



A review of tactile hallucinations in Parkinson's disease

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ABSTRACT

Various hallucinations are unpleasant not only for patients with Parkinson's disease (PD), but also for their caregivers. Visual hallucinations are a well-recognized problem. Auditory and other types of hallucinations are generally accompanied by visual hallucinations. Tactile hallucinations (THs) rarely occur in patients with PD.

Keywords

Parkinson, Hallucinations, Tactile hallucinations, Dopamine agonist, Cenesthetic hallucinations

Introduction

To our knowledge, studies of a series of patients who had THs associated with PD have not been reported previously. Case reports of THs in PD are also rare: only 12 cases have been described [1-3]. We reviewed these 12 cases in addition to 3 cases in our institution, as shown in **Table 1**.

Nature of tactile Hallucinations

The exact prevalence of THs remains uncertain. Goetz, *et al.* [4] reported that only 7% of a group of 54 patients with PD had hallucinations after more than 1 year of treatment. THs increased over time along with visual hallucinations, and the estimated incidence rose from 6.7% at 1.5 years to 26.7% at 10 years, and no patient had only THs [5]. One of 15 patients solely had THs without other forms of hallucinations [1]. THs were more frequent in a group of early hallucinators [4]. THs tend to most commonly occur in elderly patients or men [1-3]. The Hoehn-Yahr stage in 11 of 13 patients was 3 or less, and the disease duration was longer than 10 years in 8 of 14 patients with THs [1-3]. THs were likely to occur in elderly patients with a long history of PD.

THs occurred in a clear sensorium and persisted for a prolonged time. Typically, animals or insects

were visualized and felt on the skin. For example, the patients said, "an insect became bigger and it was tied to or entered my body," "small animals are on my abdomen," "an insect is pricking my hip or chest," or "an insect is entering my body." Second, the patients felt that something such as oil, a vase, or a laser ray was put in contact with, or touched, the body. They said "a thin layer of oil was put on my body," "a thin object is entering my eyes, so it's painful," or "a woman's head is stuck between my legs." The third type of THs was false sensations derived from a part of the body such as a tooth. This type of TH was called cenesthetic hallucinations. The patients said, "a tooth was lost, so it's very painful," "lost a tooth," "cold thighs, so stool is coming out," or "my nose is clogged with mucus." These THs are described in the previously reported patients [1] and unpublished three patients (**Table 1**).

Most THs occurred in the evening and nighttime, but some THs, especially cenesthetic hallucinations, can occur during any time of the day, as was the case in our patients 3 [1], and 6 (**Table 2**). During the presence of THs, most patients concurrently had other types of hallucinations, especially visual hallucinations. However in our experience, some patients did not see an object during THs. For example, patient 6 (**Table 1** and **2**), said, "a cat is riding on my

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Table 1: The details of tactile hallucinations in three previously unreported patients.

Patient 4	A woman's head is stuck between my legs. A radish is in my pants. A bottle is under my hip. An insect is entering my ear. Something is caught on my foot, so remove it.
Patient 5	A snake is wrapped around my feet. An insect is pricking my legs.
Patient 6	A cat is riding on my back. It is very hot and heavy.

Table 2: Characteristics of three patients plus two patients with Parkinson's disease who presented with tactile hallucinations.

