



REVIEW

Is there any evidence for the validity of diagnostic criteria used for accommodative and nonstrabismic binocular dysfunctions?

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Abstract

Purpose: To analyze the diagnostic criteria used in the scientific literature published in the past 25 years for accommodative and nonstrabismic binocular dysfunctions and to explore if the epidemiological analysis of diagnostic validity has been used to propose which clinical criteria should be used for diagnostic purposes.

Methods: We carried out a systematic review of papers on accommodative and non-strabismic binocular disorders published from 1986 to 2012 analysing the MEDLINE, CINAHL, PsycINFO and FRANCIS databases. We admitted original articles about diagnosis of these anomalies in any population. We identified 839 articles and 12 studies were included. The quality of included articles was assessed using the QUADAS-2 tool.

Results: The review shows a wide range of clinical signs and cut-off points between authors. Only 3 studies (regarding accommodative anomalies) assessed diagnostic accuracy of clinical signs. Their results suggest using the accommodative amplitude and monocular accommodative facility for diagnosing accommodative insufficiency and a high positive relative accommodation for accommodative excess. The remaining 9 articles did not analyze diagnostic accuracy, assessing a diagnosis with the criteria the authors considered. We also found differences between studies in the way of considering patients' symptomatology. 3 studies of 12 analyzed, performed a validation of a symptom survey used for convergence insufficiency.

Conclusions: Scientific literature reveals differences between authors according to diagnostic criteria for accommodative and nonstrabismic binocular dysfunctions. Diagnostic accuracy studies show that there is only certain evidence for accommodative conditions. For binocular anomalies there is only evidence about a validated questionnaire for convergence insufficiency with no data of diagnostic accuracy.

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PALABRAS CLAVE

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¿Existe alguna evidencia en cuanto a la validez de los criterios diagnósticos utilizados para las disfunciones acomodativas y binoculares no estrábicas?

Resumen

Objetivo: Analizar los criterios diagnósticos utilizados en la literatura científica publicada en los últimos 25 años en relación a las disfunciones acomodativas y binoculares no estrábicas, así como explorar si se han utilizado los análisis epidemiológicos de validez diagnóstica para proponer qué criterios clínicos deberían utilizarse a fines diagnósticos.

Métodos: Llevamos a cabo una revisión sistemática de los artículos científicos sobre disfunciones acomodativas y binoculares no estrábicas publicados desde 1986 a 2012, analizando las bases de datos de MEDLINE, CINAHL, PsycINFO y FRANCIS. Admitimos artículos originales acerca de los diagnósticos de dichas anomalías en cualquier población. Identificamos 839 artículos e incluimos 12 estudios. Se evaluó la calidad de los artículos incluidos utilizando la herramienta QUADAS-2.

Resultados: La revisión mostró una amplia gama de signos clínicos y sus puntos de corte diagnósticos entre autores. Únicamente 3 estudios (relativos a anomalías acomodativas) abordaron la exactitud diagnóstica de los signos clínicos. Sus resultados sugieren el uso de la amplitud de acomodación y la flexibilidad acomodativa binocular para el diagnóstico de la insuficiencia acomodativa y una alta acomodación relativa positiva para el exceso de acomodación. Los 9 artículos restantes no analizaban la exactitud diagnóstica, abordando el diagnóstico con los criterios considerados por los autores. También hallamos diferencias entre los estudios en cuanto al modo de considerar la sintomatología de los pacientes. 3 estudios de los 12 analizados llevaron a cabo una validación de una encuesta de sintomatología para la insuficiencia de convergencia.

Conclusiones: La literatura científica revela ciertas diferencias entre los distintos autores en cuanto a los criterios diagnósticos para las disfunciones acomodativas y binoculares no estrábicas. Los estudios de exactitud diagnóstica muestran que existe sólo cierta evidencia relativa a las condiciones acomodativas. En cuanto a las anomalías binoculares solo existe cierta evidencia relativa a un cuestionario validado para la insuficiencia de convergencia, sin datos sobre la exactitud diagnóstica.

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Introduction

Accommodative and nonstrabismic binocular anomalies are visual dysfunctions which can interfere with a subject's performance or impair one's ability to function efficiently at work. In fact, those persons who perform considerable amounts of close vision, such as reading or computer work, are more likely to develop symptoms and signs related to accommodative or vergence dysfunctions.¹ The most common classification to categorize vergence disorders was originally developed by Duane² for application to strabismus and was later extended to nonstrabismic binocular vision anomalies by Tait.³ Other authors have included the need to regard vergence anomalies as syndromes of deterioration or have proposed classifications based on graphical analysis.⁴ However, these categorizations have been descriptive which does not necessarily imply etiology and they only consider vergence mechanism in its unfused or open loop state⁴ but, as other authors have shown,⁵ these models do not estimate the contribution of proximal factor. For this reason, several authors state that predictions about binocular anomalies should be based on measurements under fusion conditions,⁴ so that the classification of vergence anomalies should specify binocular status with fusion present.

In this sense, Wick⁶ described a classification system for nonstrabismic binocular anomalies that represents an

expansion of Duane's classification and is based on consideration of the distance phoria (tonic vergence) and the AC/A ratio. In this system, the possible diagnoses can be divided into three main categories of binocular vision problems based on the AC/A ratio. Low AC/A ratio anomalies refer to convergence insufficiency (CI) and divergence insufficiency (DI), normal AC/A ratio are basic exophoria, basic esophoria and fusional vergence dysfunction (FVD) and high AC/A ratio disorders include convergence excess (CE) and divergence excess (DE). According to accommodative anomalies, the classification used is originally from Donders⁷ and has been popularized by several authors.^{4,8-11} It includes the anomalies of accommodative insufficiency (AI), accommodative excess (AE) and accommodative infacility (AIN).

In general, accommodative and binocular dysfunctions tend to provoke difficulties related mainly to activities requiring close vision. Symptoms commonly associated with these anomalies may include blurred far or near vision, headaches, diplopia, difficulty in reading, loss of concentration, and in many cases, impossibility to maintain clear vision for a reasonable period of time.¹²⁻¹⁵ Results of several accommodative and binocular tests, which may be altered, are named as the signs used for diagnosing these anomalies.¹¹

Although research has suggested that these dysfunctions are commonly found in clinical practice,¹⁶⁻²⁷ the scientific

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