

Neuropsychiatric Factors in the Illusion of Visitors among Geriatric Patients: A Case Series

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ABSTRACT

The 'illusion of visitors' is a common phenomenon among geriatric patients presenting for psychiatric or neurologic evaluation and treatment. Although these illusory beliefs are etiologically diverse, patients may commonly have visual impairment and functional and/or structural disruption of frontal and right-hemisphere-mediated cognitive functioning. This article outlines eight cases of illusory beliefs among elderly patients, presenting psychiatric, neurologic, neuroimaging, and neuropsychological findings among these patients. Commonalities and differences among these cases are discussed, and a framework is provided for multidisciplinary assessment and treatment of patients presenting with illusory beliefs. (*J Geriatr Psychiatry Neurol* 1997; 10:79-87).

The experience of imaginary persons in the environment by elderly patients has been variously termed the 'illusion of visitors,' 'phantom boarders,' and 'imaginary companions.' Illusions of visitors are a common occurrence among elderly patients, and may be associated with impairment in visual acuity, disturbance in visual association, dysfunction in temporal or frontal areas due to cortical or subcortical dementia or stroke, or to medication toxicity. In many cases, a combination of these factors interact to cause the visual hallucinations and/or delusions. The report of imaginary persons may represent visual illusions, hallucinations, or delusions. Neurologists, psychiatrists, and neuropsychologists are often asked to evaluate patients with such illusory beliefs in the context of diagnosing a dementing illness or other organic factor that might account for this symptom.

Visual impairment may contribute to the phenomenon of illusory visitors. In 1769, Charles Bonnet, a

Swiss philosopher and naturalist, published an account of visual hallucinations in his psychologically normal, visually impaired grandfather. Since then, numerous reports have been made of visual hallucinations accompanying visual loss.^{1,2} Conditions such as cataracts, glaucoma, macular degeneration, and diabetic retinopathy are common in the elderly and, therefore, represent a significant factor in the understanding of this phenomenon. The visual illusions can be benign, simple visual distortions, or elaborate and at times menacing visual hallucinations and delusions. The illusion of visitors can also occur with dysfunction in the visual association cortex. Illusory beliefs in visually impaired patients can occur in either the presence or the absence of concurrent dementia or other neurologic conditions. Thus, both neurologic and ophthalmologic assessment of patients with the illusion of visitors is important.

Hallucinations and delusions commonly occur in conjunction with dementia. Cummings et al³ studied hallucinations and delusions in 30 patients with dementia of the Alzheimer type (DAT) and 15 patients with multiple infarct dementia (MID). Delusions were found in 30% of DAT and 40% of MID patients. Most delusions were of the paranoid type, and involved elementary misbeliefs such as the theft of possessions. Hallucinations also occurred in both groups, but were not common in this sample. In a later study,⁴ delusions were found in approximately 50% of DAT patients, and hallucinations in 28%. Similar results were reported by Mendez et al,⁵ who conducted a retrospective chart review of 217 patients

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with probable DAT. They found that paranoia or suspiciousness occurred in 35.5%, frank delusions in 30%, and visual hallucinations in 18.4%. Thus, visual hallucinations and/or delusions occur in at least half of patients with senile dementia and no previous psychiatric history.⁶ In degenerative dementias such as Alzheimer's disease, these symptoms are usually transient phenomena, occurring in the early to middle stages of the illness, and disappearing when cognitive deficits become severe.⁷ In other etiologies such as cerebrovascular disease, they can occur acutely and persist for months or even years.⁸

There may also be an association between development of delusions and pathology of the frontal lobe and of the right temporal and parietal lobes. Levine and Grek⁹ found that delusions were evident in a group of stroke patients with lesions involving the right hemisphere, superimposed on pre-existing generalized atrophy. Study of content-specific delusions with neurologic bases (such as reduplicative paramnesia and Capgras' syndrome) also implicates a combination of right-hemisphere and frontal-lobe pathology.¹⁰ More specifically, it has been suggested that these disorders are the result of an initial experience of unfamiliarity or changed appearance in the object of the delusion (due to right temporoparietal dysfunction), with subsequent inability to self-correct the erroneous belief (due to frontal pathology).

Treatment of organic delusional syndromes has not been carefully studied. Patients are usually treated symptomatically with neuroleptic agents. However, the efficacy of such treatments has not been empirically established in this population, although case reports are commonly seen in the psychiatric literature.

We describe eight cases of the illusion of visitors to illustrate the diversity of presenting complaints and underlying etiologies. Each of these patients underwent psychiatric and neurologic evaluations, and many also had neuroimaging studies (CT scan or MRI) and neuropsychological evaluation. In cases where follow-up monitoring of treatment effects did occur, treatment response is also discussed. These cases provide a framework for understanding the neural systems that may contribute to the phenomenon of an illusion of visitors.

