

Case Report

Rescue pallidotomy for dystonia through implanted deep brain stimulation electrode

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Abstract

Background: Some patients with deep brain stimulation (DBS), where removal of implants is indicated due to hardware related infections, are not candidates for later re-implantation. In these patients a rescue lesion through the DBS electrode has been suggested as an option. In this case report we present a patient where a pallidotomy was performed using the DBS electrode.

Case Description: An elderly woman with bilateral Gpi DBS suffered an infection around the left burr hole involving the DBS electrode. A unilateral lesion was performed through the DBS electrode before it was removed. No side effects were encountered. Burke-Fahn-Marsden (BFM) dystonia movement scale score was 39 before DBS. With DBS before lesioning BFM score was 2.5 points. The replacement of the left sided stimulation with a pallidotomy resulted in only a minor deterioration of the score to 5 points.

Conclusions: In the case presented here a small pallidotomy performed with the DBS electrode provided a satisfactory effect on the patient's dystonic symptoms. Thus, rescue lesions through the DBS electrodes, although off-label, might be considered in patients with Gpi DBS for dystonia when indicated.

Key Words: Deep brain stimulation, dystonia, pallidotomy

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INTRODUCTION

Deep brain stimulation (DBS) has revolutionized the treatment of movement disorders and provided an alternative to non-reversible lesions. However, lesions may still constitute a viable option in certain conditions. DBS is prone to a number of various complications that can occur during the remaining lifetime of the patient. Even if DBS might be the preferred initial surgical procedure in a patient at a certain point of time, it is not certain that DBS will remain a preferred option compared to ablative surgery when the patient develops a hardware-related infection years later.

In this case report, we present a patient where a rescue lesion following infection was performed using the DBS electrode.

CASE PRESENTATION

The patient suffered from tremor of the upper extremities since the age of 10 years. Later, there was a gradual development of dystonia which finally encompassed all extremities, and affected her abdomen

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and neck as well as her speech. The patient underwent bilateral pallidal DBS at the age of 71 with good effect. Burke-Fahn-Marsden (BFM) dystonia movement scale scores are presented in Table 1. Seven months after the surgery, the patient suffered an infection/erosion over the left burr hole and all implants were removed. Re-implantation was performed at the age of 72, with good result. At the age of 76, a new infection/erosion occurred over the left burr hole [Figure 1a].

The patient was in an advanced age, with a rather poor general condition, and had a very thin scalp. It was, therefore, decided that the patient would not be a candidate for a third DBS procedure. However, considering the patient's deteriorating condition and the suffering caused by her dystonic symptoms in the absence of DBS, it was decided to keep the right electrode and to perform a rescue lesion through the left DBS electrode before extraction.

Before surgery, the exact location of each individual electrode contact was identified from the patient's postoperative computed tomography (CT) fused with the preoperative stereotactic magnetic resonance imaging (MRI). Each individual contact was screened *de novo* concerning acute stimulation induced effects and

side effects. The result indicated that the currently used contacts were optimal. On the left lead, the patient was on bipolar stimulation through contacts 1 and 2 (the two middle contacts), at 3.5 V, 90 uS, and 160 Hz. It was, therefore, decided to use the same contacts for bipolar lesioning.

Before surgery, test lesions were performed in egg albumin [Figure 1b]. The lesion settings chosen for a bipolar lesion between contacts 1 and 2 produced a coagulated lump with a length of 4.5 mm [Figure 1c] and a diameter of 3.5 mm [Figure 1d].

The procedure was performed using local anesthesia. A 1-cm long transverse incision was made over the connector between the intracerebral electrode and the connection cable over the linea temporalis superior. The electrode was disconnected from the connector and its proximal end was visualized. With cessation of stimulation on that side, the patient immediately complained of dystonic cramps in the neck, as well as dystonic speech. Contacts 1 and 2 of the electrode were connected to the lesion generator (Leksell Neuro Generator, Elekta, Stockholm), and a lesion was made using a power of 4 during 30 seconds. During the lesioning, the speech was markedly improved and the dystonic cramps in the neck were resolved.

After the incision over the connector area was closed, the infected wound over the burr hole was revised and the electrode removed. The distal end of the electrode was easily mobilized and showed no adherent tissue [Figure 1e].

A postoperative CT performed 4 days after surgery and fused with a preoperative MRI demonstrated a well-placed lesion in the posteroventral globus pallidus internus (Gpi) with a height of 4.5 mm and a diameter of 3 mm and surrounded by postoperative edema [Figure 2].

Total BMF movement score was 39 before DBS. With DBS before lesioning, BFM score was 2.5. The replacement of the left-sided stimulation with a pallidotomy resulted in only a minor deterioration of the score to 5, mostly in the form of increased torticollis [Table 1].

