Frontal lobe syndrome caused by traumatic brain injury presenting as mania

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ABSTRACT: We present a case of a 74 years old man, who developed behavioral abnormalities following a brain injury, 45 years ago. He was misdiagnosed with mania and had never had a brain imaging. During hospitalization in our department, brain CT and MRI showed sizable gliosis in the right frontal lobe.t.

Keywords: Frontal lobe syndrome, traumatic brain injury, mania

INTRODUCTION

Behavioral abnormalities, ranging from mildly inappropriate social behavior to full blown mania, may result from frontal lobe lesions. Apart from "frontal lobe syndrome," various names have been used, including "pseudopsychopathic syndrome[1]," "secondary mania[2]," "acquired sociopathy[3]," "disinhibition syndrome[4]."

The fact that patients with brain lesions may develop behavioral and personality changes has been known for over 150 years. Perhaps the most famous case is that of Phineas Gage[5], a railroad worker who had a bizzare work accident in 1848, damaging his frontal lobes. After an explosion, his skull was penetrated by an iron rod. He survived and was able to talk and even walk after the accident, but his behavior and personality changed dramatically. Specifically, he lost his sense of responsibility and became capricious, offensive, disrespectful, resulting to his dismissal from the job.

CASE REPORT

Mr N, 74 years old, presented to the psychogeriatric outpatient clinic, accompanied by his wife, who complained about aggression, psychomotor agitation, decreased need for sleep, elevated and irritable mood, impulsivity, disorganized and sexually inappropriate behavior, low functioning. These symptoms had gradually appeared over the past 45 years, but had deteriorated significantly during the last two years. The diagnosis of bipolar disorder (recurrent manic episodes) had been offered to him and he had been hospitalized in public and private psychiatric departments many times, showing only minimal improvement. To the best of his wife's knowledge, he had no prior medical history. He was admitted to the 3rd department of psychiatry, in order to examine possible general medical condition etiology, and to modify his medication.

According to him, the psychiatric symptoms had gradually appeared about 45 years ago, following traumatic brain injury. He believed that he inherited his "madness" from the village lunatic, when the latter hit him in the head with a heavy stick. He had lost consciousness after the brain injury and was admitted to a surgical department. He recovered fully and was discharged shortly afterwards. At that time, neither brain CT nor MRI were available. He was able to return to

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his job as a shepherd, but his behavior and personality changed. Prior to his accident, he was a shy and lonesome person. Shortly after the injury, he became more extrovert. He used to spend much money, drinking with friends and gambling. He often engaged in violent conflicts, even when he wasn't drunk.

His symptoms deteriorateded progressively over the years. Five years after the injury, he was unable to work and became so irritable and physically aggressive, that his relatives requested an order of protective custody. He was hospitalized in a public mental hospital, diagnosed with mania and begun treatment with antipsychotics. Mr N's relatives placed the beginning of his mental disorder at the time of his admission to the mental hospital, therefore dismissing the brain injury as a possible cause. Since then he was hospitalized in private and public psychiatric departments multiple times, but had never had a brain CT or MRI before admission to our department. He was also treated as an outpatient, not complying sufficiently with medication. His psychological, social and occupational functioning was low, as he was unable to keep a job, neglected his family, had few friends, engaged frequently in violent conflicts. During the last two years he seemed to develop severe memory problems, which led to a further disorganisation of his behavior. For instance, he turned on a faucet in the house basement and forgot to turn it off, resulting in the flooding of the entire basement. His loss of inhibition and self control also deteriorated. His wife became alarmed and turned to our psychogeriatric outpatient clinic.

On admission, Mr N was alert, oriented and had good eye contact. He demonstrated psychomotor agitation, impulsivity, disorganized and inappropriate behavior. For example, he frequently interrupted the clinical interview and sang loudly, entered rooms of female patients without asking, was constantly joking, especially about sexual matters. His speech was pressured, distracted, and occasionally derailed. Neither delusions, nor hallucinations were present. His mood was elevated and irritable. He was only partially cooperative and demonstrated poor insight and judgement. Neurologically, fine movements, speed and strength of movements were decreased in the left hand. In addition, deviation of the eyes to the left was incomplete.