CASE REPORTS

Impairment in Visual Acuity

Case 1

This 76-year-old, right-handed woman is a retired nurse. For the past 18 months, she had been insisting that six of her family members who had passed away were actually buried alive and had been able to climb out of their graves. These relatives were now living with her; she reported that they had been wearing her clothes, and that sometimes she was unable to find things because the relatives had a tendency to hide her belongings. She also

reported being able to see her sister's face in the face of her cat, because her sister was able to "throw it." Her insight was markedly impaired, and she would not consider the possibility that these beliefs were incorrect. Her son also reported that the patient had shown a gradual decline in memory, episodes of confusion, bizarre behavior, and paranoid ideation. The patient's medical history was significant for bilateral macular degeneration, hypothyroidism (treated with levothyroxine sodium), low serum B₁₂ levels (treated with monthly injections), and emphysema. She had no history of previous psychiatric treatment. A CT scan showed generalized atrophy and moderate periventricular small-vessel disease, but no lesion or mass effect. Laboratory tests (including B₁₂ and thyroid levels) were normal at the time of this evaluation. Visual impairment was prominent. The patient reported that she wore glasses, but could not bring them to the hospital because her (deceased) sister had hidden them. An ophthalmologic examination determined that the patient's best vision in her right eye was 20/200, and 20/400 in her left eye. Neuropsychological evaluation indicated that she had impaired frontal/executive functioning, and impaired verbal learning and free recall (though recognition memory was normal). Visuospatial skills and nonverbal learning and memory could not be assessed due to her visual impairment. Other areas of functioning (orientation, attention, and language functions) were normal for her age.

Discussion: In this case, visual impairment appears to play some role in causing visual illusions. However, this patient's delusions appear more pronounced than do the visual illusions; thus, visual impairment is not a sufficient explanation for her symptoms. This patient most likely also has an early dementing disorder such as Alzheimer's disease.

She was treated with haloperidol in doses up to 2 mg b.i.d. Her delusional ideation remitted, and she was discharged to live with her son in her home after she agreed with her treating physician that the persons in her home would no longer be present when she returned. She seemed satisfied with the assurance that they would be gone, but was reluctant to accept these as mental phenomena. Other interventions for this patient included correction of the patient's vision as much as possible, and inspection of her home to ensure adequate lighting.

Although the patient could not be convinced that her beliefs were false, it is often important to explain to the patient and family that these beliefs are related to her visual impairment and memory loss. Medication can dampen the intensity of the beliefs and the strong feelings associated with them. Families are encouraged not to argue with the patients about the misperception, but to reassure and redirect them.

Despite an initially good response to treatment, this patient returned to the hospital 1 month later. At that time, she showed similar delusional ideation, and was treated first with haloperidol (no improvement) and

