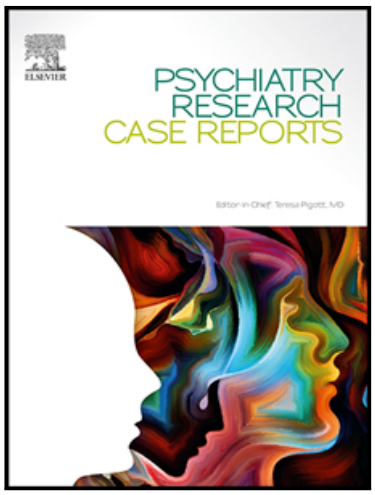

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PII: S2773-0212(23)00082-2
DOI: https://doi.org/10.1016/j.psycr.2023.100184
Reference: PSYCR 100184

To appear in: *Psychiatry Research Case Reports*

Received date: 21 November 2022
Revised date: 27 September 2023
Accepted date: 10 October 2023

Please cite this article as: Stefan Frisch , Fabian Fußer , Demons of the past – Signs of childhood trauma reflected in psychosis due to vascular cognitive disorder?, *Psychiatry Research Case Reports* (2023), doi: https://doi.org/10.1016/j.psycr.2023.100184

Demons of the past – Signs of childhood trauma reflected in psychosis due to vascular cognitive disorder?

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Keywords:

Vascular cognitive disorder (VCD) – Paranoid hallucinatory syndrome – Late-onset trauma-related symptoms – Depression – Assertive community treatment (ACT)

Abstract

Behavioral and psychological syndromes such as depression and psychosis often occur along with cognitive (esp. executive) deficits in vascular cognitive disorder (VCD) in the elderly. We present the case of an 85-year-old woman with deficits in executive functions as well as a persistent and clearly circumscribed paranoid hallucinatory syndrome (most probably due to VCD) which could not be adequately treated with antipsychotic medication. The patient also suffered from severe depression (independent of psychotic symptoms). Both psychosis and depression were successfully managed in a home treatment based on *Flexible Assertive Community Treatment* (FACT). Interestingly, a thematic association between the delusional contents and early childhood traumata could be reconstructed, and late-onset trauma-related symptoms could be successfully treated with cognitive-behavioral therapy (CBT) as well. In sum, behavioral management of psychotic syndromes is possible in the absence of adequate pharmacological treatment options, and multiprofessional and person-centered home treatment may be successful in the elderly, even in severe and complex disorders.

Introduction

Vascular pathology is a main case of both cognitive decline as well as of behavioral and psychological abnormalities in the elderly. It accounts for the second highest number of dementias, after Alzheimer's disease (O'Brien et al., 2003). Therefore, prevention and treatment of cerebrovascular risks is one of the most important targets for dementia prevention. Symptom severities encompass a continuum from mild cognitive impairment to severe dementia and are due to a range of possible pathogenetic causes. Subcortical ischemia (white matter lesions and lacunar infarcts) is the most frequent cause (Dichgans and Leys, 2017). In order to encompass the clinical and pathophysiological diversity of vascular disorders, umbrella terms such as "cognitive vascular impairment" (VCI) (O'Brien et al., 2003; Dichgans and Leys, 2017) or "vascular cognitive disorder" (VCD) (Sachdev et al., 2014) have been coined in recent years. It is widely acknowledged that in VCD, memory functions are relatively spared, whereas attentional and especially executive deficits are prominent (O'Brien et al., 2003; Sachdev et al., 2014), probably due to a disruption of structural and functional connectivity in the brain (Dichgans and Leys, 2017; Quinque et al., 2012). Behavioral and psychological symptoms such as depression, apathy, anxiety or psychosis are common especially in severe stages of VCD. They are associated with a negative course of the disease, with mismedication and increased health care costs (Cerejeira et al., 2012). They tend to cause persistent distress in patients, caregivers and medical personnel (Mukherjee et al., 2017; Yang et al., 2020). Psychotic symptoms such as hallucinations and delusions occur frequently in vascular dementia (Ballard et al., 2000, Khanna et al., 2022). They seem to be associated with female sex (Steinberg et al., 2006; Xing et al., 2012), severity of dementia (Ballard et al., 2000; Fuh et al., 2005), small vessel disease (Staekenborg et al., 2010) and impairments in executive functions (Hopkins and Libon, 2005). Hallucinations and delusions in dementia are among the most challenging symptoms with respect to both caregiver burden as well as treatment, because antipsychotic medication is associated with the risk of cognitive decline and increased mortality,

