LETTERS

Should 'visual snow' and persistence of after-images be recognised as a new visual syndrome?

Although seldom recorded in the medical literature, the 'visual snow' phenomenon, as described by patients, leads to a distressing visual condition and often to multiple unnecessary investigations and inappropriate treatments. It impairs daily life, especially through difficulty in reading, focussing and other visual tasks. Medical records of 27 patients were reviewed. They were referred to our neuro-ophthalmic clinic between 2005 and 2010 with unclassified positive visual phenomena. All patients underwent a careful history and complete clinical ophthalmic examination. Most of them had electrophysiology assessment and neuroimaging.

RESULTS

Three of the patients had suffered post-traumatic visual discomfort especially when exposed to bright light, one experienced a phosphene in the central visual field and 23 patients complained of visual snow and/or intrusive after-images without any known precipitant. Among the latter, 20 experienced visual snow, 3 persistent after-images only:

1. Twenty patients were classified as suffering 'visual snow' with or without persistence of after-images. These patients consistently described 'grainy', 'dotty' or 'pixelated' vision affecting the entire visual field of both eyes equally (table 1). The visual experience is likened to 'television (TV) snow' or 'TV noise' which is the random dot pattern of static displayed when there is no signal on an analogue[i] TV monitor, hence, the term 'visual snow'. The symptoms were continuous with some fluctuation, frequently varying with changes in ambient illumination. The phenomenon was often more prominent when an unstructured field was viewed, such as a blue sky or a white wall. Patients sometimes reported that the disturbance was visible in the dark and with eyes closed but this was not universally reported. Persistence of after-images occurred in six patients (33%). This was usually described as the persistence of an object when fixing it and then looking away—especially at a blank wall. 'Trails' behind moving objects were often also described. Tinnitus was present in three patients (15%).

   Thirteen women and seven men were affected. Symptoms occured mainly in the 2nd–4th decade of life, half the patients being referred within this age range. The first onset of symptoms was ranged from the age of 2 years, or 'from the earliest memories' to as old as 48 years. Most of the patients could not link their visual condition to any trigger. Five patients had pre-existing migraine with visual aura (25%) but only two related the beginning of the symptoms to a migraine. In another two patients, there was mention of a minor head injury one and several weeks, respectively, prior to the onset of symptoms. Only one patient disclosed consumption of a recreational drug lysergic acid diethylamine (LSD). Two patients suffered from panic attacks.

   Ocular examination was unremarkable, with normal afferent visual function (except for one patient who had an amblyopic eye) and normal intraocular examination. All patients had normal automated perimetry. Thirteen patients underwent investigations including electrophysiology (ERG: 10 patients; visually evoked potentials (VEP): seven patients) or imaging studies (MRI: four patients; CT scan: three patients). All the investigations returned normal.
2. Three female patients described the phenomenon of persisting after-images only. Age at presentation was within the 2nd and 4th decades. Two patients underwent electrodiagnostic and imaging investigations which were normal.
3. One young adult suffered a binocular visual positive phenomenon. This was limited to a bright bar of light in the central field of vision. Examination and investigations (ERG, VEP, MRI, CT-scan) were unremarkable.

CONCLUSIONS

The group of subjective visual complaints that include visual snow and persistence of after-images (group 1 in the results section) is syndromically consistent from one case to the next. The visual noise symptomatology consists of flickering bright achromatic dots affecting the whole visual field in a bilateral and symmetrical manner. Some patients describe the visual images themselves being broken up rather than superimposed dots. Persistence of after-images frequently coexists, and in a lower proportion, tinnitus is reported. This phenomenon is reported by young (2nd–4th decade) and healthy individuals, with neither ophthalmic nor neurological disease. Gender predominance is female 2:1. All these patients had normal ocular and neurological examinations. Patients in group 2 (isolated persistence of after images) and 3 (solitary persistent phosphene) were less common in this group. It is likely that group 2 is closely related to group 1 given the overlap of symptoms between the groups. The nosology of the single patient in group 3 (one author (GTP) has seen several other cases outside the study period) is uncertain.