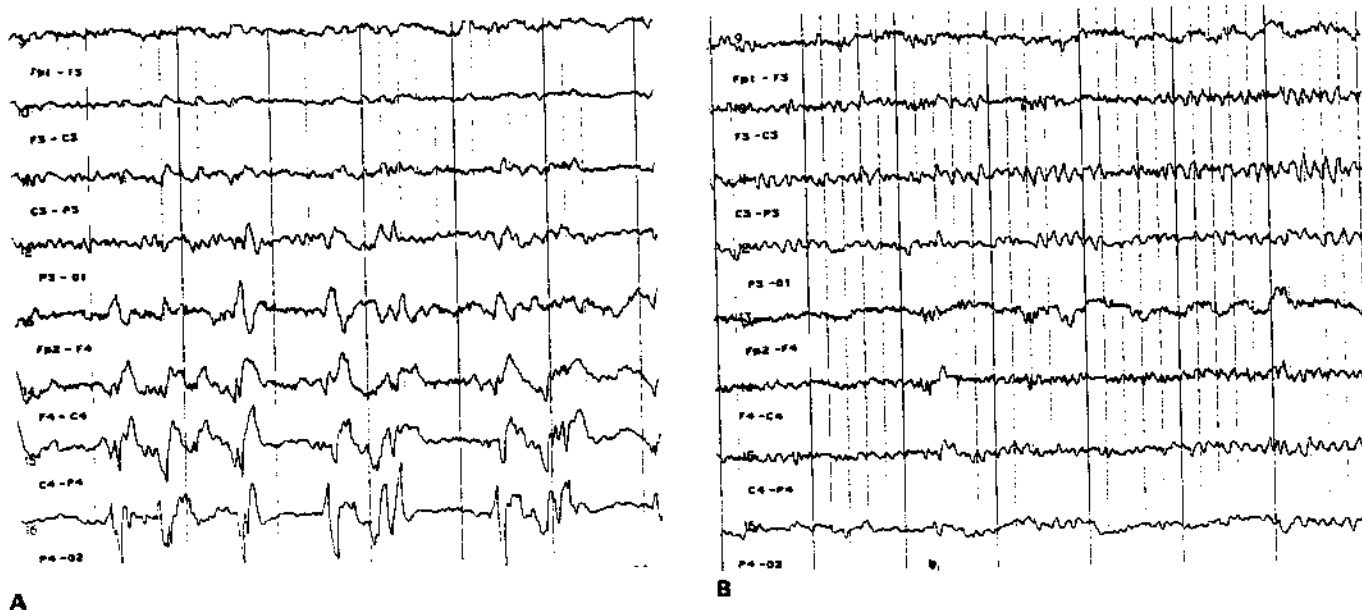


Figure 1. EEG longitudinal bipolar montage. A, leads demonstrate frequent spike and wave discharges emanating from the right parieto-occipital region. Patient 2 experienced the illusion of visitors in her left visual field in association with this epileptiform activity. B, epileptiform activity and the illusion of visitors resolved 3 days later, after treatment with phenytoin and valproic acid.

then with molindone hydrochloride, in doses up to 10 mg t.i.d. However, no improvement was noted in her delusional ideation.

Disturbance of Visual Association

Case 2

This 62-year-old, right-handed, widowed woman was well until she experienced a hemorrhagic infarct in the right parieto-occipital lobe. This infarction caused a left homonymous hemianopsia. Occasional seizures were noted. EEG revealed periodic spike-and-wave discharges from the right parieto-occipital junction in the area of the infarction. She occasionally reported seeing her husband's face in picture frames in her left visual field, and at other times imagined that her husband was in the room with her on her left side. She was convinced that these perceptions were real. EEG during an episode of visual hallucinosis revealed increased frequency of spike-and-wave discharges in the right parieto-occipital area (Fig. 1A). Treatment with higher doses of phenytoin and valproic acid led to a resolution of her visual illusions, and to a decrease in spike-and-wave activity on EEG (Fig. 1B). *Discussion:* This patient exhibited a disturbance of visual perception in her left visual field only, related to her right parieto-occipital infarction. Visual hallucinations and delusions of visitors occurred as positive phenomena when seizure discharges were more active, and the hallucinations decreased when seizures were better controlled with anticonvulsants. The location of the underlying lesion in the right hemisphere probably predisposed her to the visual misperceptions and delusions.

Case 3

This 78-year-old, right-handed woman with high school education is a retired bookkeeper. She presented with a 3-month history of deteriorating cognitive and adaptive abilities, and complaints of declining vision. She had become unable to recognize familiar people, read, or watch television due to visual limitations. She also complained of a range of visual misperceptions. The patient would look out of her window, and misperceive trees, bare from winter, as people moving their arms. She misperceived empty chairs for people sitting at her dining table. When attempting to eat, she would fail to notice utensils near her plate, but would reach successfully for a fork at another setting across the table. Because of this apparent inconsistency in her visual abilities, her family had concluded that this behavior was a volitional attempt to "get attention." The referring physician believed the disorder to be of the hysterical type, based on normal visual acuity on Snellen's chart testing. The patient had no history of psychiatric treatment; however, she was a concentration camp survivor, and it had been speculated that her current problems were conversion phenomena or other manifestations of a delayed response to that traumatic stressor.

Past medical history was unremarkable, with no previous neurologic disturbance. Family history was notable for a brother who had experienced similar problems with visual perception late in life, and who was diagnosed with dementia.

Visual acuity was normal. Neurologic examination revealed right carotid bruit and systolic murmur, but no elementary neurologic deficits. Both CT and MRI scans

were normal. EEG was abnormal, with slowing in temporal regions greater on the left than the right.

Neuropsychological testing revealed a visual perceptual disturbance. She retained the ability to avoid obstacles when walking and to recognize many objects pointed out to her around the room. However, her ability to recognize objects was inconsistent and characterized by a tendency to identify individual percepts without the ability to integrate them into a whole (simultanagnosia). For example, when asked to describe a series of geometric shapes or letters, she could describe isolated elements (e.g., the corner of a triangle or peak of the letter "A"). Sometimes, this would lead to correct extrapolation to the whole stimulus, but on most occasions she failed. She could not guide her movements using vision, consistently missing targets and then compensating with tactile cues (e.g., grasping the examiner's hand and inching up to the target digit). Letters and other stimuli were reported to "disappear," colors were "darkened," and she could not recognize faces (including her own in a mirror).

