

The clinical features of functional (psychogenic) eye movement disorders.

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Supplemental Files:

Video 1 – functional gaze limitation showing incomplete elevation of the eyes with absent frontalis corrugation, and limited horizontal eye movements that improve during the ‘casual’ examination.

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INTRODUCTION

Despite an increasing awareness of the high prevalence of functional neurological symptoms, there has been only one recent clinical evaluation of functional eye movement disorders, but this study only reported functional (psychogenic) oculogyric crises, opsoclonus, and flutter [1]. The aim of this retrospective study was to examine the clinical phenotype and range of functional eye movement disorders, and report their prevalence across two neuro-otology outpatient clinics.

METHODS

We performed a systematic retrospective search of the hospital's electronic patient database for patients attending a neurologist-led (AMB) neuro-otology outpatient clinic at Charing Cross Hospital, London, from August 2013 to August 2015 (Clinic 1), and at the National Hospital for Neurology and Neurosurgery, London, from August 2014 to August 2015 (Clinic 2). The terms "functional" or "non-organic" or "psychogenic" or "psychosomatic" or "somatoform" or "conversion" and "ocular" or "eyes" or "accommodation" or "near reflex" or "voluntary nystagmus" or "convergence spasm" or "convergent spasm" or "spasm of the near reflex" or "convergence" were searched for.

From those clinic letters identified from the above searches, patients were included in the study when clinical signs on eye movement examination were deemed to be functional (psychogenic) by the senior clinician (AMB), using chart and video reviews. Table 1 shows the diagnostic categories used.

Table 1: Diagnostic features used to characterize functional (psychogenic) eye movement disorders.

Functional eye movement disorders	Diagnostic features
<i>convergence spasm</i>	Persistence of convergence in one or both eyes when no longer fixating on a near target, associated with miosis, and with normal abduction of the affected eye(s) with distraction or reflexive eye movements [2]
<i>functional convergence paralysis</i>	Inability to perform convergence movements despite the presence of normal convergence with distraction
<i>functional gaze limitation</i>	Inability to move the eyes in one or several planes that improves with distraction, reflexive eye movements, or during the 'casual examination' [3]
<i>functional saccadic oscillations *</i>	Brief, episodic, high frequency, horizontal, low amplitude eye oscillations occurring spontaneously or triggered during eye movement assessment often accompanied by a convergent effort [4]

** 'functional saccadic oscillations' describes the more commonly termed "voluntary nystagmus" occurring as an involuntary phenomenon. Note that the eye oscillations of "voluntary nystagmus" lack the slow phases that characterise nystagmus [1].*

RESULTS

Nine patients out of a total of 670 were found to have a functional eye movement disorder in Clinic 1 (1 %), and 6 out of 147 patients in Clinic 2 (4%). The clinical and demographic features of all 15 patients are shown in Table 2.

The average age of the 15 patients in the study was 48 years (range 18-73 years). Out of the 15 patients, 11 were female, 4 male. Eight patients (53%) showed evidence of convergence spasm, 6 patients (40%) had functional gaze limitation (e.g. Video 1), and 1 patient (7%) had functional saccadic oscillations. Eight patients (53%) in the study also presented with other neurological functional signs, most commonly a functional gait disorder. Eight patients (53%) presented with ocular symptoms (diplopia, 'blurred' or 'wobbly' vision, or visual vertigo), most commonly in the context of convergence spasm (Table 2).

A magnetic resonance brain scan was performed in 10 of the 15 patients, all of which were done prior to referral to our clinics. The scans were normal in all patients except one (#5) where an incidental vestibular schwannoma (<5mm) was identified.