and often shows only small improvements in psychotic symptoms in dementia (Ballard and Howard, 2006; Khanna et al., 2022; Yunusa et al., 2021). Due to these risks, especially the risk of cerebrovascular incidents, antipsychotics should be limited to short-term treatments (Azermai et al., 2011; Khanna et al., 2022; van Leeuwen et al, 2018). Non-pharmacological interventions are at least as important (Azermai et al., 2011), especially with respect to a biopsychosocial framework of dementia as in person-centered care (Chenoweth et al., 2018). In general, non-pharmacological interventions target environmental factors causing stress in the patient by improving staff and family support, or by using sensory stimulation (such as massage or aroma therapy), although the evidence for these interventions is still inconclusive in the context of psychosis (Azermai et al., 2011; Cipriani et al., 2013). With respect to depression in VCD, antidepressant medication has limited effects; non-pharmacological interventions such as psychotherapy seem promising, but only if complemented with interventions aiming at reducing the additional cognitive deficits in VCD (Taylor et al., 2018).

In the following, we present a case of an uncommonly circumscribed and persisting paranoid hallucinatory syndrome as well as a severe depression in VCD due to subcortical ischemia. The patient was successfully treated in an individualized, multiprofessional home treatment. In the course of the treatment, a thematic association between the paranoid hallucinatory experience and war-related childhood traumata, probably unraveled by the dementing illness and triggered by current political events (war in Ukraine), could be established and treated successfully as well.

Case presentation

The patient, a 85 year-old female with a history of major depressive disorder, was referred to our clinic in spring 2020 by her GP who suspected dementia. The patient presented a severe depressive syndrome of low mood, reduced energy, apathy, anhedonia, morning low, reduced appetite, sleep

problems, feelings of isolation and insufficiency, as well as ruminating of biographical events accompanied by strong feelings of guilt. Furthermore, the patient suffered from a paranoid hallucinatory syndrome that was limited to the nightly appearance of a mouse. The patient reported multimodal sensations of the mouse: Visual (scampering on the floor), auditory (rustling and tapping on the floor and behind walls and cupboards, nibbling) and olfactory (smell of mice). The most prominent and disturbing sensations, however, were tactile: The patient felt the mouse crawling up her body from the feet to her back or through the mattress almost every night, sometimes for hours, despite repeated attempts to drive her away. The patient had tried a range of measures to get rid of the purported mouse (e.g. new mattress, mousetraps, pest-control company etc.). Even though no mouse had ever been caught or spotted independently of the patient's report, she remained convinced that a mouse was after her and hallucinatory experiences persisted. No further psychotic phenomena were ever observed. Both the depressive and the paranoid hallucinatory syndrome developed within weeks after the patient had stopped most of her activities and personal contacts due to the first COVID-19 lockdown in Germany in spring 2020.

Somatic history revealed arterial hypertension, hyperlipidemia, atrial fibrillation, bilateral hip total endoprothesis, and slight left hemiparesis due to two right-hemisphere lacunar infarcts in 2015. Furthermore, the patient suffered from chronic pain (right knee and lower back) and restless legs syndrome (RLS). Cranial MRI showed clear signs of subcortical arteriosclerotic encephalopathy with lacunar cerebral infarcts in the right periventricular white matter, but no territorial infarcts or signs of global or focal atrophy were found. Mini Mental Status Examination (MMSE) was unremarkable in June 2020 (29/30), and pointed towards mild cognitive impairment in January 2021 (27/30) and September 2022 (27/30). However, tests of executive functions indicated impairment, such as the Shulman Clock Drawing Test (June 2020: Score 5 and September 2022: Score 4) and the Frontal Assessment Battery (FAB) (September 2022 only: 10/18, problems most

pronounced in inhibition tasks 5 and 6). Geriatric Depression Scale (GDS-15) score was greatly increased in June 2020 (12/15), confirming clinical depression, but was unremarkable in September 2022 (2/15).