Most other psychometric testing was compromised by her visual agnosia. However, she was oriented, had an excellent fund of knowledge, could learn three objects and three words and recall them at 3 minutes, and could draw simple shapes and write fluently. Interestingly, she was unable to visually identify figures or writing that she had just produced.

Discussion: This patient demonstrates some elements of Balint's syndrome, a disorder of visual perception characterized by simultanagnosia, optic ataxia, and ocular apraxia.¹¹ She showed simultanagnosia, in that she was unable to integrate parts of her environment into meaningful wholes. This ephemeral, shifting visual perception is typical of simultanagnosia, and often leads to the mistaken diagnosis of conversion disorder or volitional distortion, as had occurred in the present case. She also showed optic ataxia, in that she was unable to guide her eye movements using visual cues. The final element of the syndrome, the inability to track objects actively (ocular apraxia or psychic gaze paralysis) was absent at the time of this assessment.

Balint's syndrome is generally associated with bilateral occipitoparietal infarcts, or with tumors.¹¹ Usually, there is an abrupt onset and a distinct lesion. However, in this case, CT and MRI scans showed no lesions in the visual pathways or occipitoparietal cortical zones. EEG showed slowing in temporal regions, greater on the left than on the right. Thus, this case probably represented a variant of degenerative disease affecting posterior association areas in the early stages.¹²

Cortical Dementia

Case 4

This 74-year-old married man was referred to an outpatient memory clinic for evaluation of a decline in memory,

the inability to navigate while driving, and episodes of confusing his wife with his mother (now deceased). He also complained that there were strangers in the house and requested that the clinic staff assist him by evicting these intruders. Although he denied actually seeing the strangers, he had been observed to be locking the doors and checking for them. His family reported that they first noted changes about 2 years previously, when the patient reportedly left work one day feeling weak and lost consciousness while driving home. Subsequent hospitalization revealed anemia, and he was given one transfusion and iron supplements. The first behavioral change noted by the family was suspiciousness of his wife, accusing her of infidelity.

Medical history was significant for anemia, a benign polypectomy, cholecystectomy, transurethral resection of the prostate, bilateral inguinal hernia repair, hypertension, and noninsulin-dependent diabetes mellitus. Developmental history was reportedly normal. There was no history of previous psychiatric history and no family history of dementia or psychiatric disorder. Visual acuity was normal. CT scan indicated mild atrophy. Laboratory values were notable for low iron, but were otherwise within normal limits.

Neuropsychological evaluation revealed that this man had a marked lack of insight into his difficulties. He reported that he came for the evaluation to get his driver's license back, which he believed was revoked by his family physician. He was accompanied by his wife and daughter, but did not recognize either of them. When asked to identify his daughter, he stated, "Oh, he is my cousin, but not by marriage." When asked whether this person was male or female, he replied, "As far as I know, since he was a kid, he was a man. I think he is a man, at least." When confronted with the inconsistencies of his daughter's obviously feminine appearance (e.g., earrings, lipstick), features of which he accurately described, the patient gave the excuse that "I know that some men like to wear earrings. I don't like to, but others do." He also misidentified his wife, stating, "he lives next door to me." Further inquiry indicated that at times the patient believed his wife to be his mother. During the evaluation, he stated that his mother was waiting for him at home. When asked her age, he stated that she was about the same age as he. Again, when confronted with the impossibility of this, the patient stated that she was born in Italy and, "they just have them (children) when they're young." He also appeared to confuse colors.

On cognitive testing, the patient was oriented to person, but not to place, time, or date. Fund of general knowledge was very poor; he was unable to identify the current U.S. president or governor even when given multiple-choice alternatives. Performance was markedly impaired on tests of frontal/executive functioning such as word list generation, Luria's complex motor and recurring figures tasks (i.e., ramparts), and a go/no go task. Abstraction abilities were severely impaired: for example,

when asked how shoes, pants, and sweaters were alike, he replied, "You put them on your feet." Spontaneous speech was fluent and conveyed information adequately. Comprehension of questions and serial commands was mildly impaired, and characterized by perseveration and stimulus boundedness. Repetition of high-frequency phrases was normal, but he was unable to repeat low-frequency phrases ("First field T-shirt" for First British Field Artillery). Confrontation naming was moderately impaired and characterized by circumlocutions. Complex visual perception was severely impaired, and the patient quickly lost set on a task requiring visual integration of parts of a common object. Construction was markedly impaired and characterized by extreme distortions in the stimuli copied. The patient was unable to identify the examiners by their picture identification badges, and misidentified a photograph of a young blond-haired boy as being that of the female brunette examiner.

