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CLINICAL INVESTIGATIONS

Voluntary Nystagmus Associated With Accommodation Spasms

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Background: Voluntary nystagmus has been recognized as a pendular, rapid, conjugate, primarily horizontal, benign eye movement initiated and maintained by voluntary effort.

Case: A 10-year-old Japanese girl presented with voluntary nystagmus associated with accommodation spasms. Her chief complaints, intermittent blurred vision, headache, and soreness of the eyes, were thought to be related to the voluntary nystagmus and accommodation spasms.

Findings: The waveform of the nystagmus appeared pendular, the frequency was 13–15 Hz, and the amplitude was 3–5 degrees. Scanning laser ophthalmoscopic video images clearly demonstrated vertical and torsional components in addition to the horizontal eye movements. Her refraction was unstable, varying between −0.5 diopters (D) and −5.5 D, and the recording of the accommodometer increased to −12.0 D when nystagmus was initiated.

Conclusions: This may be a unique form of voluntary nystagmus that consists of horizontal, vertical, and rotational components associated with accommodation spasms. Observation of this patient continues, without any further treatment or examination. **Jpn J Ophthalmol 1999;43:1–4**

Key Words: Accommodation spasms, functional visual loss, scanning laser ophthalmoscope, voluntary nystagmus.

Introduction

Voluntary nystagmus has been recognized as a pendular, rapid, conjugate, primarily horizontal, benign eye movement initiated and maintained by voluntary effort. Shults et al.[1] identified it as consisting of rapidly generated back-to-back saccades. Zahn[2] reported that 8% of the normal population could produce voluntary nystagmus. Although the nystagmus in itself is not pathological, people with voluntary nystagmus sometimes visit ophthalmology clinics with complaints of dizziness, headaches, blurred vision, difficulty in concentration, and fear about their eye movements.

We examined a school girl with voluntary nystagmus that had not only horizontal but also vertical and rotational components. The nystagmus was associated with accommodation spasms.

Case Report

A 10-year-old Japanese girl was referred to Nagoya University Hospital by a general ophthalmologist because of her nystagmus. She complained of blurred vision and soreness of the eyes that had lasted for a few days before the referral. Even though she had been observed by the general ophthalmologist for about 5 years for school myopia, this was the first time the ophthalmologist had noticed her nystagmus. She stated that she had known that her eyes fluttered occasionally since she was 5 or 6 years old, especially when she was tired or when she was in a very bright place. While her eyes were fluttering, she

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stated that she experienced double vision and blurriness. She could initiate and stop the nystagmoid movement but it required great effort and she felt tired after halting the nystagmus. The nystagmus was also induced involuntarily under particular situations, such as bright light. Her general health and family history were unremarkable. Her visual acuity was 20/30, and −4.0 spheres corrected her visual acuity to 20/20 OU. Her refractive error measured by an auto-refractometer was −5.5 D OD and −4.75 D OS. Retinoscopy revealed that she accommodated strongly, and the neutral point of retinoscopy was valid between −0.5 D and −5.0 D. When she initiated the nystagmus, the retinoscopic refraction increased to −10 D. Cycloplegic refraction (with cyclopentrate hydrochloride) was −0.25 D OU by retinoscopy. The recording of the accommodometer was normal up to 20 cm (−5.0 D) without nystagmus. When she initiated the nystagmus, the reading became −12.0 D (Figure 1). Miosis, which is usually associated with accommodation, was not observed during the nystagmus. The eye positions were orthophoric at both distance and at near with the 9/9 Titmus stereo tests. During her nystagmus periods, her eyes were not converged and her complaint of "double vision" was confirmed. The double vision was not binocular double vision but monocular blurred vision. Under slit-lamp examination, both miosis and involuntary nystagmus were observed. She commented that under bright light, it was difficult for her to control the nystagmus. Results of fundus examination was normal. Her eyes moved smoothly except for occasional bursts of conjugate horizontal, vertical, and rotational oscillations, which were provoked particularly by looking at a bright light.

