

Chapter 10

Testing Accommodation in Children

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ABSTRACT

Accommodation disorders are associated with a host of etiologies. Children with accommodative disorders can present with various symptoms including blur, fluctuating vision, eye pain, burning sensation, tired eyes, asthenopia, headaches, fatigue with near work, and excessive rubbing, blinking, or tearing. This chapter provides an overview of accommodation testing on pediatric patients in the clinical setting. The author describes the indications for accommodation testing and provides clinical pearls for testing accommodative function in children. The chapter covers the specific tests, equipment required, and step-by-step procedures for testing accommodative amplitude, accommodative response, and accommodative facility.

INTRODUCTION

The purpose of ocular accommodation is to maintain clear vision at variable distances to resolve objects through changes in the refractive power of the crystalline lens.

Patients who have asthenopia such as headaches, eye fatigue and eye pain that are worst at the end of the day and blurred vision at near, especially with prolonged near work, or intermittent distance blur after sustained near work may indicate one or more forms of accommodative dysfunctions (Daum, 1983). It is more important today to test for accommodative dysfunction as the world has shifted its emphasis from distance to near vision tasks such as reading, smart phones, tablets, computer and desk work (Rosenfield, 2016).

Evaluation of accommodation should be a part of a comprehensive eye examination, including a baseline cycloplegic refraction to quantify significant refractive error in children (American Optometric Association, 2017). Symptomatic patients who have accommodative dysfunction may also have binocular dysfunctions and vice versa because the two systems, accommodative and vergence, are controlled by an interactive negative feedback loop (Ciuffreda and Tannen, 1995).

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Young children with accommodative problems may be asymptomatic (US Preventive Services Task Force, 2011). Reliance on symptoms to drive testing for accommodative dysfunction for younger children may be misleading due to younger patients' inability to relate performance with visual dysfunction. Children may not report blurred vision at near because of their lack of awareness of what clarity is or they avoid the tasks that make them uncomfortable. It is important to include a test of accommodation for all school-aged children even if the patient does not report symptoms.

The varied causes of accommodative dysfunction make it essential for the clinician to evaluate accommodative dysfunction by selecting the appropriate tests and interpreting the test findings in the context of the patient's symptoms, ocular health, and systemic health to reach an appropriate management plan.

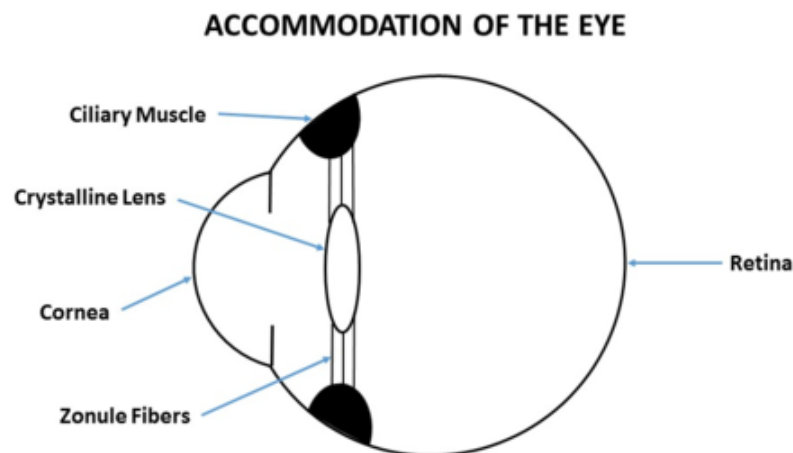
This chapter covers the specific tests, equipment required, and provides step-by-step procedures for testing accommodative amplitude, accommodative response, and accommodative facility.

BACKGROUND

Accommodation disorders are associated with a host of etiologies. In healthy children, accommodative disorders are associated with convergence disorders, emotional stress and uncorrected refractive errors, particularly hyperopia (Chrousos et al., 1988). Associated ocular conditions include ocular inflammation and sclerosis of the crystalline lens. Neurologic conditions including head trauma, cranial nerve III palsy, pharmacologic agents, and encephalitis, can negatively affect accommodation. Additionally, systemic conditions that can affect accommodation include myasthenia gravis, diabetes, hypertension, Gillian Barr syndrome, tuberculosis, endocrine disorders, and syphilis (Cooper and Panariello, 1988; DeRespinis et al, 1989; Master et al., 2016; Moss et al., 1987).

The eye structures involved in accommodation are the crystalline lens, ciliary muscle, and zonule fibers which attach the lens to the ciliary muscle. Figure 1 shows the ocular structures involved in accommodation.

Figure 1. Anatomy of the accommodation structures



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