A PARKINSON'S DISEASE PATIENT TREATED WITH DEEP BRAIN STIMULATION, WITH IMPLANTATION AND REIMPLANTATION OF THE SYSTEM – AN 8 YEARS FOLLOW-UP

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ABSTRACT

Deep brain stimulation is the most used neurosurgical procedure for advanced Parkinson's disease. This procedure improves motor symptoms and some non-motor symptoms over a long period of time. In rare cases there are several complications which might lead to system removal. We report here a case were removal of the stimulation system was prompted by a scalp infection which extended to the subcutaneous fatty tissue and subcutaneous wire trajectories and did not resolved with antibiotics. The symptomatology worsened after device removal and reimplantation was decided. We followed this patient for 8 years after the first implant (6 years after the second implant) and he still has a good quality of live, being completely independent in most daily tasks.

Keywords: Parkinson disease, deep brain stimulation

BACKGROUND

Parkinson's disease was first described by James Parkinson in 1817 (1). This is a neurodegenerative disorder of the nervous system that results eventually in many different motor and non-motor symptoms. It develops gradually, over years, from a discrete bradykinesia with tremor and/or rigidity in one limb to a generalized incapacity to initiate movement, stiffness, pain, dysautonomy and cognitive decline. In the early stages of Parkinson's disease, the symptoms can be improved with classical oral medications, but in the advanced stages patients need advanced therapy, such as deep brain stimulation, levodopa/carbidopa intestinal gel or apomorphine pump.

The system of deep brain stimulation (DBS) consists of three implantable components: quadripolar brain leads, implanted pulse generator and extension wires. In Parkinson's disease deep brain stimulation of the subthalamic nucleus or globus pallidus internus improves the cardinal motor features like rigidity, tremor, bradykinesia and in some instances disturbances of gait (2).

CASE PRESENTATION

Our patient L.G., 52 years old, known with Parkinson's disease since 1993, was admitted to our clinic for important dyskinesia of right lower limb and freezing of gait. The onset of disease was with

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rest tremor of right upper limb and bradykinesia, and after one year the tremor was present as well in the lower limb on the same side. Being clearly levodopa-responsive, he was given levodopa from the onsetand the dose was increased gradually up to 750 mg of levodopa/carbidopa per day. In 2001, the patient develop rigidity and dystonic posture of the right upper limb and at that time IMAOB inhibitor was added (Selegiline 5 mg, b.i.d). After 5 years, in October 2006, motor symptoms worsened again (important motor fluctuations, hypophonic and dysarthric speech), and the patient did not respond to several therapeutic schemes. Due to this reason, he was selected for a deep brain stimulation implant procedure. After the implant, the stimulation decreased his UPDRS score by 70%.

Two months after the surgery, while having a haircut, a retroarticular cutaneous lesion produced a scalp infection which expanded to the subcutaneous deep brain stimulation extensions route, with fast occurrence of signs of inflammation and local pain. Cultures were collected from the wound and they show the presence of Staphylococcus aureus; different antibiotic treatment is given, but without resolution of the infection local signs, therefore the neurosurgeon decided to completely remove the system, being afraid of meningo-encephalitis as a consequent complication. After device removal, motor sings worsened seriously despite the maximal oral anti-parkinsonian treatment with dopamine agonist and levodopa/carbidopa/entacapone. Considering the motor severe symptomatology, after two years, in 2008, the medical team decided to reimplant the patient, with stimulation of subthalamic nuclei bilaterally. The procedure was successful and without any complications. The stimulator was turned on, stimulation being set up with the following parameters: STN SIN – single pole, 2.5 V, 60 ms, 130 Hz; STN Dx – single pole, 1V, 60 ms, 130 Hz. Oral treatment consisted in Pramipexol 1.05 mg per day, Levodopa/carbidopa 375 mg per day, Entacapone. "Off" periods and dyskinesias were completely resolved, and the motor UPDRS decreased again by 70%.

In time, non-motor signs of depression, anxiety, orthostatic hypotension, visual hallucinations, REM sleep behavior disorder completed the clinical picture, reasons for which Clozapine 25 mg, Alprazolam 0.25 mg and Fludrocortisone 0.1 mg per day wereadded to the therapeutic scheme. In September 2013, the Kinetra IPG is replaced for reasons of flat battery.

In May 2014, the neurologic clinical exam revealed appendicular rigidity, discrete resting tremor in right upper limb and global bradykinesia in 'off' state, important peak-dose dyskinesia in right lower limb in „on" with painful dystonia and choreaticmovements.Therefore, we added to treatment Amantadine 200 mg per day. Other complains werelinkedto freezing, shuffled walk, dysarthria, hypophonia, sialorrhea and drooling at night, constipation. The patient did not havesignificant postural instability or falls, motor UPDRS was 18 in „on" state and 28 in „off" state and MMSE in „on" was 29. After 4 days of Amantadine treatment the symptomatology was not substantially improved, and we decided to decrease parameters of the stimulation on the left STN (from 2.5V, 60 ms, 130 Hz to 2,1V, 60 ms, 130 Hz). With these stimulation adjustment dyskinesia of the right lower limb completely resolved.