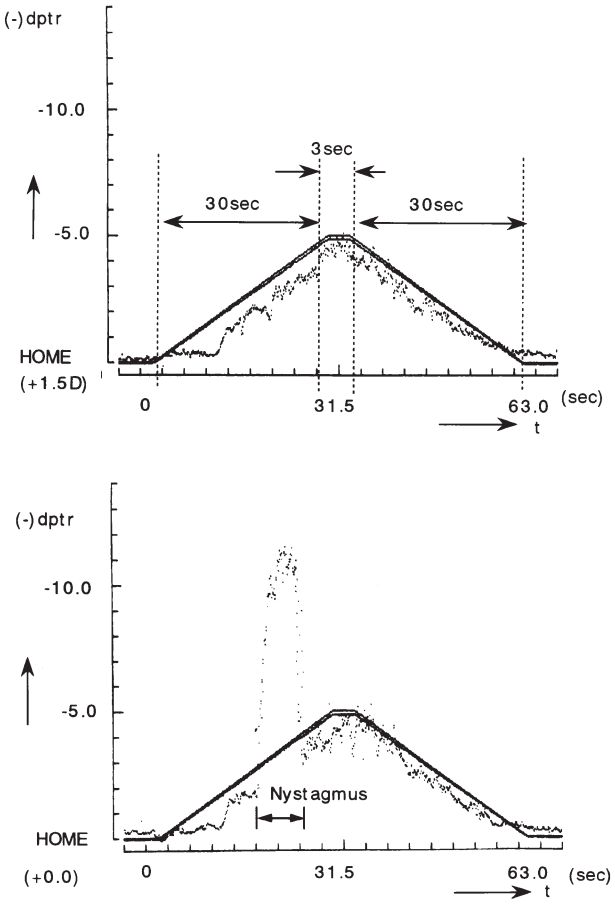

Figure 1. Recording of accommodometer during nystagmus and during steady fixation. When voluntary nystagmus was initiated, patient accommodated over −12.0 diopters.

Eye movement recordings were performed by electro-oculography (EOG) with AC-coupling and a high cutoff at 75 Hz. The time constant of the recording was set at 0.3 seconds for eye position and at 0.001 seconds for velocity measurements. The nystagmus waveform appeared pendular, the frequency was 13–15 Hz, and the amplitude was 3–5 degrees (Figure 2).

Scanning laser ophthalmoscopy (SLO) was performed while the head was kept steady with a chin rest and a headband. The nystagmus was videotaped at 30 frames/second and each image was captured and analyzed by a personal computer (Macintosh Performa 7600/120). Scanning laser ophthalmoscopy confirmed that her nystagmus consisted of not only horizontal but also vertical and rotational movements, with the amplitudes of each component very variable (Figure 3). Other neurological examinations, including magnetic resonance imaging showed normal results. The cause of her symptoms was assumed to be voluntary nystagmus, accommodation spasms, or both. To reduce accommodation spasms, 0.4% tropicamide (Mydrin M, Santen, Osaka) was prescribed. She was seen by us 3 months after the initial examination and did not show any improvement. She complained of difficulty in walking in sunlight or participating in outdoor activities. She stated that she needed to close her eyes for several seconds to stop the oscillations. The patient and her family were informed that her trouble was not organic and they agreed that we should continue to observe her condition without any further treatment or examination.

