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Intraparenchymal cystic lesion after Deep Brain Stimulation surgery: An unusual complication

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Deep Brain Stimulation (DBS) is an effective treatment in selected cases of Parkinson's disease (PD). Although it is considered a relatively safe treatment, complications related to the surgical procedure and/or the implanted hardware may occur. The development of a cystic lesion along the track of the DBS lead is a rare complication that has recently been described [1]. Although its etiology remains unknown, in a few cases, it seemed to be secondary to transient postoperative peri-lead edema [2]. These cystic lesions may be symptomatic or asymptomatic neuroradiological incidental findings. On occasions, the only evidence of an underlying cyst formation is the reduction of neurostimulation effect [3].

The management of this complication comprises different strategies including hardware removal, cyst aspiration, and/or the use of steroids [1]. Interestingly, spontaneous regression of the cyst may sometimes occur, therefore, in asymptomatic patients, clinical and neuroradiological observation rather than surgical intervention is considered a reasonable approach [4].

We describe a patient with PD who underwent bilateral subthalamic DBS and developed a cystic lesion along the track of the left lead.

This case started at the age of 38 with left predominant upper limb rigidity, bradykinesia and resting tremor. A brain magnetic resonance imaging (MRI) was normal. He was diagnosed with PD and started treatment with ropinirole and rasagiline. During the first year of treatment he developed compulsive sexual behavior as a manifestation of an impulse control disorder leading to ropinirole discontinuation. At the age of 40 he began treatment with L-dopa/carbidopa which was followed by a substantial alleviation of bradykinesia and rigidity while resting tremor in the left upper limb improved partially. At the age of 44 he developed levodopa induced motor complications such as peak-dose dyskinesias, delayed on, and wearing-off phenomenon. At that moment he was taking L-dopa/carbidopa 250/25 mg every 3 hours 7 times a day and sertraline 100 mg qd. Surgical treatment was considered, and after a complete preoperative screening evaluation, bilateral subthalamic nucleus (STN) DBS was indicated. Intraoperative microelectrode recording was performed with 4 passes before DBS lead insertion. No intraoperative complications were reported. A post-operative brain neuroimaging was not obtained. The patient presented a transient lesion effect that lasted approximately 7 days after surgery. DBS programming was initiated 1 month after surgery. Alleviation of symptoms was observed with right subthalamic DBS, however, neither a favorable response nor adverse events were observed with left subthalamic DBS despite programming with a high amplitude (up to 4 mVolts) electrode configuration. The lack of any response on the right side of the body after consecutive DBS programming sessions during 4 months after surgery prompted us to perform a brain MRI which revealed the presence of a large cystic lesion and edema located along the track of left STN electrode. A small subcutaneous collection at the left burr-hole site, with intensity similar to the CSF, was also observed (Fig. 1A). Besides the lack of response to DBS, the intraparenchymal cyst formation was asymptomatic. However, due to the presence of radiological signs of intracranial hypertension, we decided to perform a stereotactic cyst aspiration without hardware explantation. Routine blood analysis was normal, and cultures of the aspiration material were all negative. One month after the aspiration surgery, left neurostimulation was started. After several programming sessions, a marked improvement of dyskinesias, motor fluctuations and left-hand resting tremor was achieved. Levodopa/carbidopa dose was reduced to 100/25 every 3 hours. A brain MRI performed 1 year after aspiration surgery showed a marked reduction of the cystic lesion, cerebral edema and intracranial hypertension signs. A marked reduction of the subcutaneous collection size was also observed (Fig. 1B). Turning off the implantable pulse generator was associated with worsening of motor symptoms, thus a permanent lesion effect due to cystic lesion was ruled out.

Post-operative scans were not performed to rule out the presence of peri-lead edema, a possible precursor of cyst formation. The presence of a transient subcutaneous collection at the burr-hole site might have been due to CSF tracking along the DBS lead despite the absence of overt ventricular penetration (Fig. 1C). The lack of either alleviation of symptoms or adverse events related to neurostimulation should raise the suspicion of hardware malfunctioning. In our case, the presence of intracranial hypertension signs on neuroimaging were determinant in

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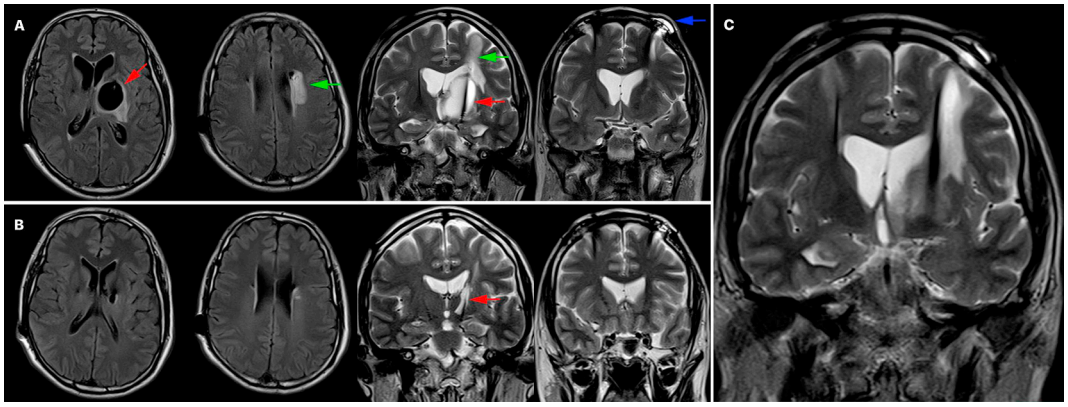

Fig. 1. Brain MRI. A. Axial FLAIR and coronal T2-weighted images: a 32-mm diameter intraparenchymal cyst formation, consistent with CSF signal, located in the thalamus-capsular left region (red arrow) and around the distal aspect of the left STN electrode. Marked edema around the left STN electrode and cyst formation (green arrow). Small subcutaneous collection at the left burr-hole site consistent with CSF signal on all MRI sequences (T1 not shown) (blue arrow). B. Axial FLAIR and Coronal T2-weighted image 1 year after aspiration surgery: marked reduction in the size of the intraparenchymal cyst formation (red arrow) and peri-electrode edema. Complete reabsorption of the subcutaneous collection at the left burr-hole site. C. Coronal T2-weighted image showing that the left DBS lead does not traverse the lateral ventricle. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

choosing a surgical approach. We decided not to remove the DBS hardware because there were no signs of extra or intracranial infection, lead migration or fracture. To our knowledge, this is the first case successfully treated with stereotactic cyst aspiration alone, without lead removal and/or steroids.

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