Exaggerated Tilt and Turn Test for the Diagnosis of Subtle Cyclovertical Deviation

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Abstract

Superior oblique paresis/palsy is among the most common disorders encountered by an ophthalmologist in the office. Unfortunately, in some patients, recognition of vertical deviation is difficult with the commonly used three-step test. Herein, we introduce a novel modified three-step test, the exaggerated tilt and turn test, which may be helpful in the diagnosis of such subtle cases. In this novel test, after tilting the head to one side, the face is simultaneously turned to the same side and the patient is asked to fix on a distant accommodative target. In this new position, performance of the cover-uncover test could manifest any subtle hypertropia, if present, in the adducted eye.

Introduction

Superior oblique paresis/palsy is the most common cyclovertical muscles paresis/palsy encountered by the ophthalmologist [1]. The anterior fibers of the superior oblique muscle enable incyclotorsion of the eye, and the posterior fibers enable depression and abduction movements of the eye. Patients with unilateral superior oblique paresis/palsy generally present with hypertropia and excyclotorsion of the affected eye.

One of the most common tests for evaluating isolated cyclovertical extraocular muscle paresis/palsy, especially for the diagnosis of superior oblique paresis/palsy, is the Park-Bielschowsky three-step test. The three-step test hypothesizes that there is over-activation of the paralyzed muscle's antagonist (the inferior oblique muscle), which increases hypertropia in contralateral gaze to the unaffected side [2]. The head tilt phenomenon is supposed to result from a deficit of the incyclotorsion effect of the superior obliquemuscle in the affected eye during ocular counter-rolling [3], which results in stimulation of the superior rectus muscle as an intorter of the affected eye but at the cost of hypertropia during ipsilateral head tilt [4].

In some cases with longstanding cycloversion deviation, such as in patients with congenital superior oblique palsy, a large fusional amplitude develops over time [5]. These patients may report only blurred vision rather than double vision. In such cases, the three-step test may not elucidate the deviation. In this novel modified three-step test, the exaggerated tilt and turn test, we describe a new technique that could manifest subtle superior oblique paresis.

Diagnostic Technique

First, we examine the eye deviation in the primary position. These patients most often report intermittent diplopia and/or subtle anomalous head posture. Significant deviation in the primary position is not usually detected (Figure 1a). The second and third steps of the three-step test may be also be negative (Figure 1b-1d).

In this new technique, the patient's head is tilted to one side with the face simultaneously turned to the same side (e.g., tilt the patient's head to the left while turning the face to the left) (Figure 2). While in this position, the patient is instructed to fix on a distant accommodative target. While in this position, a repeat cover-uncover test should be conducted. The combination of head tilt and head turn exaggerates the vertical deviation in subtle hypertropia of the paretic eye.

Discussion

In a patient with superior oblique paralysis, tilting the head to affected side induces otolith stimulation for ocular counter-rolling, resulting in intorsion of the lower eye. In patients without ocular disorders, the superior rectus and oblique muscles are both incyclotortors of the lower eye. When there is paralysis of the superior oblique, the exaggerated tilt and turn test activates another intortor of eye (the superior rectus), resulting in hypertropia of the lower eye. Simultaneously

Figure 1: (a) A patient with no manifest vertical deviation in the primary position. (b,c) The patient did not show any significant vertical deviation in lateral gazes. (d) In tilting the head to the left, we did not find any significant vertical deviation in either eye.

Figure 2: The head of the same patient in Figure 1 was tilted to the left and the face was simultaneously turned to same side; the patient was instructed to fixate on a distant target. In this new position, the cover-uncover test revealed hypertropia of the left eye. The patient was diagnosed with subtle left superior oblique muscle paresis.

turning the face to the same side as the head tilt promotes adduction of the lower eye and activation of the inferior oblique muscles the antagonist of the superior oblique; this results in hypertropia of the adducted eye. In this new position, both the superior rectus and inferior oblique muscles are activated and result in hypertropia of the eye affected with superior oblique muscle paresis. In the traditional three-step test, the second step stimulates only the inferior oblique of the affected eye, resulting in hypertropia. In the third step, only the superior rectus muscle of the affected eye is stimulated, also resulting in hypertropia. However, in this new test, both the superior rectus and inferior oblique muscles of the affected eye are simultaneously stimulated and result in noticeably more pronounced hypertropia than the second or third step of the three-step test alone.

An earlier study reported that the three-step test is not highly specific to superior oblique paresis/palsy [6], and may in fact only have 50% specificity in the diagnosis of this entity [6]. It has been suggested that the three-step test and clinical clues alone are unreliable for diagnosis of superior oblique paresis/palsy [6,7].

The most common symptom of superior oblique paresis/palsy is diplopia and the treatment of choice is surgery; therefore, the confirmation of diagnosis is very important [8]. When cyclovertical deviation is suspected despite a negative three-step test, the exaggerated tilt and turn head test could enable a diagnosis of superior oblique paresis in patients with no significant hypertropia detected in the primary position.

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