheat on screening eye exams yielding false negative results. Irreversible amblyopia can occur if imperfect vision is experienced during the first ten years of life.

I recommend a quick, inexpensive, non-threatening and non-verbal technique to enhance the visual screening of Alaskan children. This test is called Enhanced Brückner Test.

METHODS

The Enhanced Brückner Test should be used *in addition* to the distance and near chart verbal tests which currently are administered by school nurses, optometrists, physicians and community health screens. Children who cannot be annually examined by a primary care physician should have an eye examination at age one year. All Alaskan children should have a thorough eye exam including cycloplegic refraction and an assessment of the retina by age five years.

The vision in non-verbal children is assessed by fixation responses. Each normal unoccluded eye should be able to center on an interesting object without nystagmus. When the occluder is removed, the normal eye should maintain fixation. Children object to occlusion of a monocularly poorly seeing eye, but do not object to occlusion of a blind eye. Normal vision in infants can be reported as **SCM, ou** or "Steady, Centered and Maintained, Each Eye."

The Brückner Test requires repeated sighting through a direct ophthalmoscope from a distance of one-half meter in reduced ambient light (Figure 1). The objective

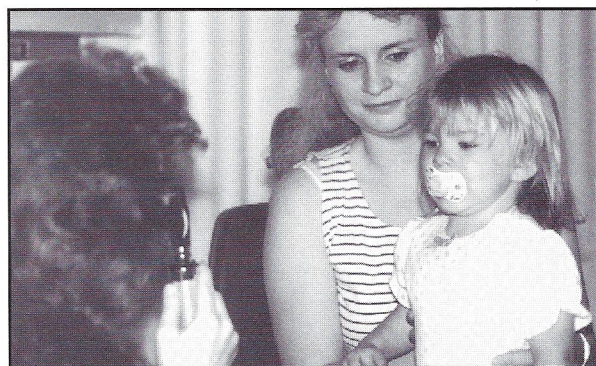


Fig 1. The Enhanced Brückner Test: View each pupil with a direct ophthalmoscope from one-half meter.

lens should be plano (zero). The coaxial illumination of the direct ophthalmoscope will yield a red pupillary reflex to be simultaneously compared in both eyes. The Brückner Test is positive if red reflex asymmetry persists. Positive Brückner Tests are highly sensitive and fairly specific for large and small angle strabismus, obstructions in the ocular media, refractive errors and retinal disorders (1). In large or small angle strabismus, the fixing eye has a darker red reflex (2). Mydriatics (i.e. tropicamide-Mydracil®) can be used if the pupils fail to dilate sufficiently.

The Brückner Test can be enhanced to detect asymmetric neuroretinal dysfunction and additional amblyogenic refractive errors. After initial simultaneous bilateral viewing, the ophthalmoscope beam is directed from one eye to the other several times. A relative afferent pupillary defect or Marcus-Gunn will appear as more pupil constriction with the light in the better eye and relative dilation as the light swings to the impaired eye (3). The fixed viewing distance obviates unwanted accommodative pupillary constriction. Retinal detachment, optic nerve hypoplasia, optic nerve tumor or atrophy can be detected by asymmetric Enhanced Brückner pupils. Amblyogenic refractive errors can be detected by viewing just over the top and the side of the direct ophthalmoscope aimed at relatively large pupils. High or asymmetric myopia, hyperopia and astigmatism can be detected as a non-uniform red reflex crescent.

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Table Childhood Eye Disease and Examination Techniques:							
EBT = Enhanced Brückner Test EXT = External Observation SL = Split Lamp Fun = fundus by direct or indirect ophthalmoscopy Ret = Retinoscopy Tono = Tonometry, i.e. Tonopen® VA = Snellen or Allen distance acuity							
DISORDER	EBT	EXT	SL	Fun	Ret	Tono	VA
Vision Threatening							
Amblyopia:							
Strabismic-Large Angle	**	*					*
Strabismic-small angle	**						*
Deprivational (cataract)	**		*		*		*
Refractive	*				**		*
Keratitis	*	*	**		*		*
Iritis	*		**		*		
Glaucoma		*	*	**		*	
Retinal Detachment	*			**			
Shaken Baby	*			**			
Neuroretinal Dysfunction	*			*			*
Life Threatening							
Retinoblastoma	*			**			*
Orbital Tumor		*					
Orbital Cellulitis		*					
Optic Nerve Glioma	*			*			*
Brain Tumor/papilledema				*			

An additional enhancement of the Brückner Test extends the attentive fixation of wiggly, small children. The direct ophthalmoscope can be aimed over a small toy and the beam can be alternated from white to green (red-free) which may give a few seconds more to compare red reflexes.

OBSERVATIONS

Various ophthalmic tests beneficial for screening vision and life threatening eye disease in children are compared in the Table. Notice how many can be seen using simple external observation and the Enhanced Brückner Test.