Discussion: This patient was diagnosed with a moderately advanced multifocal cortical dementia, most likely of the Alzheimer type. Additionally, in the context of his dementia, he appears to have a visual agnosia (prosopagnosia), confusion of his mother and wife, and a delusional belief that there were strangers in his home. He did not have basic sensory impairment, and did not experience hallucinations (did not claim to "see" or "hear" the visitors). However, behaviors exhibited by the patient in response to his delusions and visual agnosia were frustrating and puzzling for family members. In this case, educating the family about the nature of these phenomena and their nonvolitional nature was the primary intervention, helping the family to develop more realistic expectations.

Subcortical Dementia

Case 5

This 81-year old, right-handed woman with a seventh-grade education had worked as a cook in a convent. She was hospitalized for behavioral problems secondary to delusional beliefs. She had been involved in confrontations with her nursing home roommate due to talking aloud to imaginary visitors. She reported that in recent weeks, she had been visited by her sister, by other family members (deceased), and by the bishop. She further reported that these visitors conversed with her. In addition to the perceptual disturbances noted, the patient's mental status on admission was significant for agitation, tremulousness, disorganized thinking and circumstantiality, tearfulness, and disturbance of appetite and sleep.

She had no history of previous psychiatric treatment. Medical history was significant for hysterectomy and breast cancer with bilateral mastectomy 2 years prior to the current evaluation. She was taking no medications. Visual acuity was within normal limits. A neurologic examination indicated signs of parkinsonism, including resting tremor, gait with small steps, cogwheeling,

and postural instability. Frontal release signs (grasp, glabellar, and snout reflexes) were also observed. CT scan revealed predominantly frontal atrophy, which was interpreted as normal for her age. EEG showed minimal slowing of the background and mild intermittent theta and delta activity bilaterally. Other laboratory tests were within normal limits. Neuropsychological evaluation indicated deficits in frontal/executive functioning, confrontation naming, word fluency, visuospatial abilities, and nonverbal memory. Orientation, attention, and verbal memory were relatively intact.

Discussion: These findings were interpreted as consistent with a probable subcortical degenerative dementia given the relative severity of frontal/executive impairment, relatively intact verbal memory, and the ability to benefit from context and cueing on memory tasks, as well as the presence of prominent parkinsonism. Approximately 20% of patients with Parkinson's disease develop a cortical dementia with plaques and tangles similar to Alzheimer's disease.³ Once again, the probable combination of right-hemisphere dysfunction (suggested by visuospatial and nonverbal memory deficits) and frontal-lobe-mediated executive dysfunction was seen.

Initially, the parkinsonian symptoms were not treated for fear of worsening her delusions. Eventually, she was treated with resperidone, in doses up to 3 mg b.i.d. She became less anxious, and more interactive with other patients. However, her delusional ideation did not appear to abate during her hospitalization. The patient was discharged to a nursing home.

Medication Toxicity: Dopamine Replacement

Case 6

This 70-year-old, left-handed man with a Bachelor of Arts degree had worked as a retail jeweler. He was admitted to the hospital with a chief complaint of "some trouble at his apartment." He reported that he had seen three people standing around, and they refused to respond to his questions regarding who they were and why they were there. He tolerated the visitors for a few days, but became increasingly upset by them, because they refused to leave and were using his electricity without paying for it. He called the police, who told him to go to the hospital.

He had no previous history of psychiatric treatment, but had been diagnosed with Parkinson's disease 2 years prior to these events, and was treated with carbidopa-levodopa, 25/100 t.i.d. His medication dosage had been increased to 25/200 t.i.d. a few weeks prior to admission. His medical history was also significant for mitral valve replacement, atrial fibrillation, noninsulin-dependent diabetes mellitus, and rheumatic fever as a child. His vision was corrected with glasses for presbyopia, and he was moderately hard of hearing. He presented with a severe resting tremor in his left arm. Neuropsychological evaluation demonstrated significant memory impairment as well as difficulty with abstraction; other cognitive functions,

including naming and visuospatial skills, were relatively intact.

Discussion: This patient presented with a known history of Parkinson's disease, and a recent increase in levodopa dosage. When his carbidopa-levodopa was held, his psychosis appeared to resolve, and he began to concede that the visitors might have been imaginary. Thus, in this case, the delusional ideation seems related to dopaminergic treatment for parkinsonism. However, his underlying cognitive impairment may have increased his susceptibility to psychosis.

Cummings¹³ evaluated common behavioral complications of drug treatment for Parkinson's disease, and concluded that a substantial proportion of patients treated with dopaminergic agents develop complications: up to 30% develop visual hallucinations, 10% show delusions, 10 to 15% report feelings of increased anxiety, and 15% have confusional episodes. Elderly patients and those with concomitant dementia are the most likely to have untoward side effects with antiparkinsonism treatment. Thus, those patients who develop delusional ideation following dopaminergic treatment of parkinsonian symptoms may have a cognitive vulnerability that predisposes them to develop side effects.