DISCUSSION

We highlight two findings of clinical relevance: firstly, functional eye movement disorders are common and occur in 1-4% of patients attending neuro-otology clinics. This is lower than that reported in movement disorder clinics, where the reported functional eye movement disorders were psychogenic oculogyric crises', 'psychogenic opsoclonus', and 'functional saccadic oscillations' [1]. Secondly, identifying functional eye movement disorders during examination may lend weight to a suspected functional disorder as almost half the patients with a functional eye movement disorder in our cohort had an associated functional movement disorder (most commonly a functional gait disorder). We now discuss the different types of functional eye movements observed in our cohorts:

Convergence spasm (CS)

CS was the commonest type of functional eye movement disorder observed. It consists of intermittent brief episodes of convergence, accommodative spasm, and miosis. Most patients will report visual disturbance during the spasm (Table 2), but not always diplopia. Pupillary constriction is a useful diagnostic sign suggestive of accommodative effort rather than failure of eye abduction. Where miosis is difficult to observe clinically (e.g. dark iris), the use of videonystagmography where available might allow pupillary examination in low light conditions. Even if miosis is technically difficult to see during the spasm, a diagnosis of convergence spasm can nevertheless be made when convergence is not sustained and full abduction of the affected eye(s) is observed with distraction or during reflexive eye movements. Although most patients reported

CS when fatigued or during tasks requiring high levels of concentration, CS could be triggered during the eye examination with sustained gaze (vertical or horizontal), startle, or by positional manoeuvres.

Functional gaze limitation

We found a high proportion of functional limitation of gaze during the clinical evaluation of patients presenting to neuro-otology clinics. The apparent inability to move the eyes is typically transient and intermittent. Improved range of eye movements was observed in all patients during the informal observation of the patient's eye movements during, for example, history taking (the 'casual' examination' [3]), and either using the dolls-head eye manoeuvre, with verbal encouragement, or reflexive eye movements (Video 1). In patients with upward gaze limitation, we observed a lack of eyebrow elevation, and lack of frontalis muscle corrugation, which has previously been reported in a single patient [5].

Functional nystagmus

When voluntary nystagmus is experienced as *involuntary* this is best referred to as 'functional' or 'psychogenic' [3]. The term nystagmus is strictly speaking incorrect given that these movements consist of low amplitude (approx. 4 degrees), high frequency (approx. 10Hz) *saccadic* oscillations that are mostly horizontal; the term 'psychogenic/functional saccadic oscillations' has been proposed instead [1]. There is often a convergent effort at the onset of the movement, and each episode lasts 5-20 seconds. There may be accompanying lid flutter as was present in our patient (patient #15). Our patient with functional nystagmus reported that symptoms would occur when she was fatigued, or anxious, and that the frequency of these episodes had increased when she was originally referred to our unit, suggesting perhaps a role for hypervigilance and abnormal attention.

Conclusions

Convergence spasm and functional gaze limitation are the commonest functional eye movements seen in our specialist clinics, and their identification lends weight to a suspected functional movement disorder. Our findings are placed in the context of a neurologically oriented clinical setting, and we suspect that the presence of functional eye movements may be under-recognised. A lack of awareness of the functional nature of these disorders may reinforce patient anxieties about their condition, and lead to invasive investigations and unnecessary treatments.

Author contributions

VP performed the patient searches, compiled the Table, and assisted in drafting the manuscript. DK performed patient searches, compiled Tables and Figures, reviewed clinical data, and compiled the manuscript. AMB reviewed all patient data, compiled the manuscript and approved its final version.

Dr Kaski reports no disclosures

Vidushi Pradhan reports no disclosures

Professor Bronstein reports no disclosures

Ms Pradhan reports no disclosures

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Table 2: Demographic and clinical features of patients with functional eye movement disorders from Clinic 1 (Charing Cross Hospital, London, UK) and clinic 2 (National Hospital for Neurology and Neurosurgery, London, UK).