We also performed a brain CT scan, which showed the leads in the correct position, with no displacement (Fig. 1).

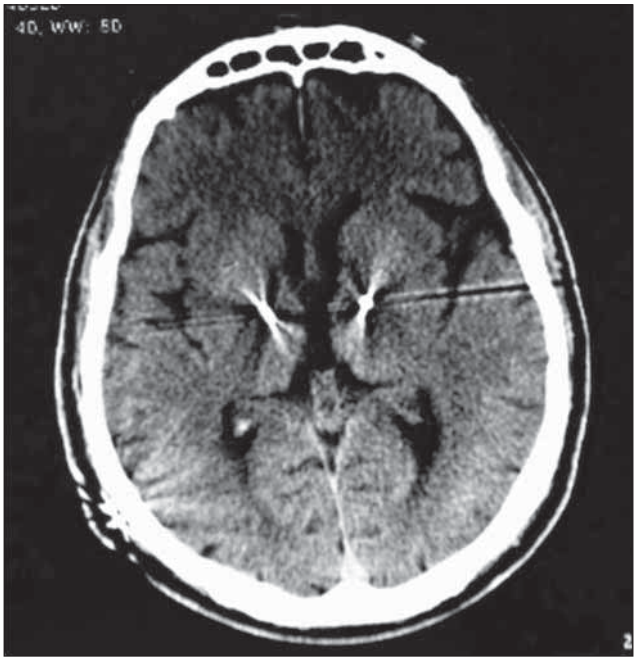

FIGURE 1. *DBS – bilateral subthalamic nucleus leads in correct position.*

DISCUSSION

Deep brain stimulation is an efficient therapeutic option for patients with advanced Parkinson's disease. The long-term benefit of this kind of therapeutic approach was proven in numerous studies. The cardinal motor symptoms are suppressed most effectively when the subthalamicnucleus is stimulated (3,4,5).

A series of rather rare complications are associated with this procedure, both linked to the implantation itself and to the long run use of stimulation.

Infection is generally an incident linked to the neurosurgical implantation stage. We report here a case were infection was a complication of an usual haircut, not linked to the implantation intervention.

The absolute contraindications for DBS are: coagulopathies, prior bleedings, severe comorbid conditions (organ failures), prior anesthetic complications, psychiatric disorders, pre-existing and nonresponsive depression and/or anxiety to the pharmacological treatment in adequate manner cannot benefit from the surgical therapy (6, 7) cognitive disorders and lack of responsiveness to levodopa (2).

Another contraindication is related to age – the eligible patients for this intervention must be < 70 years old (8).

Perioperative complications:

Surgery-related

Inadequate placement of the electrodes – is one of the most common causes of such therapy failure, the incidence being of 3.8-12% (9)

Intracerebral hemorrhage – occurs in around 1-5% of cases, the risk of bleeding is of 3.3% per implanted electrode and around 0.6% out of patients present permanent neurologic impairments (10, 11).

Delayed beep cerebral venous bleeding – includes severe headache, epileptic seizures and focal neurologic deficits (12).

Epileptic seizures – occur postoperatively with a frequency of 3.1% (13).

Pulmonary embolism – occurs with a frequency between 0.4 and 4.9% after the surgery. The mortality rate is of 8.6 and 59.4% (14).

Pneumonia – the presence of pneumonia within 30 days after DBS is around 0.6%, and it is frequent in patients with deglutition disorders (15).

Perioperative confusion – the occurrence is of 1-36% and is transient. (16)

Infection: the most common complication related to the device, the occurrence being of 3-10%. (13,17).

Permanent deficit: 0%-2%

Hardware-related

Device malfunction, lead fracture, lead disconnection, lead erosion, leeds or wire break, lead migration – a rare event.

Stimulation-related

Parenthesis, muscle contractions, dysarthria, diplopia, cognitive changes, depression, mania, suicide, pseudobulbar affect, obsessive-compulsive thoughts, anxiety/panic attacks, aggressive behavior.

In infections, the most common pathogen agent cited in the literature is Staphylococcus aureus, such as in our case, and the gate of entrance for infections is located at the scalp, neck, or subclavicular tissues (18).

CONCLUSION

DBS can improve the symptoms of advanced Parkinson disease, but like in any surgical procedure with hardware placement, a number of complications can occur. Infection might be a serious complication of DBS implantation and commonly requires device removal for cure. In our case the infection of extension wire was resistant at antibiotics therapy, due to this reason the neurosurgeon decided to remove the device to prevent brain infection and serious other complications. However, since the initial clinical response to stimulation was excellent, we decided to reimplant the patient after the infection was resolved, and the results of the long observation of the patient were excellent.

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