Comparison of the clinical alternating cover test measurement with the results of a new visual analyser

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Purpose: To compare the values obtained by the traditional clinical method with the values obtained from the ocular records using the eye tracker in a prototype of a new vision analyzer (EVA), employing in both methods the alternating cover test technique (ACTT).

Introduction:

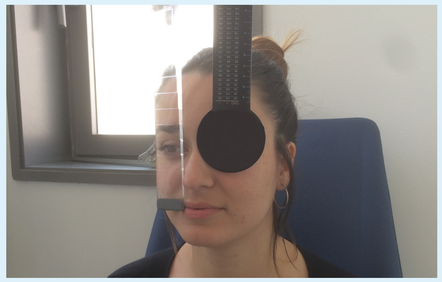
- **Heterophoria is the latent deviation of the visual axes without presence of a fusion stimulus.**
- **ACTT is a day-to-day technic to measure the phoria angle and it helps to diagnose binocular dysfunctions. It is an objective technic but it result depends of the examiner ability.**
- **The prototype measures objectively the angle heterophoria while the patient watches a true 3D short video game. It contains an eye tracker system which allows to detects at any given moment the position of both eyes even if one is occluded.**
- **In this study, the results of traditional ACTT was compared with the ACTT performed by the EVA prototype and evaluated their correlation.**

Methods:

- **Sample: 55 healthy subjects were enrolled in this study. The mean age ± standard deviation (SD) was 21.5 ± 1,56 years (range: 19 to 24).**
- **Inclusion criteria: Far and Near Visual Acuity greater or equal to 0.00 logMAR; Spherical Ametropia ≤ ±6.00D ; Astigmatism ≤ 3.00D; No previous history of amblyopia or strabismus, ocular pathology or history of eye surgery.**

Traditional ACTT (M1)

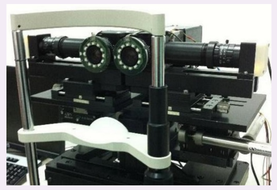
- **Measurements were made with an occluder to break the fusion and a prism bar to assess the angle of deviation.**
- **The phoria was measured 3 times by the minimum (without eye movement) and maximum (last one without inverse movement) technique. Each phoria value was the mean of this two measurements.**
- **The optotype was placed at 40 cm and the visual acuity for the test stimulus was 0.2 logMAR.**



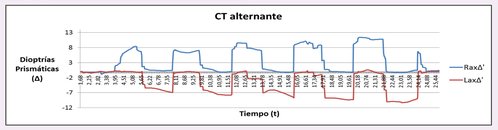
Traditional ACTT measurement.

ACTT with EVA (M2)

- **Measurements were made using a prototype of a new vision analyzer showing true-3D vision and stimulating accommodation and vergence.**
- **The subjects underwent 5 alternating occlusions in each eyes for 2 seconds. The angle of deviation was measured by the eye tracker system with a 25Hz frequency.**
- **The optotype was shown at 40 cm and the visual acuity for the test stimulus was 0.2 logMAR.**



Prototype of Eye and Vision Analyzer, EVA,used in this study

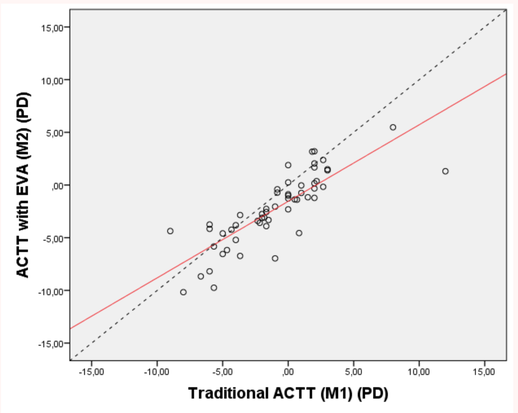


Graphic of ACTT with prototype results.

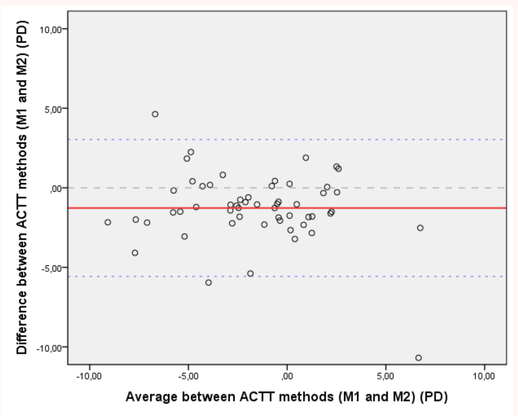
Results:

M1 (Traditional ACTT)	**Mean (PD)**	-1.00±3.77
M2 (Prototype ACTT)	**Mean (PD)**	-2.27±3,36
M1 vs M2	**Mean of differences (PD)**	1.27±2.20
	95% confidence limits (PD)	-5.57 to 3.03
	Pearson r	0.82
	ICC	0.90
Exophoric group (n=36)	1.09 PD more exophoria in eye-tracking system	
Esophoric group (n=19)	1.55 PD more esophoria in eye-tracking system	

Results of phoria value for ACTT traditional (M1) and Prototype (M2) and its differences. Negative value of phoria for exophoric and positive value for esophoric



Pearson Correlation Coefficient.



Bland and Altman plot.

Conclusions:

1. **The results with the EVA system show that it is a useful clinical examination device for ACTT.**
2. **Both methods obtained similar results because the difference between them is lower than 2 PD, although it is statistically significant, it is not clinically significant.**
3. **The ICC indicates a very good agreement with a value of 0.90.**

References:

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