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
age/sex	71/M	65/F	76/M	74/M	79/M	73/M
disease duration (years)	13.9	7.3	5.9	24	7	7
duration of PD therapy	13.3	6.3	2.9	22.1	5	7
Hoehn-Yahr stage	2	3	3	5	4	4
UPDRS Part 3	36	13	12	68	not examined	32 (6 months after this evaluation)
history of hallucinations	+	-	-	+	+	+
other formed Hs during tactile Hs	+	+	-	+	+	+
other formed Hs associated with tactile Hs	-	+	-	-	-	+
wearing-off	+	+	-	+	-	+
dyskinesia	+	+	-	-	-	-
MMSE during OS	29	26 (1 year after this evaluation)	27	28 (2 months before this evaluation)	21	24 (6 months after this evaluation)
daily treatment when development of tactile Hs [dose /d]						
levodopa	550 mg	500 mg	200 mg	600 mg	150 mg	400 mg
ropinirole (RP)	9 mg	-	-	-	-	14 mg
pramipexole (PRX)	-	-	1.5 mg	2 mg	-	-
cabergoline (CAB)	-	2 mg	2 mg	3 mg	-	-
pergolide	-	-	-	1.5 mg	-	-
selegiline	5 mg	2.5 mg	-	-	2.5 mg	10 mg
entacapone	-	-	-	400 mg	-	-
trihexyphenidyl	-	-	4 mg	-	-	-
amantadine (AMT)	-	200 mg	300 mg	50 mg	-	-
zonisamide (ZNS)	50 mg	-	-	-	-	-
dose modification within 6 months before OS [time]	RP initiated (0.5mg/d) [4.5 m] and increased (9mg/d) [1 m], addition of ZNS [4.5 m], levodopa increased [5.5 m]	CAB increased (4 mg/d) [14 d], addition of pergolide (250 ug/d) [24 d]and ZNS (50 mg/d) [4 d], levodopa decreased [1 m]	PRX initiated (0.5mg/d) [4 m]and increased to 1.0 mg/d [3.5 m]and to 1.5 mg/d [2.5 m], AMT (500 mg/d) increased (600 mg/d) [4.5 m]	-	-	RP increased (2 mg/d) [1 m]
neuroleptics before OS treatment of OS	donepezil (10 mg/d)	-	amitriptyline (30 mg/d)	quetiapine (25 mg/d)	-	-
antiparkinsonian drugs	withdrawal of ZNS and selegiline; levodopa (500 mg/d) and RP (8mg/d) decreased; *addition of entacapone (300 mg/d)	withdrawal of CAB, pergolide and ZNS; *levodopa (400 mg/d), *RP (3 mg/d)	withdrawal of AMT, CAB and PRX; *levodopa increased (250 to 500 mg/d); *addition of entacapone (300 mg/d)	*addition of ZNS (25 mg/d), *PRX increased to 2.5 mg/d	-	RP (2 mg/d) decreased
atypical neuroleptics	-	**olanzapine (7.5 mg/d)	milnacipran (150mg/d)	quetiapine (50 mg/d)	-	-
others	-	deep brain stimulation surgery	yokukansan (5 g/d)	yokukansan (5 g/d)	-	yokukansan (7.5 g/d), memantine (10 mg)

outcome after the onset of tactile Hs	28 m	8 years	12 m	33 m	16 m	10 m
Hoehn-Yahr stage	4	5	4	5	5	4
other formed Hs	+	+	none	+	+	+
tactile Hs	decreased	decreased	disappeared	unchanged	unchanged	unchanged
PD: Parkinson's disease, Hs: hallucination, UPDRS: Unified Parkinson's Disease Rating Scale, MMSE: Mini-Mental State Examination, m: months, d: day, ND: not done, * because of decreased motor function, ** patient received at 8 years after the onset of tactile hallucination						

back, so it is too hot and heavy” for short periods throughout the entire day. The insight was well retained. It was unpleasant, but sometimes he was willing to feed the cat. However, he did not clearly see a cat. Patient 3 with cenesthetic hallucinations had no history of hallucinations and did not complain of other forms of hallucinations [1]. THs can independently occur apart from visual hallucinations, minor hallucinations, or both. Most THs are unpleasant to the patient and are often intolerable, especially pain, and such THs can elicit delusions. THs can occur for several months and warrant changes in anti-parkinsonian medications or neuroleptic drugs.

Possible Risk Factors for THs

Non-pharmacological factors such as age, disease duration, or severity of motor symptoms are known risk factors for visual hallucinations [6]. As seen in 15 patients with THs [1-3], advanced age or a prolonged duration of disease may play an important role in THs. Advanced PD was also suggested to be linked to the presence of THs [2]. THs have been reported to increase in association with visual and auditory hallucinations as the disease duration becomes longer [5]. A history of hallucinations, especially visual hallucinations, may therefore also contribute to the onset of THs [1,2].

Recently, an association of THs with dopamine agonists has been suggested [1]. Dopamine D3 receptor is thought to be involved in reward, craving, emotional, and cognitive processes [7]. This receptor is expressed in mesolimbic structures [8]. Dopamine agonists with an affinity for D3 receptor might increase dopaminergic stimulation in mesolimbic areas. Previously, the severity of THs decreased after lowering the dose of dopamine agonists or after lowering the doses of both dopamine agonists and levodopa [2,3]. Dopamine agonists were initiated or the dose was increased during several periods immediately before the onset of THs [1-3] (Table 2). An increase in the dose of dopamine agonists can trigger THs. However, THs were apparently

unrelated to dopamine agonists in 3 previous patients [2], and anti-parkinsonian drugs other than dopamine agonists such as amantadine, zonisamide or trihexyphenidyl appeared to be partly trigger THs [1].

Discussion

In 2 of our patients with THs (Table 2, Patients 4 and 5), THs occurred without the modification of antiparkinsonian drugs. In Patient 5, we examined the details of non-motor examinations during THs. In brief, a 79-year-old man presented with Parkinsonism features in 2010 and received anti-parkinsonian medications in 2012. In 2013, minor hallucinations were evident. He was given levodopa (150 to 200 mg/day) and selegiline (2.5 mg/day) until 2016. In May 2015, he said, “a snake is wrapped around my feet,” or “an insect is pricking my legs.” In June 2015, THs and minor hallucinations persisted. During this time, the score on the Mini-Mental State Examination was 21. The scores on the Zung Self-Rating Depression Scale, Parkinson's fatigue scale [9], Japanese version of the Starkstein Apathy scale [10], and REM sleep behavior disorder screening Japanese questionnaire [11] were 42, 4.25, 18, and 7, respectively, suggesting that the patient had mild cognitive impairment, depression and apathy, moderate fatigue, and REM sleep behavior disorder. On Parkinson's Disease Sleep Scale (PDSS) [12], the average scores (from normal to severely disturbed: 0 to 100) of sleep quality (items 1-3), nocturnal restlessness (items 4 and 5), nocturnal psychosis (items 6 and 7), nocturia (item 8), nocturnal motor symptoms (items 9-13), and daytime somnolence (items 14 and 15) were 2.3, 2.5, 44, 60, 3.4, and 74, respectively. Hallucinations are generally ascribed to a disorder in rapid-eye-movement (REM) sleep mechanism [13], Fénelon, *et al.* [2] speculated that REM sleep mechanisms are involved in the onset of THs because in advanced forms of PD, brainstem structures controlling sleep and generating REM sleep are affected by pathological processes. Other non-motor features might also be associated with THs, as well as with visual hallucinations.

Conclusion

The management of THs seems to be difficult because THs often make physicians wonder if a physical abnormality is the underlying cause, in contrast to other types of hallucinations. First, physical problems must be ruled out. Second, THs can be managed similarly to the treatment of visual hallucinations, such as by reducing the dose of anti-parkinsonian drugs or additionally giving neuroleptics. The potential risks might be multifactorial, but THs have decreased or disappeared in some patients after the modification of dopamine agonists [1-3]. The dose of dopamine agonists was significantly

associated with psychosis in a subgroup analysis of elderly patients with PD aged ≥ 70 years [14]. Our experience indicates that clinicians should try to decrease dopamine agonists in patients who have persistent THs.

Disclosure

The authors report no conflicts of interest related with our paper.

Funding Statement

H.K received JSPS KAKENHI Grant Number (15K9356).

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