Figures 2-15 show photographs of positive Enhanced Brückner Tests (Olympus OM-2S with T-32 Flash, Tokina 500mm Mirror f.8, Ektachrome 100 ASA, distance 3 meters). Each Alaskan child was referred as a result of positive conventional or Brückner Test Screening.

CONCLUSION

With practice, the Enhanced Brückner Test takes less than ten seconds to administer. In children, more ocular disease can be detected than with direct ophthalmoscopy through undilated pupils. Photoscreening devices are available commercially (4). Each uses a camera or video with a relatively coaxial flash and a fixed-distance chin rest. Photographs from these usually give reliable infor-

mation on most children whose pupils dilate sufficiently in a dim room. Primary physicians and public health nurses may extend detection of visual disorders with these devices. However, the photographs are less reliable and slightly more expensive than the Enhanced Brückner Test when used by an experienced observer. I urge any care-giver charged with the awesome responsibility of screening young Alaskans for visual disorders to practice the Enhanced Brückner Test. Please refer young Alaskans with persistently positive tests to an appropriate ophthalmologist or optometrist for confirmation.

REFERENCES

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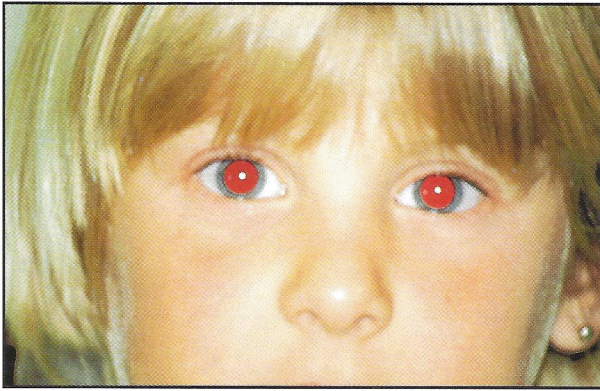


Fig 2. Asymmetric Red Reflex (Positive Brückner) due to small angle (4 pd) esotropia (microtropia or monofixation syndrome).

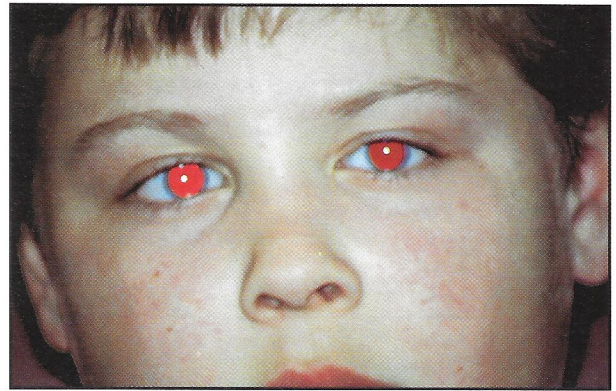


Fig 3. Positive Brückner due to small angle (15 pd) esotropia. Darker red reflex in patient's left fixing eye.



Fig 4. Congenital Glaucoma, right eye. Notice the asymmetry of corneal size.



Fig 5. Bilateral ectopia lentis (dislocated lenses) which may be due to Marfan's or Homocystinuria.



Fig 6. Left congenital cataract.



Fig 7. Bilateral keratoconus yields "oil drop" appearance in red reflex.



Fig 8. Vertically viewed Enhanced Brückner of high astigmatism right eye.



Fig 9. Horizontally viewed Enhanced Brückner of high astigmatism right eye, same patient as Fig 8.



Fig 10. Amblyogenic anisometric hyperopia (+6.50 od, +1.00 os).



Fig 11. Anisometropia. Same patient as Figure 10 treated with a contact lens.



Fig 12. Yellow reflex due to Coat's Disease, a potentially blinding childhood retinal vascular disorder in the left eye.



Fig 13. Large herpes dendritic lesion on the left cornea.

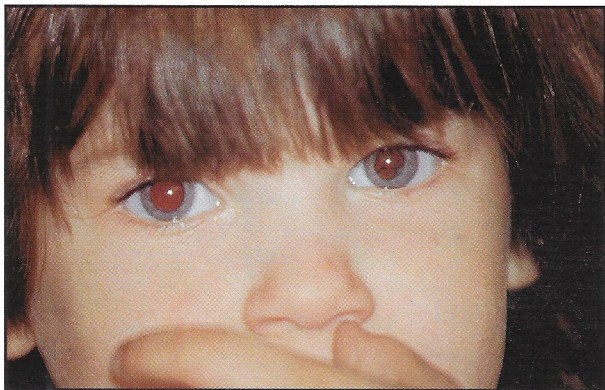


Fig 14. Posterior synechia due to iritis in a patient with Juvenile Rheumatoid Arthritis.



Fig 15. Bilateral Retinoblastoma causing leukocoria.