Late-Life Reactivation of Obsessive-Compulsive Disorder Associated With Lesions in Prefrontal-Subcortical Circuits

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The authors describe the reactivation of obsessive-compulsive disorder (OCD) in three patients with lesions in the prefronto-subcortical circuits after decades of being asymptomatic. The patients also reported the emergence of new OCD symptoms and motor/phonic tics as well as mental rituals thematically related to the negative experience of suffering cognitive and motor deficits.

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Structural damage to prefrontal-cortical circuits, particularly involving the basal ganglia and functionally related orbitofrontal and anterior cingulate/caudal medial prefrontal cortices, can produce OCD.[1,2] OCD has been associated with stroke, traumatic brain injury, neoplasms, and infections.[1,2] Elderly individuals may be at higher risk for developing OCD because of their proneness to stroke-related neuropsychiatric disorders.[3,4] A recent study showed that late-life occurrence of basal ganglia lesions in chronically depressed elderly patients predisposes to the emergence of OCD.[4] However, studies of OCD after stroke lesions are few, and there are no reports linking the effects of later-life brain lesions on behavior among individuals who had recovered from idiopathic OCD several decades before.

We report the case of three elderly patients who experienced OCD reactivation subsequent to cerebrovascular lesions or hypoxic brain damage involving the prefronto-subcortical circuits.

CASE REPORTS

Case 1

A 70-year-old right-handed man, who was a retired lawyer, presented with a 2-year history of parkinsonism and obsessional thinking. He described a previous diagnosis of OCD when he was 28 years old involving a fear of being homosexual, concern with having cancer, and touching compulsions. The patient had a poor treatment response over a 2-year period, but his symptoms resolved with ECT. He remained asymptomatic until the age of 68 when he gradually developed unilateral tremor and OCD symptoms. By that time, he experienced intrusions of obscene words, which appeared repugnant to him. He resisted the impulse to blurt out these obscenities, but occasionally he insulted his wife in public. Additionally, he developed unwanted impulses to stab his friends, a fear of not saying the right word, and compulsive rereading.

On examination, he showed resting tremor, rigidity, and bradykinesia of the left arm. An MRI scan revealed multiple infarctions involving the basal ganglia, internal capsule, and periventricular white matter bilaterally and frontal lobe atrophy. His MMSE score was 28/30. He had impaired performance on some executive function tasks COWAT=27; Trail Making test, part A=105 seconds; part B=could not complete] but not in others (Money's Road Map test=7 errors)[1,5].

Y-BOCS scores revealed a clinically significant OCD (obsessions=10, compulsions=6). He also displayed generalized anxiety disorder (Tirer's Brief Scale for Anxiety=8) but not depression (HAM-D=4)[1,5]. His psychiatric symptoms and tremor were successfully treated with sertraline (100 mg/day) and clonazepam (1 mg/day).

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Case 2

A 72-year-old right-handed man, who was a retired construction worker, was referred for an evaluation of cognitive decline. He reported memory problems and personality change. His brother had Alzheimer's disease and he was worried about dementia. He described OCD symptoms in his early 20s including fear of blurting out obscenities and an excessive concern with doing embarrassing things. He was preoccupied with his wife becoming sick from germs and developed compulsive hand washing. He denied seeking psychiatric services and his symptoms gradually resolved. He remained asymptomatic for 45 years.

The patient reported having two heart valve replacements (1984 and 1995) and he experienced OCD reactivation shortly after the second intervention. He described OCD symptoms similar to the ones he had experienced earlier (e.g., fear of proffering obscenities to his wife), although new symptoms emerged such as a fear of saying certain things, strong "need to know" obsessions, and remembering arbitrary information. He engaged in mental rituals in order to test his memory (checking the chronology of prior employment positions, memorizing car licenses) and he made excessive lists. He also developed complex motor behavior such as involuntary tic-like head jerks and vocalizations.

Two years after the development of these symptoms, the neurological examination was normal. A CT scan revealed bilateral frontal lobe and left caudate nucleus atrophy and a [^{99m}Tc] HMPAO SPECT showed significant hypoperfusion (regions of interest $\leq$0.93) in orbitofrontal and prefrontal cortices and basal ganglia bilaterally probably secondary to hypoxic changes (according to our own previous data from healthy subjects [mean ratio: 1.00 $\pm$ 0.03], ratios below 0.93 were considered abnormal).[6] His MMSE (29/30), phonemic fluency (COWAT=43), and Boston Naming Test (56/60) scores were normal. His performance on learning and memory WMS logical memory: immediate recall=7, delayed recall=0, WMS paired associated learning=9.5, Rey Complex Figure: delayed recals=10] and executive tasks (Wisconsin Card Sorting Task: 2 categories; Trail Making test part A: 90 seconds) was impaired. Y-BOCS scores demonstrated a clinically significant OCD (obsessions=11, compulsions=8). He exhibited a generalized anxiety disorder (Tirer's Brief Scale for Anxiety=16) and mild depression (HAM-D=9). He showed a partial reduction of obsessive-compulsive symptoms with sertraline (100 mg/day).

