Case Report

Intracerebral abscess: A rare complication of deep brain stimulation

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ABSTRACT

Introduction: Deep Brain Stimulation (DBS) is a therapeutic option for some forms of Parkinson's disease (PD). The main adverse effects of this surgery are: infection (2–9%), haemorrhage (1–4%) and seizures (1–3%). We report a rare complication of DBS: an intracranial abscess.

Case report: A 59-year-old male who had suffered PD for 19 years was submitted to bilateral subthalamic nucleus DBS in September 2003, when he was 52. One month later, he developed an inflammatory reaction of the skin and subcutaneous tissue surrounding the area of the subcutaneous DBS system. No infectious agent was isolated. In the following 12 months he required 5 major surgeries due to a process of systemic inflammation/infection throughout different locations of the DBS system. A few days after removal of the DBS device, he developed a right oculomotor nerve paresis and mild left hemiparesis. A CT scan revealed an abscess in the right thalamo-mesencephalic area. Both the new neurological deficits and the previous tremor and rigidity improved after surgical drainage and medical treatment.

Conclusion: This case report illustrates a rare complication of DBS surgery. Nevertheless, Parkinsonism improved, probably because the abscess acted like a subthalatomy.

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Absceso intracerebral: una rara complicación de la estimulación cerebral profunda

RESUMEN

Introducción: La estimulación cerebral profunda (DBS) es una opción terapéutica en algunas formas de la enfermedad de Parkinson (PD). Sus complicaciones principales son las infecciones (2–9%), las hemorragias (1–4%) y las convulsiones (1–3%). Se presenta una complicación rara de la DBS: un absceso intracranial.

Caso clínico: Un paciente de 59 años fue enviado para estimulación bilateral del núcleo subthalámico en setiembre del 2003 tras 19 años de enfermedad. Un mes más tarde desarrolló...
Introduction

Patients with Parkinson’s disease are candidates for surgery if they still achieve some benefit from medication, but have significant side effects such as motor fluctuations and dyskinesias.1,2

Subthalamic deep brain stimulation has proved its efficacy to control major symptoms in Parkinson disease.23 Nontheless, numerous surgical, hardware-related, or infective complications may develop after surgery.4,5 In literature the major adverse effects of this surgery are brain haemorrhage – about 1–4%; hardware-related complications (including migration or misplacement of the leads – 5.1%, lead fractures – 5.0%, skin erosion – 1.3%); infections 1–9%; and seizures 1–3%. The vast majorities of infections are superficial and normally involve the implanted pulse generator pocket and the connecting wires. The most typical complication is the scar above the connection between the electrode and the extension cable and their ulceration infection.6,7,9,10,11 Literature reports of cerebritis or brain abscess are extremely rare.5,8,10–12

Case report

A 59-year-old male, suffering from Parkinson Disease for 19 years was submitted to a bilateral subthalamic nucleus DBS when he was 52 (in September 2003). The patient had significant side effects related to medication (650 mg L-dopa, 45 mg bromocriptine), like unpredictable on/off fluctuations and dyskinesias. He was not depressed or demented. The Unified Parkinson’s Disease Rating Scale (UPDRS)13 (part 3) score was 35 Off and 10 On. A bilateral subthalamic nucleus DBS was done in September 2003, without any complications. Fifteen days later, when discharged home, he was independent with an UPDRS (Med Off/STM ON) -13, still with 500 mg L-dopa without agonists. No dyskinesias were observed nor off periods.

A month after surgery, he developed an inflammatory reaction of the skin and subcutaneous tissue around the subcutaneous DBS system. In a period of 12 months, he was submitted to five surgical interventions due to a process of systematic inflammation/infections in different locations of the DBS device, before total removal of the system. Empirical antibiotic was provided but no infectious agent was isolated (even from the electrode tips). The skin allergies tests to talc gloves and to the device material (sent by Medtronic) were negative. Skin biopsy revealed: presence of giant cells, macrophages, lymphocytes and eosinophil.

Few days after removing the DBS electrodes (August 2004), he developed a right oculomotor paresis and a mild left hemiparesis. He had fever, headache, somnolence and nuchal rigidity. He had no seizures. A CT Scan revealed an abscess in right thalamo-mesencephalic region (Fig. 1). The patient underwent stereotactic drainage of the abscess. A Staphylococcus aureus was isolated from CSF, and he started antibiotic treatment during 21 days (vancomycin1500 mg/day ev), with improvement of his state. He was a slight diplopia, mild left hemiparesis and no parkinsonic tremor, bradykinesia and rigidity on the opposite side of abscess as well as no dyskinesias. UPDRS (part III) 12; Hoehn and Yahr state – 2. The control CT scan revealed only sequelae (Fig. 2).

PD has been progressing slowly over the years predominantly in right side. In March 2011 (59 years old), 7 years after the last surgery, with 200 mg of L-dopa, he had cervical dyskinesias as well as in the right upper limb but without

Fig. 1 – (CT scan) Cerebral abscess before drainage.
dyskinesias in the left side. He kept a good walking without instability. Without dopa he had rest tremor, bradikinesia, rigidity on the right limbs and walking with freezing, but remained without rigidity and tremor on the left side.

**Discussion**

Deep brain stimulation (DBS) is established as a therapy for movement disorders. DBS is non-ablative, offering the advantages of reversibility and adjustability. This might permit therapeutic effectiveness to be enhanced or side effects to be minimized. The complications of DBS can be separated into those related to surgical procedure, device/equipment, and the stimulation itself. Thus, seizure and hemorrhage are possible consequences of lead implantation, although rare. Exceptional are literature reports of serious adverse effects, such as death (two patients with implanted DBS systems died when exposed to therapeutic ultrasound or diathermy). Infections requiring removal of the leads have been listed as a rare adverse effect of STN-DBS but without substantial information regarding location and extent of infection. Vergani et al. described two patients (1.4%) that experienced infection of the intracranial lead. In both cases the control MRI showed a signal change in both T1 and T2 sequences along the lead. Cultures were positive for *Staphylococcus aureus* in one patient and negative in the other.

We found another two cases reported in the literature of intracerebral electrode infection. In both there were no signs of localized external infection. Merello et al. described an abscess in corona radiate and VanderHorst reported a frontal abscess. In our patient the abscess is in talamo-mesencephalic region (near subthalamic area), the first case with this localization.

Although no microorganism was isolated, we think that in our case the process of systematic inflammation of skin and subcutaneous tissue around several parts of the subcutaneous DBS system was a local infection.

Extracranial infection usually involve skin flora, including *Staphylococcus aureus*, Propionibacterium acnes, and *Staphylococcus epidermidis*. In our patient the intracranial infection was probably an extent of the extracranial, nevertheless when was detected the skin scar had resolved. Like the majority of DBS hardware related infection, in our case the extracranial infection occurs after a month. However, the intracranial infection became clinically apparent after a year. Merello et al. reported a case of a delayed intracerebral electrode infection (detected 6 months after DBS).

After treatment and removal of DBS device, the patient presented an improvement in his left parkinsonism, probably because the abscess acted like a subthalatomy. He still needs medical treatment with L-dopa and equivalents because of his right parkinsonism. Even with L-dopa he had no dyskinesias in the left side.

**Conclusion**

This case reports a rare complication of DBS surgery. Nevertheless patient’s left parkinsonism improved, probably because the abscess acted like a subthalatomy.

**REFERENCES**


![CT scan](image.png)

**Fig. 2** – (CT scan) Abscess sequelae after treatment.