Visual snow has been associated with the use of recreational drugs. LSD-like substances (psilocybin) or other psychedelic drugs (ecstasy) are known for recurrent hallucinations. When such hallucinations are continuous and persist for months or years after cessation of drug consumption, the condition has been referred to as "hallucinogen persisting perception disorder".[1] Visual symptoms described have features in common with those reported by our patients. Alterations in synaptic connectivity have been postulated as underlying the disorder.[2] Other authors associate visual snow like symptoms with persistent visual aura in the context of migraine,[3] with modifications in corticocortical and corticosubcortical interconnectivity postulated to account for permanent perceptual changes.[4] Treatment with acetazolamide and valproic acid has been reported successful in some persistent aura cases, with a more marked effect on headache than on the visual disturbance.[5] The prevalence of migraine and visual aura in cases presenting with visual snow symptoms should await a prospective study. However, our patient cohort, referred to a neuro-ophthalmology clinic because of unexplained visual symptoms, demonstrates that neither migraine nor recreational drug use are necessary associations with symptoms of visual snow and persistent after-images. The descriptions provided by patients have a syndromic consistency and we consider that the phenomenon merits future study. Furthermore, patients can be reassured

[i]In some cultures, the noise is rather seen as black bugs on a white background and described, for example, in Scandinavian countries as 'war of the ants'. It should also be noted that the reference to TV in this syndrome may become less common because contemporary digital displays produce noise which is less random and often revert to a blue screen if there is no signal.

Table 1 Visual snow and after-images patients

	Gender	Onset of symptoms	Age at presentation	Duration of symptoms	Description of symptoms	Migraine +visual aura	MHx psy	Tinnitus	VA RE	VA LE	VEP	ERG	Brain CT or MRI
1	F	26	30	4	Grainy vision	1			6/6	6/6	N	N	
2	F	40	41	1	TV static				6/5	6/5			
3	M	20	25	5	Dots of light				6/5	6/5			
4	F	9	39	30	Grainy vision				6/5	6/6	N	N	
5	F	32	32	0	Smoke rings				6/6	6/6	N	N	N
6	F	30	34	4	Dotty vision				6/5	6/5			N
7	M	31	31	0	Visual noise, after-image				6/6	6/6	N	N	
8	F	19	19	0	White blobs			1	6/6	6/6	N	N	N
9	F	8	21	13	Grainy vision		1		6/5	6/5	N	N	
10	F	28	29	1	Dotty vision				6/5	6/5	N	N	N
11	F	49	49	0	Dotty vision	1			6/6	6/6			N
12	M	17	25	8	Sparkling granules, after-image				6/5	6/5			
13	F	48	49	1	Orange rain	1			6/6	6/6		N	
14	F	26	26	0	Vision instability, after-image	1			6/4	6/24 amblyopia			
15	M	23	24	1	Vision static				6/4	6/4		N	N
16	M	2	20	18	TV static, after-image			1	6/5	6/6		N	N
17	M	4	33	29	Visual snow			1	6/5	6/6			
18	F	22	24	2	Visual snow, after-image	1	1		6/5	6/5			
19	M	16	21	5	TV static, after-image		1		6/6	6/6			
20	F	20	21	1	TV static				6/5	6/5			

Duration of symptoms, age of onset and age at presentation in years. Migraine and visual aura, psychiatric medical history (MHx psy) 1=present.
LE, left eye; N, in the normal range; RE, right eye; TV, television; VA, visual acuity; VEP, visual evoked potentials.

that the condition, although disabling, is benign, in the sense, that it does not lead to visual loss. Special investigations may still be required for patient reassurance, but in this group of patients did not assist in the diagnosis which must be made on a clinical and syndromic basis.

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