Right-Hemisphere Dysfunction: Cortical Infarction

Case 7

This 71-year-old, right-handed woman with a high school education had worked as a department store salesperson. She was hospitalized with the belief that "spirits" were entering her house at night and putting plastic on the windows. She was unable to make sense of finding, each morning, that there was no plastic there. She also reported hypervigilance associated with this belief (i.e., staying awake to "make sure they leave"). These beliefs persisted for 6 months prior to admission, but had worsened to the extent that the patient was no longer able to stay alone. No paranoia was associated with these "spirits"; she was not concerned that they might harm her. She had also had several falls over the past year, and reported other perceptual anomalies (seeing zigzags and spots) and seeing inanimate objects moving.

An ophthalmologic evaluation was ordered, but her vision was not found to be significantly impaired. She did have a cataract in her right eye, but the ophthalmologist thought it was premature for removal. Her medical history was also significant for peripheral vascular disease, hypertension, noninsulin-dependent diabetes mellitus, myocardial infarction 3 years previous, a right-sided infarction with residual left-sided weakness 4 years ago, a history of transient ischemic attacks, and obesity.

A neurologic evaluation indicated no visual field or hemisensory deficits, normal strength, and normal sensation. Her gait was slightly wide based, with retropulsion. CT scan showed an area of decreased attenuation in

the right middle cerebral-artery territory involving the anterior temporal lobe and posterior frontal lobe, which was interpreted as a subacute or chronic infarct in addition to atrophy with prominent extra-axial space overlying the frontal lobes.

Neuropsychological evaluation indicated moderate to severe impairment in frontal/executive functioning, severe visuoconstructive difficulties, and difficulty with free recall on memory testing but marked improvement with cueing. Other cognitive functions (orientation, attention, and language) were not impaired.

Discussion: This case of dementia and right middle cerebral-artery infarction illustrates well the scenario first observed by Levine and Grek⁹ in which patients with cortical atrophy and a superimposed right-hemisphere CVA become vulnerable to illusory beliefs. This case is particularly interesting in that her symptoms did not emerge immediately after her stroke, suggesting that post-stroke atrophy played a role in precipitating illusory beliefs. This patient was not treated with medication, as her hallucinations were not present after the first day of hospitalization. She was discharged to home, with follow-up planned in the outpatient clinic.

By her first follow-up appointment (1 month post-discharge), she was again experiencing delusional beliefs with associated hypervigilance. She was treated with Ambien 10 mg qhs, and subsequently reported better sleep and less hypervigilance, although she continued to believe the "spirits" were present.

Right-Hemisphere Dysfunction: Microvascular Disease

Case 8

This 83-year-old, right-handed woman with seventh-grade education is retired from factory work. She had no previous history of psychiatric or neurologic disorder. Family history was also negative for neuropsychiatric problems. On close questioning, the patient revealed that she had experienced a brief syncopal episode while picnicking with her family a few weeks prior to the onset of her delusions.

The patient was brought to an outpatient geriatric clinic by her daughter with the chief complaints that her children had unaccountably disappeared, and that she had "two free boarders" in her house. This woman returned to her home one evening and was surprised to note that her teenage son and daughter were not at home (in fact, she had only two adult children in their 50s). She simultaneously discovered two young men in her living room whom she did not recognize and who were always seen in stereotypic postures on the same couch and chair. She never conversed with them, and they never engaged in active behavior around the room.

When her children did not appear by the next morning, she contacted her son and daughter, Ron and Beth, to inform them that their teenage siblings (also named