Prior to admission, he had been treated by a private psychiatrist with exceptionally high doses of risperidone (36mg daily), amisulpride (800mg daily), chlorpromazine (600mg daily), oxcarbazepine (1200mg daily) and also biperiden (4mg daily), but his symptoms didn't improve considerably. On admission, the ECG showed a notable QTc prolongation and, consequently, the medication doses were lowered (risperidone 12mg daily, oxcarbazepine 600mg daily, discontinuation of chlorpromazine and amisulpride). During the following days, the ECG became normal but he demonstrated hypertension (about 180/100mm Hg), that was treated with amlodipine 10mg daily. Probably he had a history of hypertension, which remained undiagnosed due to the antipsychotics' hypotension side effect.

His laboratory results, including complete blood count, basic metabolic, liver and thyroid profile, prolactin, vitamin B12 and folic acid, were normal, except from hyperprolactinemia (950 μIU/ml). A CT scan of the brain showed sizable gliosis in the frontal operculum and the precentral area of the right frontal lobe. A following brain MRI scan (Fig. 1) confirmed the cerebral CT findings, which could be attributed with a considerable degree of certainty to old traumatic brain injury. The Addenbrooke's Cognitive Examination (ACE-R) revealed severe cognitive decline. Specifically, the general scores were 20/30 in MMSE and 38/100 in ACE-R and the subscores were 14/18 in attention and orientation, 7/26 in memory, 3/14 in fluency, 9/26 in language and 5/16 in visuospatial abilities.

Different drug combinations were tried, in order to achieve maximum efficacy. Oral risperidone was continued (6mg daily) and long-acting risperidone injection 50mg was added, due to his history of treatment incompliance. Quetiapine up to 300mg daily was added, which was replaced later with zuclopenthixol 75mg daily. Memantine 10mg daily was also added. He gradually became less agitated, irritable and impulsive, slept normally and was more cooperative. He was discharged following 25 days of inpatient care, accompanied by his wife.

DISCUSSION

Regarding Mr N's case, we ought to highlight the importance of laboratory tests and brain imaging to the diagnosis of mental disorders. His behavioral disturbances had been attributed to bipolar disorder for over 40 years and he had never had brain imaging. His relatives had considered the brain injury as irrelevant, probably because he needed psychiatric treatment almost five years subsequent to the incident. Nevertheless, a detailed clinical interview revealed behavioral and personality changes right after the brain injury. Fur-