Patient	Age at presentation (yrs)	Gender (M/F)	Ocular presenting complaint	PC	PMH	Eye movement examination	Diagnosis	Treatment	Associated features
Clinic 1									
1	18	F	Yes	Sensations of 'squeezing' in the head and episodes of blurry vision with eyes going into 'spasm', particularly when tired. Rapid recovery.	Autistic spectrum disorder. Left mastoid abscess with episode of vertigo four years prior	Convergence spasm most prominent on upgaze and with startle stimuli. Miosis during convergence.	Convergence spasm	Inpatient gait rehabilitation program	Functional bilateral limb weakness. Non-epileptic seizures.
2	73	F	Yes	Difficulty focussing and involuntary eye movements.	Familial dystonia	Convergence paralysis. Intermittent and distractible forced upgaze.	Functional gaze limitation and functional convergence paralysis	Eye movement exercises offered	
3	40	M	No	Collapses associated with vertigo		Intermittent downgaze palsy	Functional gaze limitation.	Reassurance	Functional gait. Non-epileptic seizures
4	61	F	No	Episodic 'falling feeling' with weakness throughout left side of body. Facial numbness and sensation of left eye drooping.		Apparent inability to move eyes to the left during gaze testing and pursuit.	Functional gaze limitation	Reassurance	Functional gait, and functional limb weakness

5	58	F	Yes	Episodic vertigo provoked by head movements. Episodic diplopia, especially when tired.	Migraine	Upbeat and torsional nystagmus on positional testing associated with convergence spasm. Convergence spasm in the upright position.	Convergence spasm	Semont manoeuvre for BPPV	BPPV
6	70	F	No	Bilateral facial and peri-oral twitching when stressed and anxious.		Gaze impersistence overcome with encouragement.	Functional gaze limitation	Gait physiotherapy.	Functional hemifacial spasm
Clinic 2									
7	54	F	No	Imbalance and 'vibrating sensation' through body.	Left sided mastoidectomy	Convergence spasm but no miosis was observed.	Convergence spasm		Functional postural imbalance
8	59	F	Yes	Disabling vertigo with involuntary eye movements, and 'wobbly' vision, when reading or when tired.			Convergence spasm	Eye movement exercises under orthoptic guidance. CBT/psychotherapy.	
9	34	M	No	Rocking boat sensation and stiffness of spine.	Vasovagal syncope	Eye flickering and convergence spasm during positional testing. Miosis during convergence.	Convergence spasm	Cognitive behavioural therapy and anxiolytic medication	
10	18	M	No	Left hearing loss following a left mastoid operation	Migraine PoTS	Random eye movements, not present during consultation (casual examination).	Functional gaze limitation	Recommended intense rehabilitation	Functional limb weakness

11	59	F	Yes	Isolated hearing loss and occasional episodes of blurred vision, especially when tired (and watching TV).	Relapsing remitting MS, Oscillopsia	Convergence spasm on sustained horizontal gaze. Miosis during convergence.	Convergence spasm	Reassurance	
12	60	F	No	Daily dizzy spells with 'rocking' sensation.	Vestibular migraine	Convergence spasm during vertical gaze, with miosis. Difficulty with gaze holding and re-fixation and square wave jerks seen.	Convergence spasm		
13	41	F	Yes	Visual vertigo[6]	Vasovagal syncope Vestibular migraine	Excess of blinking and difficulty looking horizontally.	Functional gaze limitation		Functional gait
14	26	M	Yes	Positional dizziness following traumatic brain injury triggered. Headaches with motion sensitivity.	Traumatic brain injury	Hallpike testing showed convergence spasm/right eye blepharospasm. Miosis during convergent effort.	Convergence spasm	Migraine prophylaxis therapy + visual motion desensitisation	Functional postural imbalance. Functional blepharospasm
15	32	F	Yes	Episodic eyeball flickering and wobbly vision, when tired.		Voluntary nystagmus on sustained convergence	Functional eye oscillations.		

PC= presenting complaint; PMH= past medical history; GP= General Practice; PoTS= postural orthostatic tachycardia syndrome; BPPV= benign paroxysmal positional vertigo