Table 1: Burke-Fahn-Marsden (BFM) dystonia movement scale scores before deep brain stimulation (DBS), with DBS before lesioning and 1 year after the lesioning done through contacts 1 and 2 of the left-sided DBS electrode

| | BFM total | Right arm and leg | Neck | Speech |
|------------------------|-----------|-------------------|------|--------|
| Baseline before DBS | 39 | 7 | 4 | 0 |
| With DBS before lesion | 2.5 | 1 | 0.5 | 0 |
| 1 year after lesion | 5 | 0 | 3 | 2 |

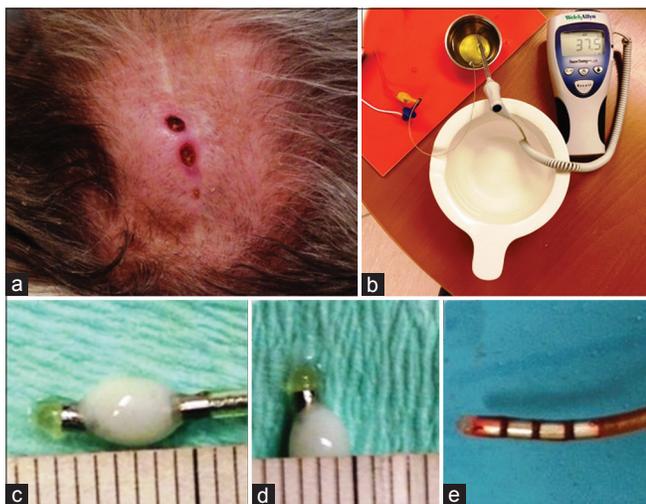


Figure 1: (a) Infection with erosion over the left burr hole. (b) Setup for test lesions in egg albumine. (c, d) Size in mm of the coagulate at the test lesion. (e) The extracted deep brain stimulation electrode after intracerebral lesioning

DISCUSSION

In our patient, it was necessary to remove the DBS electrodes due to a repeat hardware-related infection. Because of old age, thin scalp, and frail general condition, it was evident that the patient will not be a candidate for later re-implantation. Cessation of the therapy, even if only on one side, was likely to result in a rebound or at least a re-emergence of the dystonic symptoms, as was evidenced during surgery when stimulation through the left lead was interrupted.^[4]

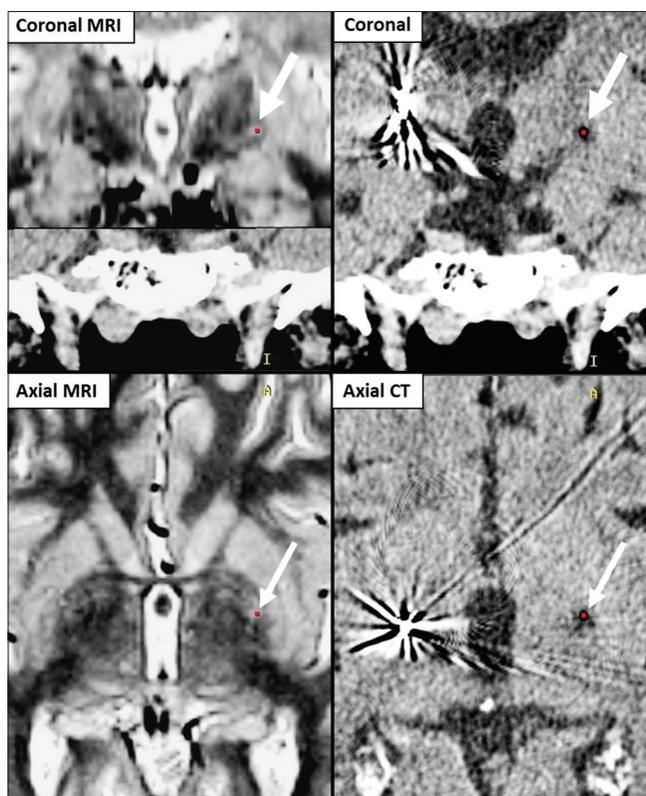


Figure 2: Preoperative magnetic resonance imaging fused with post-lesional computed tomography. The arrows indicate the center of the lesion

The technique of lesioning through an implanted DBS electrode has previously been described in two patient with subthalamic nucleus (STN) DBS for Parkinson's disease (PD)^[2,6] and one with Vim DBS for essential tremor (ET).^[6] The technique has further been used in three *de novo* patients (1 thalamotomy for ET, 1 thalamotomy for PD, and 1 pallidotomy for PD) in whom a DBS electrode was permanently implanted for an immediate lesion and left in place should the need for additional lesions arise.^[7]

In the patient described by Raoul *et al*,^[7] who underwent pallidotomy for PD through the implanted DBS electrode, 3 incremental different sessions with lesioning over a period of 7 months proved necessary to achieve the desirable effect. In classical pallidotomies performed with an RF electrode, the effect is normally achieved in one single session, and the results compare well with pallidal DBS for PD.^[1] Traditionally, larger

lesions have been used for pallidotomies than for thalamotomies or subthalamotomies, and bipolar lesions through a DBS electrode tend to have a smaller diameter than typical pallidotomies made with a monopolar RF electrode.^[3,5,8]

In our case, because the patient had an infected hardware and the DBS electrode had to be removed, a single lesion proved sufficient to produce a satisfying effect on the dystonic symptoms, albeit not as efficient as the previous stimulation through that electrode.

CONCLUSION

In the case presented here, a small pallidotomy performed with the DBS electrode provided a satisfactory effect on the patient's dystonic symptoms. Thus, rescue lesions through the DBS electrodes, although off-label, might also be considered in patients with Gpi DBS for dystonia when indicated.

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Conflicts of interest

There are no conflicts of interest.

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