Discussion

Voluntary nystagmus is a benign entity consisting of oppositely directed saccades produced without an

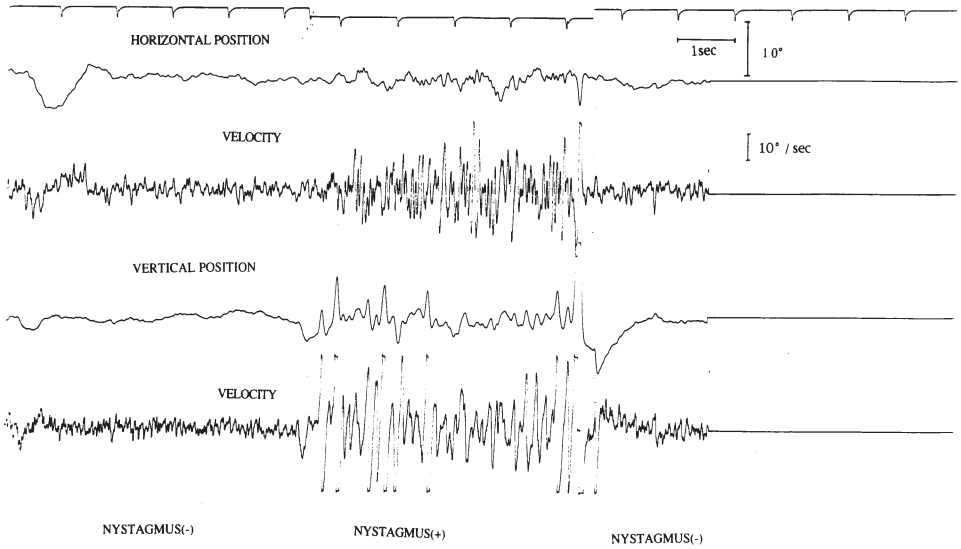

Figure 2. Electro-oculographic recording. Electro-oculographic pattern of voluntary nystagmus has horizontal and vertical components in right eye. Amplitude and frequency of nystagmus were 3–5 degrees and 13–15 Hz, respectively.

intervening period of fixation. It is similar in structure to ocular flutter and opsoclonus,[3] but its frequency is lower. Because it is entirely saccadic with no slow component, and is initiated with either a conscious or unconscious effort of will, the term *psychogenic flutter* has been proposed as a more accurate designation.[4] It has almost always been reported to be horizontal, although one case report exists of a patient who, on clinical examination, had a low amplitude, irregular, vertical upbeat and horizontal nystagmus in the primary position, which was provoked by facial straining.[5] These authors also cite an earlier report of a subject who had a vertical component to his voluntary nystagmus.

However, these authors indicated that the vertical oscillations could have been due to a slight displacement of the EOG electrodes. Although such concerns could be raised about our EOG data, examination of our SLO video images clearly revealed the vertical and torsional components of our patient's eye movements (Figure 3).

Another unusual feature of our patient's presentation was the absence of a convergence effort in the triggering of her ocular oscillations. The nystagmus could be initiated with no apparent change in ocular alignment, and in the absence of any grimacing or facial straining. However, the spike of accommodation associated with the onset of nystagmus (Figure 1) suggests that accommodation rather than convergence may be involved in its release.

The argument of an artifact in the accommodometer reading may be raised. The eye positions were not kept centered and the nystagmus and the retinal movements possibly reduced the preciseness of the reading. However, the retinoscopy reading supported the large accommodative changes that occurred during the nystagmus. Considering that other patients have been reported who can release voluntary nystagmus without converging, it may be that they also would demonstrate a similar accommodative spike if such measurements were made. The basis for this association between the onset of nystagmus and accommodation is not immediately apparent. The relationship between bright light and the nystagmus is also uncertain, although an increase in illumination might facilitate the perception of blur, which in turn could trigger the accommodative response. Catalano et al[6] reported a patient with voluntary nystagmus and spasm of the near reflex in his series of 17 children with functional visual loss.

Both voluntary nystagmus and near reflex spasms are generally considered to be nonorganic findings, and we could not find the possible cause of our patient's psychological reaction, even after careful consultations by one of the authors (MS) with the patient and the parents separately. Because this patient's presentation differed from those usually seen in individuals with more typical voluntary nystagmus, a more extensive neurological investigation had been undertaken. It may be, however, that she presents a variant of this unusual ocular oscillation. Measurement of the accommodative state of other patients with similar presentations will aid in the determination of whether her constellation of symptoms is truly unique.

