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Neuropsychological alterations secondary to symptomatic edema after subthalamic nucleus deep brain stimulation surgery for Parkinson's disease: a case series

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Introduction: Severe non-infectious or hemorrhagic brain edema surrounding the electrode represents a rare complication of subthalamic nucleus deep brain stimulation (STN-DBS) surgery.

Objective: To report three patients with advanced Parkinson's disease (PD) who developed symptomatic brain edema after STN-DBS surgery treated with intravenous steroids with a specific profile of reversible cognitive alterations.

Methods: Patients were systematically evaluated with a deep neuropsychological and behavioural assessment before the surgery (baseline), as they became symptomatic for the post-surgery edema and few more times in follow-up.

Case description: The first PD patient was a 63-years-old woman without previous cognitive deficits or emotional-behavioural alterations who underwent bilateral STN-DBS surgery, complicated by delayed-onset bilateral frontal subcortical edema manifested with difficulties in language production and spatial-temporal disorientation. Subsequent neuropsychological assessment detected left unilateral spatial neglect related to personal and peripersonal space, executive deficits and complete anosognosia. Three weeks after surgery, the CT scan showed complete resolution of brain edema with resolution of cognitive alterations. Second patient was a 55-years-old male with baseline slight executive and visuo-spatial deficits. Five days after surgery he developed confusion, spatial-temporal disorientation with severe cerebral edema. Neuropsychological reassessment showed severe worsening of cognitive performances, particularly left unilateral spatial neglect and inhibitory control deficits. Six weeks later neuropsychological assessment revealed a cognitive and psychological improvement with complete resolution four months after surgery. The third patient was a 60 years-old woman who underwent bilateral STN-DBS with normal baseline cognitive performances. 7 days after surgery the patient complaint new onset procedural difficulties and brain CT-scan revealed left middle-upper frontal edema. Neuropsychological evaluation documented executive and visuospatial deficits. After 6-months, neuropsychological evaluation was repeated and resulted superimposable to the pre-operative one.

Conclusion: In all patients we observed the resolution of cognitive deficits within six months after surgery with the corresponding reabsorption of edema at brain CT scans.