Although the patient had led a successful life with respect to both work (leading position in a small company) and family (two children and five grandchildren), the patient's biography was full of traumatic experiences: As a preschool child, she experienced the hostilities at the end of World War II in 1944 and 1945 and hunger in the postwar period. Her father was unable to cope with his war experiences and became a violent alcoholic, later suiciding himself. Her mother developed severe depression, committing suicide soon after her husband's suicide, when the patient was a young woman and had just given birth to her first child. As a toddler, her child died in a road accident which the patient is still convinced she would have been able to prevent. The patient gave birth to a second child, but her husband died soon after. Some years later, she married a second time and got another child, but the second husband also died early. Today, the patient is able to live in her own house and can take care of household and garden with some help by family members and a nursing service preparing the medication.

The patient had developed a first episode of major depression after her first husband's death when she was in her twenties. However, there was no history of further mental disorder, especially no specific phobias as of mice, no psychosis and no abuse of drugs or alcohol. Although there was a slight impairment of vision due to cataract, all other sensory functions were intact. The patient gave written informed consent to publish her case.

Intervention

For several reasons, the patient refused to stay in hospital and was therefore referred to a home treatment based on a *Flexible Assertive Community Treatment* (FACT) (Nielsen et al., 2021; Stobbe et al., 2014) following on an individualized, biopsychosocial approach (Fazio et al., 2018; Spector and Orrell, 2010). From June 2020 to May 2021, the patient was contacted several days per week by members of the FACT team consisting of a psychiatric nurse, a psychiatrist, a psychotherapist, and an occupational therapist. Multiprofessional cooperation was established in regular team meetings, both daily (organizational issues) and weekly (treatment planning). Contacts took place at the patient's home or via telephone and occasionally included close family members. Contact frequency was reduced in the course of the treatment when the patient's condition improved, but at least one contact per week was guaranteed until the end. In the beginning of the FACT treatment in June 2020, psychiatrist, nurse and occupational therapist were involved for adjusting the medication, for a training of fine movements in the left hand, for establishing daily routines of activities and providing support in coping with everyday life demands. From October 2020 on, the psychologist was actively involved with CBT. During FACT, the following number of sessions (with average duration in parentheses) were conducted in each occupational group: psychiatrist: 14 (19 min), nurse: 45 (97 min), occupational therapist: 35 (77 min) and psychologist: 28 (54 min). After FACT treatment had been finished in May 2021, the patient was referred to our outpatient clinic, where she then had regular contacts in longer intervals (every 3-5 weeks) with the same psychotherapist (29 session with 31 min on average) continuing CBT and trauma-related narrative therapy and a psychiatrist (3 sessions with 25 min on average) until July 2023.

At the beginning of FACT, we prescribed nortriptyline (25 mg) as an antidepressant. We added quetiapine as an atypical antipsychotic, also for inner restlessness, mood stabilization and sleep promotion. Dosage increase of quetiapine had to be stopped at a total dose of 225 mg, however, due to an increase in hemiparetic weakness and gait instability and thus an increased risk of falling, as

well as to an exacerbation of the RLS. Therefore, we had to reduce the dosage to 200 mg per day (150 mg retarded plus 50 mg unretarded) which was then continued but which was most probably insufficient to produce an antipsychotic effect. Due to probable negative side effects especially with respect to falls and the RLS, we refrained from prescribing further antipsychotic medication such as risperidone. The mild cognitive deficits were targeted with Ginkgo biloba 240 mg per day. Medication for hypertension and atrial fibrillation included bisoprolol, torasemide, and dabigatran, respectively, in order to target vascular risk factors and to prevent disease progression and, therefore, dementia.