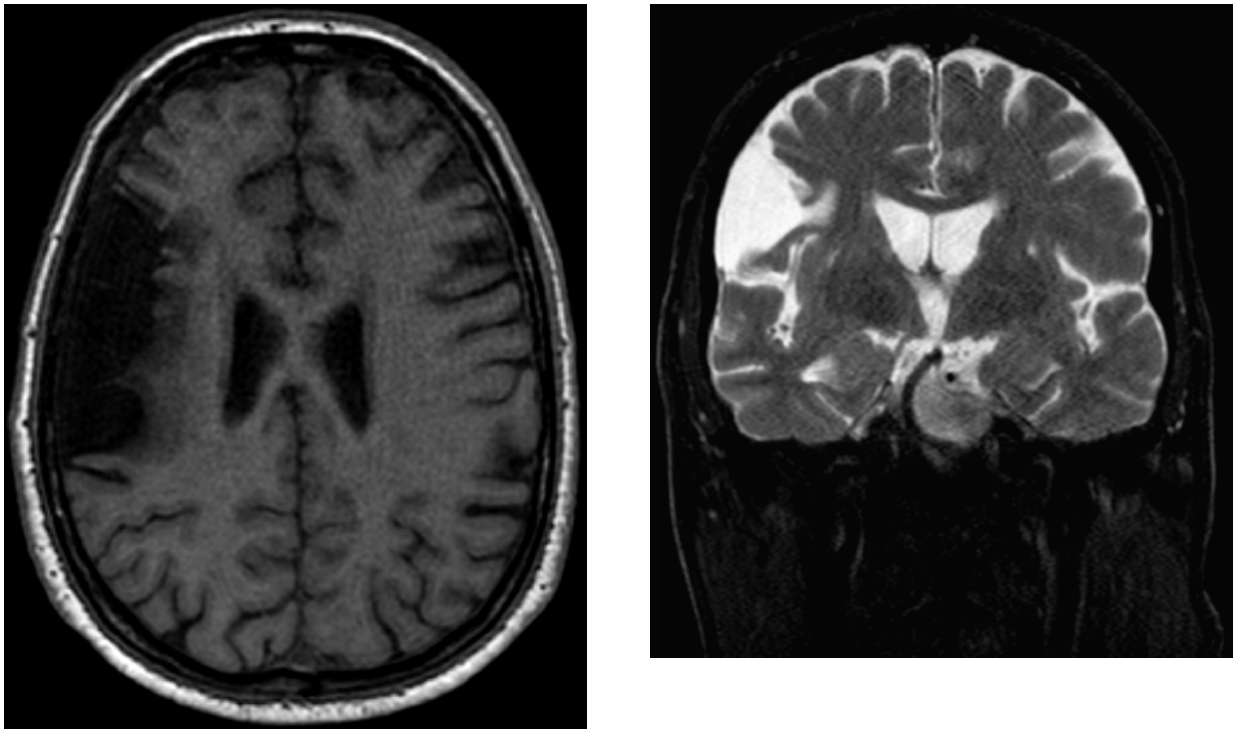

Fig. 1 (a) T1 weighted MRI, axial view, shows sizable gliosis involving the frontal operculum and the precentral area of the right frontal lobe. **(b)** T2 weighted MRI, coronal view.

thermore, his symptoms seemed to deteriorate progressively through the years, whereas exceptionally high doses of antipsychotics, which caused notable side effects (hypotension, QTc prolongation), didn't improve his symptoms significantly.

We questioned the bipolar disorder diagnosis and examined general medical condition etiology. Brain CT and MRI scans revealed a sizable gliosis in the frontal operculum and the precentral area of the right frontal lobe. Due to the size of the lesion, there can be assumed that nearby areas, such as right orbitofrontal cortex and inferior frontal cortex, were also affected. Numerous studies have shown a significant association between behavioral abnormalities and right frontal lobe lesions. Some of them are presented below, though a comprehensive review of the literature is beyond the scope of this short paper.

Starkstein et al (1997)[4] described a mechanism of motor, sensory, affective, intellectual, and instinctive disinhibition, resulting from lesions to specific brain areas, especially orbitofrontal and basotemporal cortex. Aron et al (2004, 2014)[6,7] proposed that right inferior frontal cortex in humans is critical for inhibiting response tendencies and can be characterized as a "brake," whose disruption could underpin response control disorders. James et al (2015)[8] examined the architecture of behavioral disturbances following brain injury. They concluded that physical aggressiveness, verbal aggressiveness and sexually inappropriate behavior reflect distinct but related clinical phenomena. In a large follow-up study of 113,906 patients, Orlovska et al (2014)[9] investigated the relationship between head injury and subsequent psychiatric disorders. Head injury was associated with a higher risk of schizophrenia, depression, bipolar disorder and organic mental disorders.

Our patient also developed progressively severe cognitive decline that led to the further disorganization of his behavior. Cipolotti et al (2015)[10] studied the effect of age on cognitive performance of frontal patients. The results showed that the combined effect of aging and frontal lesions impairs the frontal cortical systems by causing its computational power to fall below the threshold needed to complete executive tasks successfully.

Σύνδρομο μετωπιαίου λοβού από κρανιοεγκεφαλική κάκωση με κλινική εικόνα μανίας

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ΠΕΡΙΛΗΨΗ: Πρόκειται για την περίπτωση ενός άνδρα 74 ετών, που παρουσίασε διαταραχές συμπεριφοράς μετά από κρανιοεγκεφαλική κάκωση προ 45ετίας. Διαγνώστηκε με μανία και δεν έκανε απεικονιστική εξέταση του εγκεφάλου έκτοτε. Κατά τη νοσηλεία στην κλινική μας, οι CT και MRI εγκεφάλου ανέδειξαν ευμεγέθη γλοιωτική εστία στην περιοχή του δεξιού μετωπιαίου λοβού.

Λέξεις-Κλειδιά: Σύνδρομο μετωπιαίου λοβού, κρανιοεγκεφαλική κάκωση, μανία.

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