Case 3

A 64-year-old right-handed housewife was referred for evaluation of right hemiplegia and anomic aphasia secondary to left thalamic hemorrhage. She described anorexia nervosa (restrictive type) and OCD symptoms (unrelated to eating habits) during adolescence, including fear of something bad happening as well as washing and cleaning compulsions associated with anxiety. Her symptoms resolved gradually over the next years.

Several weeks after the thalamic hemorrhage, she experienced the resurgence of the same OCD symptoms she had previously experienced in early adulthood. She also described the emergence of new OCD symptoms (rereading her rehabilitation notes to check for errors) and depression. She also ruminated about her daily planning specific to her treatment and about transportation to physical therapy appointments. She was worried about increasing debilitation, social isolation, and depression leading her to discontinue physical therapy. A [^{99m}Tc] HMPAO SPECT showed a significant hypoperfusion (regions of interest $\leq$0.93) in the left thalamus and frontal-parietal cortices bilaterally. On the Western Aphasia Battery, her aphasia quotient (92.4/100) indicated mild anomic aphasia. She also demonstrated impaired performance on phonemic fluency (COWAT=9), picture naming (Boston Naming Test=28/60), learning and memory (WMS logical memory: immediate recall=2; delayed recall=0; WMS paired associated learning=7.5) and executive functioning tasks (Trail Making test, part A=105 seconds, part B=180 seconds; Money's Road Map test=15 errors, Wisconsin Card Sorting Task=2 categories).

Y-BOCS scores revealed a clinically significant OCD (obsessions=8, compulsions=10). She exhibited generalized anxiety disorder (Tirer's Brief Scale for Anxiety=16) and depression (HAM-D=13). She showed a partial reduction of symptoms with alprazolam (2 mg/day), mianserin (30 mg/day), and fluvoxamine (100 mg/day).

DISCUSSION

Damage to different components of the prefronto-subcortical circuits in our three patients was associated with late-life reactivation of OCD previously experienced in early adulthood. These patients reported that once recovered from idiopathic OCD, they remained symptom free for several decades, achieving good psychological and social adjustment. After brain injury, the

reawakening of OCD was persistent, disabling, and associated with the emergence of new OCD symptoms. All three patients met the diagnosis of OCD based on DSM-IV, and on the symptom checklist of the Y-BOCS they described more OCD symptoms than those they had presented in the index OCD episode suffered during adulthood. The patients' scores on the Y-BOCS (≥16) were in the range of moderate severity (16–23). Comorbid psychopathology and cognitive deficits in executive function and memory were similar to those previously described in studies of OCD associated with acquired prefronto-subcortical pathology.[1,2]

The interaction between reactivation of previous OCD symptoms and the emergence of new ones after brain damage is intriguing. Damage to the basal ganglia and thalamus and their connected cortical sites (orbitofrontal cortex and anterior cingulate) most likely contributed to OCD reactivation in our patients.[7] The involvement of cortico-basal ganglia loops was responsible for the emergence of new symptoms in Case 1 and the increase in the number of compulsions in Case 2. Moreover, the patients developed for the first time repetitive OCD tic-related behaviors (coprolalia in both and complex motor tics in Case 2) which may be related to disinhibition of thalamo-cortical projections.[7–9] On the other hand, the involvement of cortico-thalamic loops in Case 3 was associated with the reactivation of dormant OCD symptoms with little occurrence of new ones. While this could be related to thalamic participation in the processing of internal signals and in the reexperience of symptoms,[6,10,11] at present the role of the thalamus in idiopathic and acquired anxiety disorders is not well understood. Symptom improvement in OCD[12] and PTSD[10,11] has been associated with reduction of thalamic activity and increased activity of connected cortical sites implicated in reappraisal and suppression of negative emotions.[10] However, the reemergence of OCD in Case 3 and PTSD in another patient[13] were associated with thalamic strokes.

The emergence of repetitive engagement in memorizing daily events, naming objects, rereading paragraphs, needing to know, and remembering arbitrary information in our patients may be the direct consequence of damage to complex and partially overlapping neural systems that serve to detect, appraise, and react to potential threats.[14] In addition, it is possible that these "new" mental compulsions could be aimed at counterbalancing the negative consequences of cognitive and motor deficits and to prevent further deterioration. Thus, this ritualistic "cognitive" training seems to be adaptive and could reflect the other side of ritualistic "motor" acts, such as those described by patients with head trauma-related OCD who engage in compulsive exercising, and who justify it as an effort to recover physical effectiveness and to neutralize anxiety-provoking OCD symptoms.[1,15]

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