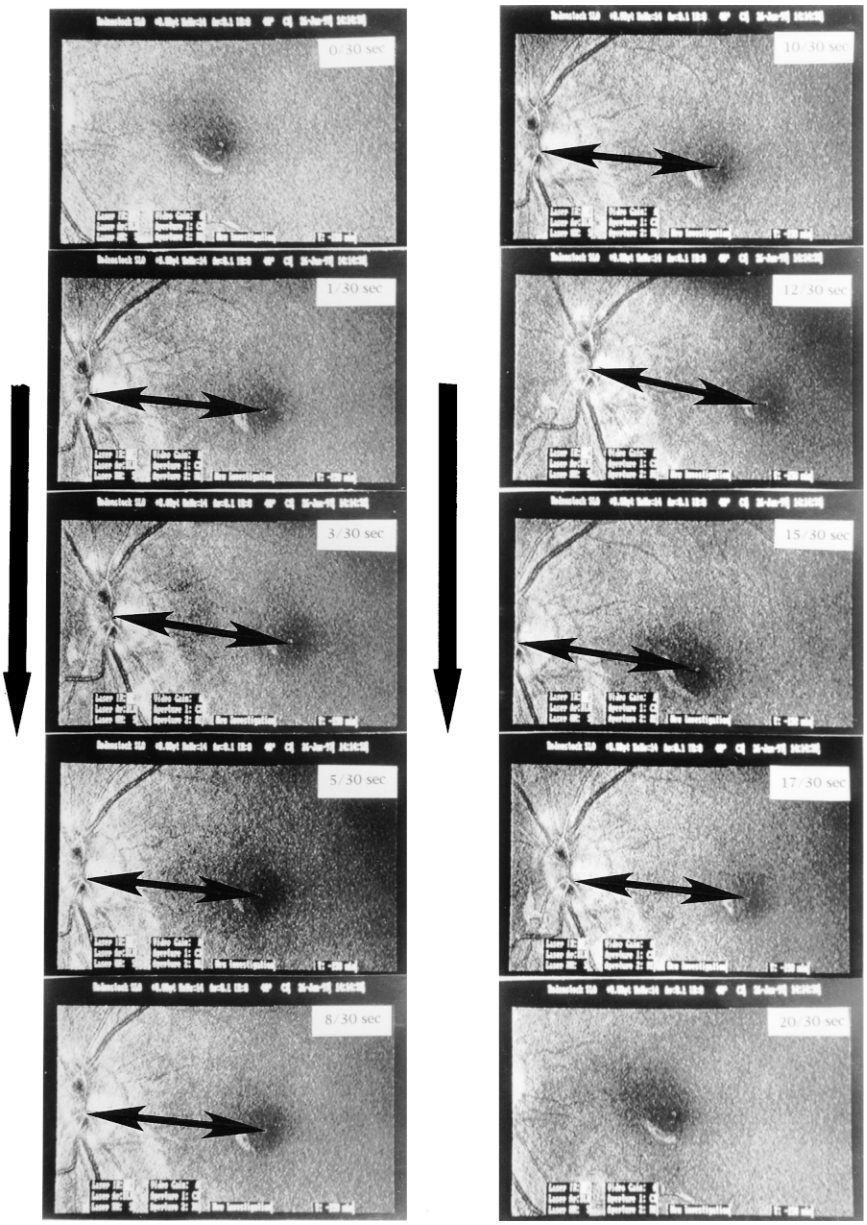

Figure 3. Video images of scanning laser ophthalmoscopy during nystagmus. Interval of each image is between 1/30 and 3/30 seconds. These video frames obtained in 20/30 seconds show not only horizontal, but also vertical and torsional movements (from top left to bottom right). Arrows pointing to center of optic nerve head and fovea indicate torsional movements during nystagmus.

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