Non-pharmacological treatment started with cognitive-behavioral therapy (CBT) of depression: Psychiatric nurse, occupational therapist and psychotherapist cooperated in establishing a day schedule with activities and social contacts as best as possible under the COVID-19 lockdown restrictions. Occupational therapy developed a specific training program in order to improve the stroke-related handicaps (left hemiparesis) and helped the patient to cope with eyeryday life demands. From the beginning and by all therapists, the patient was carefully exposed to facts contradicting the existence of a mouse, and alternative explanations for her experiences were considered. In psychotherapy, unrealistic thoughts underlying the excessive feelings of guilt were identified and modified, self-identity and self-worth were promoted. Furthermore, traumatic episodes from the patient's adult life (suicides of both parents, death of child and husbands) were addressed in narrative exposure, and the patient learned relaxation techniques in order to cope better with stress. Overall, the patient's mood and drive continuously improved, although phases of depression resurfaced especially in the COVID-19 lockdown in winter 2020/2021 and were addressed again with CBT.

Interestingly, the paranoid hallucinatory mouse experience also decreased during CBT treatment, though slower and only partially, and although antipsychotic medication was insufficient. Accordingly, the team developed hypotheses about the experiential dimensions and context factors modulating the mouse experience that were then assessed systematically, in cooperation with the patient. Mouse experience (as well as experienced stress) was found to modulate along the following dimensions: (1) The extent to which the patient was able to distance herself from the experience (hallucinations vs. illusions). (2) The patient's focus of attention towards the mouse (i. e. whether she reported the experience spontaneously or only upon inquiry). (3) The (multi-)modality of the sensory experience, i. e. whether the hallucinations were unimodal (mostly visual or auditory from a distance, mostly during day times) or multimodal (with additional bodily/tactile experiences in legs and back at night, inducing extreme stress and prolonged sleeplessness). 4) The averseness of the experience (i. e. whether the mouse's behavior was experienced as "aggressive" or "considerate" by the patient).

Mouse experience was found to modulate in response to the following triggers: (1) Loneliness/loss of personal contacts: This became first apparent when the psychiatric nurse once stayed at the patient's home overnight at the very beginning of the treatment and no mouse was experienced by the patient that night. Furthermore, it was in line with the observation that mouse experience had started shortly after COVID-19 lockdown restrictions. (2) Loss of control and helplessness in the context of persistent or recurring stressful events: For example, mouse experience was strongest at nights after the patient's regular phone calls with her chronically ill and severely depressive sister. Furthermore, mouse experience was intensified by repeated obscene phone calls as well as nightly ringing of her doorbell (both turned out to be real). (3) Feelings of guilt in relation to remembered traumatic life episodes (see above) in phases of excessive rumination.

In accordance with these observations, we extended our CBT treatment as follows: The patient learned to detect correlations between increased stress on the one hand and frequency and intensity of the hallucinatory experiences on the other. Further, the patient's irrational beliefs about the mouse were continuously questioned (e.g. how can a shy animal such as a mouse be so persistent and aggressive, why does she not touch bait or leave any droppings etc.) and she was informed about brain-induced phenomena such as hallucinations. The patient learned to accept the possibility of the mouse being "just in my head". She continued to question her beliefs and to relate mouse experiences with stress events. Frequency and intensity of mouse hallucinations diminished considerably in the course of the treatment. Although they never completely disappeared, the patient's quality of life greatly improved to a satisfying degree. The mouse was not reported spontaneously anymore and "occurred" only briefly and occasionally at much longer intervals (sometimes several weeks). The question of the meaning of the hallucinatory experience (the *mouse*), however, remained unanswered.

In March 2022, the mouse experience fully returned tormenting the patient several nights in a row. Due to a little accident, the patient had to stay at home and to pause most contacts and activities for some time. She spent most of the time in front of her TV, being permanently exposed to scenes of war and destruction from Russia's invasion of Ukraine which had just begun some days before. The patient now reported numerous intrusive biographical episodes that she had experienced the end of World War II as a preschool child: Injured German soldiers were medically provided at her parents´ farm, but she remembered not being able to help as she was often scared by the soldier's screams and injuries. The family then had to flee to a small town that was bombed several times. The family found only insufficient shelter in the cellar of a vinery, where the children always had to be "as quiet as a *mouse*". The patient witnessed nearby explosions of pattern bombings and attacks from low-flying pursuit planes. She feared for her elder sisters threatened with rape, always feeling the

helplessness of her parents. The patient reported these memories were as vivid “as if they had just happened”. In the cellar of the vinery where the family tried to hide during the bombings, there were masses of mice nesting in the straw-filled walls. The father tried to catch them, set up mousetraps, and pulled the mouse nests out of the walls. Her brothers often made fun of scaring the patient and her sister with the idea that mice were coming out of the walls at nights. In a narrative exposure, an integration of these traumatic experiences into the patient’s biographical memory could be supported. Along with this, the patient systematically reduced the exposure to TV scenes of Ukraine war, as a means of stimulus control. Again, the mouse hallucinations minimized to a level providing a reasonable quality of life for the patient.

