XIIIth International Orthoptic Congress
27 - 30 June 2016
Rotterdam the Netherlands
IOA INTERNATIONAL ORTHOPTIC ASSOCIATION
ESCOLA SUPERIOR DE TECNOLOGIA DA SAÚDE DE LISBOA
UNIVERSITY OF LIVERPOOL

Fusional vergence measurements for eso versus exo deviations: is there a difference?

Carla Costa Lança, PhD[1,2] and Fiona J Rowe, PhD, DBO[3]

[1]Lisbon School of Health Technology, Portugal (PT)
[2]Centro de Investigação em Saúde Pública, ENSP, Universidade NOVA de Lisboa, PT
[3]Department of Health Services Research, University of Liverpool, UK

Financial disclosure

- There is no actual or potential conflict of interest in relation to this presentation.

Introduction

- The **fusion reflex** is responsible for maintaining heterophoria compensation; knowing what proportion of the total vergence amplitude is needed to compensate a deviation, is important to the clinician (Antona et al., 2008).

- In a previous study, the authors found out that **exophoric children** had reduced convergence break points when compared with orthophoric and esophoric children without symptoms (Lança & Rowe, 2016).

- The **aims** of this study were to compare angle of deviation, fusional vergence measurements and fusion reserve ratio between esophoria and exophoria.

Methods

- A cross-sectional study was performed in children with:
  - best-corrected visual acuity of 0.0 LogMAR in either eye,
  - compensated heterophoria within 10 prism dioptres (PD),
  - full ocular rotations,
  - presence of fusional vergence and
  - stereopsis (60 seconds of arc or better).
- Fusional amplitudes were compared across angle of deviation categories (2, 4, 6, 8 and 10 PD) in esophoria and exophoria.

Heterophoria	Angle of deviation categories	n
Esophoria	2	1
	4	9
	6	7
	8	3
	10	2
	Total	**22**
Exophoria	2	22
	4	88
	6	51
	8	17
	10	3
	Total	**181**

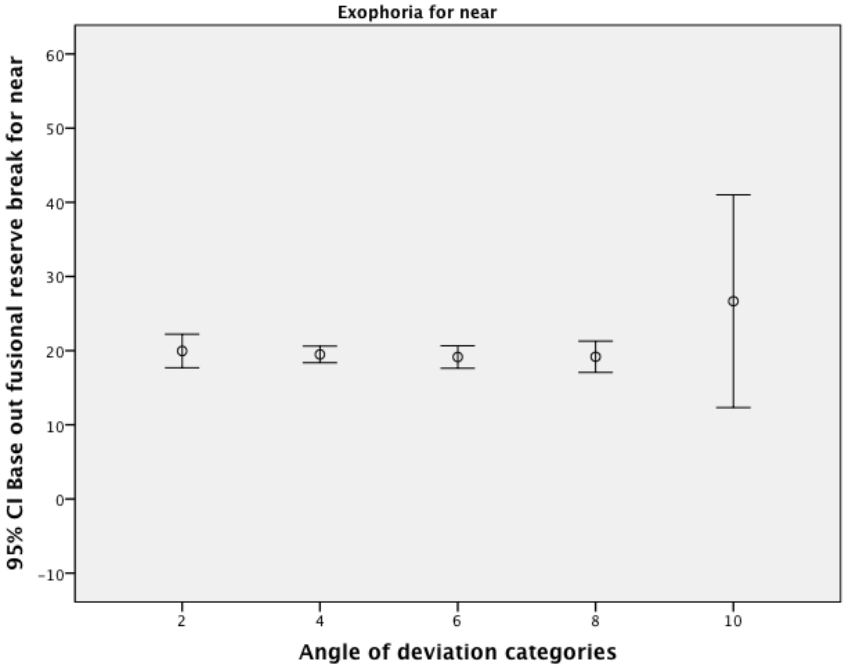
Methods

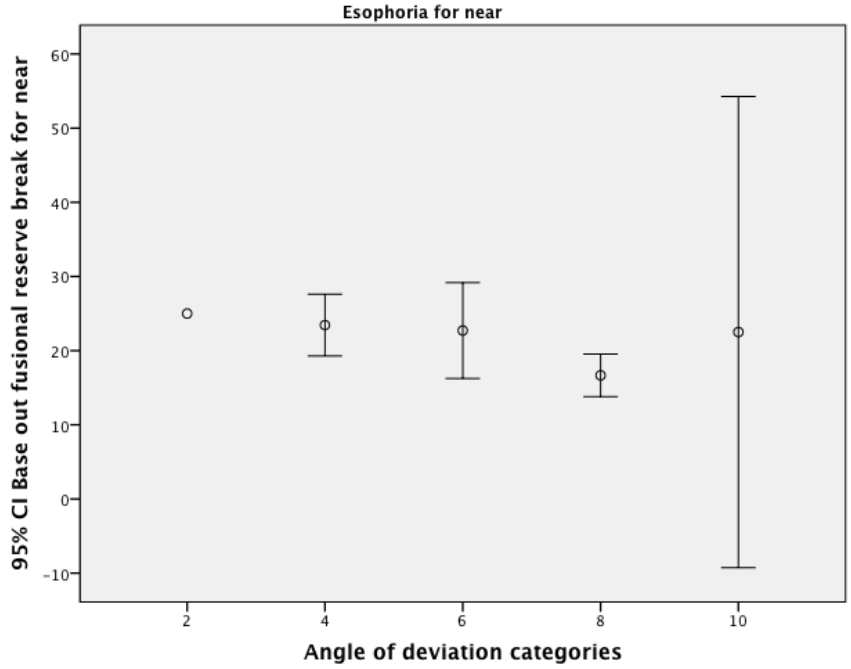
- The **fusion reserve** ratio was calculated as:
  - compensating vergence divided by prism alternating cover test for exophoria (Sheard's criterion) and
  - base out fusional reserve break divided by the base in for esophoria (Percival's criteria).
- **Nonparametric analysis** was used for analyzing prism fusion bar measurements because of the unequal step changes.
- The Kruskal-Wallis test was used to compare fusional vergence measurements between esophoria and exophoria.

Results

- Two-hundred and eleven children (7.65±1.16 years) were recruited to this study.
- Exophoria was most common for near (n=181; 85.8%) and distance (n=20; 9.5%).
- Esophoria was present in 22 children for near (10.4%) and in 1 child for distance (0.5%).
- **No significant differences** were found between fusional amplitudes and angle of deviation for near across categories in esophoria and exophoria ($p>0.05$).

Results





- Children with exophoria of 10PD had a slight but **no significant** (p=0.264) increase in mean fusional convergence (26.67) for near compared with 2PD (19.95).
- In esophoric children the variation of mean fusional convergence was smaller from to 2P (25.00) to 10PD (22.50) and **non significant** (p=0.185).

Results

- The mean fusion reserve ratio ranged between 2.50 (2PD) and 2.04±0.06 (10PD) for esophoria and between 9.98±2.55 (2PD) and 2.67±0.58 (10PD) for exophoria.

- The fusion reserve ratio was significantly smaller in children with higher deviations (i.e. 10PD) for exophoria ($p<0.001$).

Conclusions

- Angle of deviation is not an efficient measure to predict fusional amplitudes.
- The fusion reserve ratio appears to be a better measurement to assess the effect of the underlying angle of deviation on fusional convergence in exophorias.
- Limitations of this study include the number of children in each deviation category.
- More studies are necessary to better understand the relationship between fusion amplitudes and angle of deviation.

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