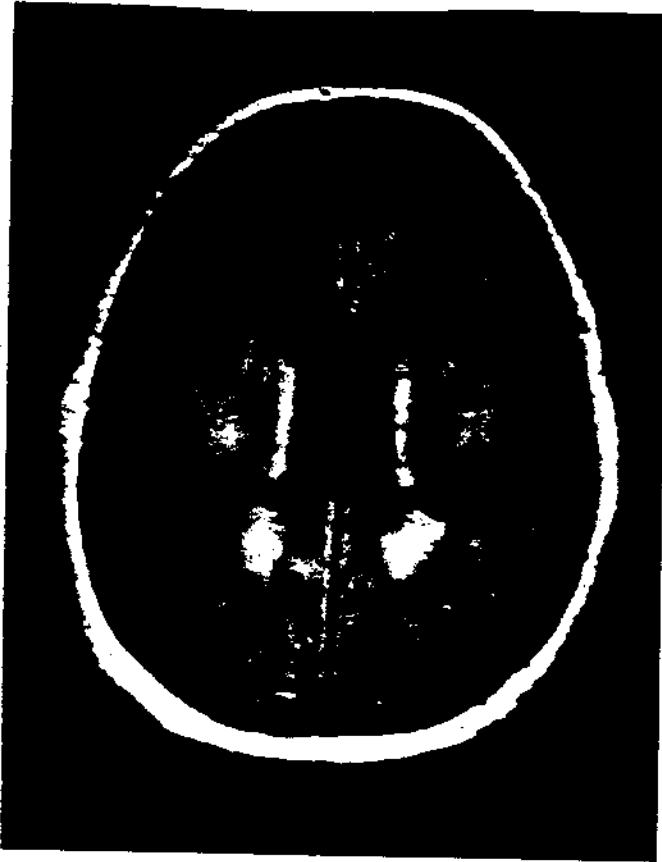


Figure 2. In case 8, a noncontrast, axial, proton-density weighted MRI scan at the level of the superior portion of the lateral ventricles demonstrates a large confluent area of high signal in the right frontotemporoparietal white matter. Confluent areas of high signal are also seen at other sites in the white matter.

Ron and Beth) had not returned home. Her children were unsuccessful in repeated attempts to persuade their mother that they had no younger siblings, and that there were no other people in her house. The patient was mildly perturbed that they did not share her concern for her missing children. She initially placed objects near her door lest her "boarders" enter her bedroom at night, and she occasionally left senior-center activities and family gatherings early to return home to check on the "intruders." She was eventually hospitalized when she suggested that the police be contacted to look for her missing children.

Elementary neurologic examination was within normal limits for her age. Laboratory blood chemistry, hematology, and urinalysis were normal. Visual acuity was normal. EEG was abnormal, with mild nonspecific slowing. An MRI scan revealed a large confluent area of high signal intensity in the right frontotemporoparietal white matter, and more widespread T2 hyperintensities throughout the white matter of both hemispheres, worse on the right than on the left (Fig. 2).

Neuropsychological evaluation revealed that the patient was fully oriented and had normal basic attentional, language, and verbal memory abilities. Executive and spatial functions were significantly impaired.

Perseverative tendencies interfered with her performance on spatial and nonverbal memory tasks. Constructions were significantly distorted and subject to perseverative errors. For example, when asked to draw a clock, the patient continued to write numbers up to 26, stopping only because the circle was filled. The patient also displayed perseverative contamination from previous drawings on recall testing of simple line drawings. Evidence of perceptual dysfunction was noted on a visual integration task, on which she was unable to integrate cut-up objects into wholes, repeatedly responding to individual parts. There was no gross prosopagnosia—the patient could readily identify her actual offspring and hospital staff.

Discussion: In this case, an illusion of visitors coexisted with a separate Capgras' delusion. Capgras' syndrome is the belief that well-known persons, such as family members, have identical doubles or have been replaced by impostors.¹⁴ It is one of a variety of content-specific delusions involving the reduplication of elements of the environment.¹⁰ The patient's visual misperception of the two men in her house was an hallucinatory misperception of visitors, whereas her belief that she had two sets of children with the same psychological identity constituted the Capgras' delusion.

This patient demonstrates concurrent right-hemisphere and frontal-lobe dysfunction (demonstrated by neuropsychological evaluation) in association with these content-specific delusions. The etiology of the right-hemisphere and frontal dysfunction is probably due to severe microvascular disease causing a large focal area of demyelination, gliosis, and microinfarct in the right temporoparietal white matter.

The patient was treated initially with molindone hydrochloride 5 mg t.i.d., and later with haloperidol in dosages up to 2 mg t.i.d. Her symptoms remained unchanged throughout hospitalization and during a 3-month follow-up in the outpatient clinic. Thus, this patient did not appear to experience remission of symptoms following treatment with two different neuroleptic medications. She was discharged to a sheltered care facility with the diagnosis of organic delusional disorder.

DISCUSSION

Etiologic Issues

The cases in this series demonstrate that the symptom of imaginary visitors in elderly patients may result from a variety of etiologic conditions, including peripheral eye pathology, disease of the visual association cortex, dopaminergic treatment for parkinsonism, lesions in the right hemisphere, degenerative changes in dementia, or a combination of these conditions.

While resulting from many different underlying conditions, similarities are seen among the cases presented. For example, most patients who develop these imaginary

visitors show measurable impairment on neuropsychological tests of frontal-lobe-mediated executive functions as well as poorer-than-normal visuospatial skills. This finding may represent a common pathway that could explain the development of the same symptom among patients with many different conditions. Frontal-lobe and right-hemisphere pathology have also been identified in Capgras' syndrome,^{10,15} suggesting that the belief of imaginary visitors may share an etiologic basis with other forms of delusional misidentification.

Considering this hypothesis among the cases presented, it can be noted that one patients showed significant problems with visual acuity. However, the appearance of illusory visitors does not appear fully explainable by classic Charles Bonnet syndrome, in that other delusional beliefs (e.g., relatives buried alive) as well as auditory hallucinations (conversing with the visitors) were present. Also, greater cerebral atrophy than expected for age was noted on CT scan. Thus, it seems likely that the phenomena of Charles Bonnet syndrome (visual illusions) interacted with cognitive and neurologic factors to produce this patient's illusory experience. Several cases of degenerative dementia (probable DAT, vascular, and parkinsonian dementia) were also presented; these cases also had in common findings of decreased performance on executive and spatial tasks. Visual agnosia and simultagnosia were noted among these patients, suggesting that patients who develop illusions in the context of a degenerative dementing illness may be characterized by more severe right-hemisphere degeneration than patients with dementia but no illusions or delusions. Sensitivity to the side effects of a dopaminergic medication was seen in one patient with Parkinson's disease; this patient demonstrated significant memory impairment as well as frontal-executive impairment on neuropsychological testing. Thus, it does seem that impairment of frontal-lobe-mediated executive functions may be a prerequisite for the development of the illusion of visitors.

Delusions are also commonly seen in conjunction with dementia. Simple delusions of theft and vague suspicions directed at relatives are most commonly observed, and probably represent an attempt by the amnesic patient to explain the loss of articles that have been misplaced. Unable to remember losing the object, the demented patient confabulates an explanation involving theft by someone close at hand, often a caregiver. Many of the delusions that evolve from the visual experience of imaginary visitors can similarly be viewed as an attempt to make sense of bizarre input that nonetheless seems real to the patient—if there are strangers in the house, they must be here for a purpose. Precise interpretation (benign or malignant) probably depends on premorbid personality.

Delusions can either precede visual disturbance or evolve from it. For example, one patient first developed the delusional belief that he was being threatened, then misinterpreted the sight of a telephone pole as an assassin

lurking outside his home, consistent with his delusional belief. Conversely, a patient with prosopagnosia may initially have difficulty with facial recognition, interpret the sight of relatives as the presence of strangers, then develop a Capgras' delusion that relatives have been replaced by impostors. By the time the patient is seen in the clinic with complaints of imaginary visitors, the visual hallucinations/illusions and delusions may be intertwined in a complex way. Therefore, it is often difficult in the individual patient to determine whether the delusion or visual disturbance occurred first. Fleminger¹⁶ proposed a model demonstrating how neurologic and psychological factors may interact to produce the 'illusion of visitors': that is, misperceptions that normally would have been subjected to visual scrutiny or summarily dismissed by good judgment can lead to persistent misinterpretations in vulnerable elderly patients. For example, a patient with cataracts may become mildly demented with the passing of years. Because of his poor visual acuity, reduced sensory input, and central visual-processing deficits due to incipient dementia, he begins to experience visual misperceptions (illusions), mistaking patterns in fabric for faces, especially under conditions of poor lighting at night. He becomes frightened by these experiences, has trouble sleeping, and avoids leaving his house. Proper nutrition and medication management is ignored or actively avoided as the patient becomes more paranoid about these "strangers" in his house. By the time the patient presents to a hospital, he may be disoriented, confused, and frankly paranoid. Discriminating the contribution of each etiologic factor requires comprehensive multidisciplinary assessment.

Clinical Significance and Conclusions

As previously noted, empiric investigation of psychopharmacologic treatment for the illusion of visitors has been limited. Neuroleptic treatment was utilized with several patients in this series, with variable success. Ophthalmologic evaluation should be obtained and vision should be corrected as much as possible. Environmental modification, such as increasing light in the patient's home, is beneficial in some cases. Identification of cognitive deficits, and an opportunity to assess level of competence with regard to activities of daily living was a positive consequence of hospitalization for illusory beliefs in several of our cases. The need for in-home supportive services, or alternative living arrangements, should be assessed in patients presenting with illusory beliefs as these are often accompanied by cognitive changes and, in some cases, a degenerative dementing illness.

The importance of assessing visual-perceptual disturbances such as prosopagnosia in elderly patients with illusory beliefs cannot be overemphasized. These phenomena are often a source of considerable distress to relatives and other caregivers. Even professional examiners may not recognize the visual-perceptual disorders that can contribute to delusional beliefs, leading to the

inappropriate diagnosis of a primary psychiatric disorder. Providing explanations for these disturbances can itself be therapeutic, and may alleviate fears of mental illness. Furthermore, many of the underlying disorders are treatable, leading to substantial improvement in quality of life for both patients and their families.³

Understanding the variety of conditions that can cause or contribute to the phenomenon of illusory visitors allows the clinician to undertake a streamlined diagnostic workup, and to initiate treatment interventions in an expedient manner.

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