Discussion

Isolated, circumscribed multimodal hallucinations in the elderly are rare, but may occur (Wang et al., 2021), often in connection with sensory impairments. The most probable explanation in the case reported here is VCD due to subcortical ischemia causing executive deficits, although the patient was generally able to manage her everyday life. Even though psychosis in VCD occurs more frequently in vascular dementia compared to milder levels of impairment (Ballard et al., 2000; Fuh et al., 2005), psychotic symptoms have been observed in non-demented elderly patients with a higher risk of dementia, especially in women (Östling and Skoog, 2002). In our case, depression does not seem to cover the psychotic symptoms as delusions were not thematically related to depression in the typical way (as guilt, impoverishment or illness) and did not modulate with symptoms of depression. Due to earlier episodes of depression in our patient (starting in her twenties), the most probable diagnosis was a depressive episode in the course of a recurrent depressive disorder. However, it cannot be excluded that vascular pathology played a causal role here as well, as depression in the elderly has been associated with vascular changes (O’Brien et al., 2003), subsumed under the concept of “vascular depression” (Taylor et al., 2013).

The thematic connection between the psychotic mouse experience and childhood traumata due to World War II hostilities is striking. There is accumulating evidence of late-onset trauma-related psychopathology in the elderly, especially in World War II and Holocaust survivors (Dasberg, 2003; Johnston, 2000; van Achterberg and Southwick, 2001), even after a long latency phase in which the patients have lead a functional and mentally healthy life. Neuronal degeneration and disruption of neural connectivity, especially in frontal or mesiotemporal areas, seems to play a key role in a complex interplay of biological, psychological and social factors triggering early traumatic experience under stress (Martinez-Clavera et al., 2017). In the present case, however, the relation is more indirect as the hallucinations were not memory intrusions in a strict sense. Nevertheless, there is a strong thematic connection between delusional content (mouse) and childhood trauma. In addition, the hallucinatory experience was strongly dependent on the level of stress experienced by the patient (esp. induced by TV scenes of war) who was impaired in executive functions (esp. inhibitory control) as revealed by neuropsychological tests. Further evidence stems from the observation that hallucinations minimized after trauma therapy. The question remains whether the diagnostic criteria for PTSD were fulfilled at any time in the patient's life. With respect to her current situation, we do not think so: Although the TV reports elicited vivid intrusive episodes from childhood and increased her sleep disorders, the patient did not spontaneously avoid them, and symptoms were generally not as stable and persistent in order to justify PTSD diagnosis. By contrast, this diagnosis seems much more probable with respect to the childhood of the patient, although PTSD diagnosis can be more difficult in children in general (Cohen and Scheeringa, 2009) and, in our case, can only be made in retrospect based on the patient's memory of events that took place almost 80 years ago.

To conclude, late-onset trauma-related symptoms have to be taken into account in the elderly, even in absence of earlier PTSD, esp. in the present generation of geriatric patients, many of which have been exposed to traumatic events in the course of World War II. In addition, behavioral management of psychotic syndromes is possible in the absence of adequate pharmacological treatment options. Last but not least, our case demonstrates that multiprofessional and person-centered home treatment such as FACT may be successful in the elderly (Nielsen et al., 2021; Stobbe et al., 2014), even in severe mental illness such as severe depression and psychosis, and may help to facilitate a satisfying and largely autonomous life.

Conflicts of Interest: The authors have no potential conflicts of interest to disclose.

Acknowledgments: We would like to thank the patient for her consent to publish her case, and Natalie Klein and Bianca Heider for helpful suggestions.

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Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: