CAROLINAS REHABILITATION

Atrium Health

Man In A Barrel Syndrome After Deep Brain Stimulation Procedure: A Case Report

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Introduction

We report a novel case of Man in a Barrel Syndrome (MIBS) due to anoxic brain injury in a patient with refractory Parkinson's Disease who underwent deep brain stimulation (DBS) procedure. This complication has never before been associated with DBS.

Deep brain stimulation involves the surgical implantation of electrodes into targeted areas of the brain, which are connected to a pacemaker-like device in the chest wall (Figure 1, Okun 2012). This procedure is used after pharmacologic treatments have failed for movement disorders such as Parkinson's disease (PD), essential tremor, dystonias, and Tourette's syndrome. It has also been used to treat refractory seizures and some psychiatric disorders such as obsessive-compulsive disorder. For Parkinson's Disease, such as in this case, DBS is used to stimulate motor circuits (i.e. in the subthalamic nucleus) that are otherwise disrupted and cause motor symptoms.[2]

Reported DBS Complications[3]:

- **Perioperative**
  - Infection
  - Intracerebral hemorrhage
  - Infarction
  - Seizures
  - Transient mental status changes
  - CSF leak
  - Pulmonary embolism
- **Hardware-related**
  - Lead misplacement
  - Hardware malfunction
  - Hardware infection
  - Electrode/wire fracture or migration
  - Allergic reaction to hardware
- **Stimulation-related**
  - Paresthesia
  - Dysarthria
  - Diplopia
  - Hemiballismus
  - Gait abnormalities

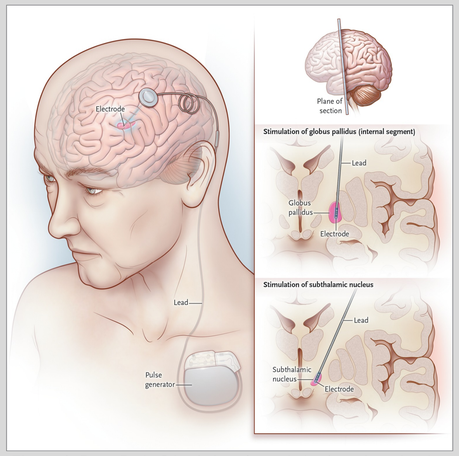

Figure 1: Deep Brain Stimulation electrode implantation, showing leads implanted in the globus pallidus interna or subthalamic nucleus. (Okun 2012)

Case Report

A 46-year-old male with a past medical history of refractory Parkinson's disease (PD) and depression was admitted for pre-scheduled deep brain stimulator implantation for severe dyskinesia of his lower extremities. He was taken to the OR and placed under moderate sedation. Then, burr holes were made, fiducials placed and a micro-recording electrode was slowly advanced into the brain. After sedation was weaned for the interactive portion of the surgical intervention, he developed decreased mentation, requiring intubation and abrupt discontinuation of the procedure. Subsequent workup revealed negative CT head and EEG. MRI brain ultimately revealed acute ischemia of bifrontal, biparietal, left occipital, bitemporal lobes, and right dentate nucleus (Figure 2), attributed to hypoxemia.

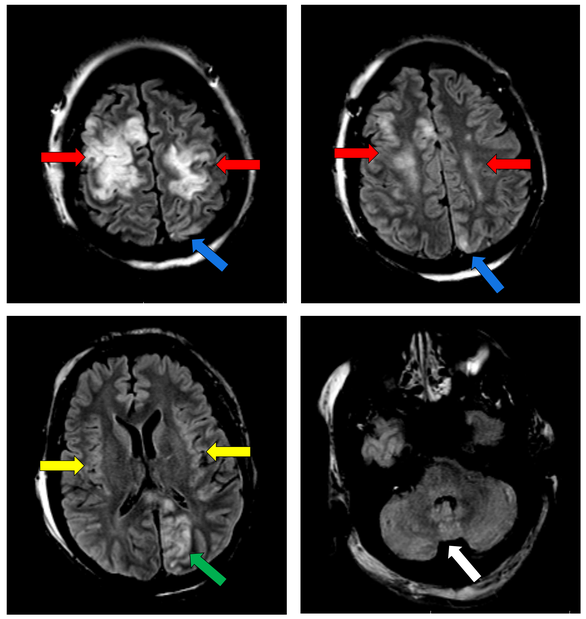

Figure 2: MRI Brain Axial FLAIR images demonstrating bifrontal (red arrows), biparietal (blue arrows), bitemporal (yellow arrows), left occipital (green arrow), and right dentate nucleus (white arrow) ischemia.

Functional Status

Post-operatively, the patient's mentation improved, but he suffered motor deficits including bilateral upper extremity plegia: (0/5) bilaterally with trace movement of the finger flexors. Lower extremity examination demonstrated anti-gravity activation of major muscle groups and baseline PD-related dyskinesia. He was admitted to inpatient rehabilitation and was able to make a significant functional recovery (Table 1).

Activity	Inpatient Rehab Admission	After 1 month Inpatient Rehab	After 2 months Outpatient Rehab
Ambulation 350 ft	Dependent	Minimal Assistance	Independent
Toilet Transfers	Dependent	Minimal Assistance	Minimal Assistance
Eating	Dependent	Maximal Assistance	Minimal Assistance
Grooming	Dependent	Maximal Assistance	Minimal Assistance
Dressing	Dependent	Maximal Assistance	Minimal Assistance

Table 1: Patient's functional recovery; demonstrating his rehab progression with ambulation and activities of daily living (ADLs).

Discussion

Man in a Barrel Syndrome (MIBS) is a neurological syndrome defined by bilateral upper extremity weakness with preserved head, neck and lower extremity strength.

Pathophysiology:

- Bilateral symmetric injury to the brain affecting UE motor innervation
- Brainstem injury
- Cervical spinal cord injury
- Bilateral brachial plexus injury
- Peripheral nerve injury.

Cause: Impaired blood flow to the brain, specifically the watershed areas[4] (via cardiac arrest, severe vascular injury, head trauma, or poisoning)

Treatment: Address precipitating factors[4]

- Blood pressure support
- Revascularization of arterial stenoses
- Antithrombotic medications where indicated
- Therapies focused on functional recovery

Prognosis: depends on etiology, location of injury, and extent of brain damage.

Conclusion

This case highlights an unusual etiology of anoxic brain injury and subsequent MIBS as a possible complication of deep brain stimulation; a complication not otherwise reported. The clinical course and relative recovery in this case highlights the importance of early recognition and intervention. Physicians should be aware of this potential complication when offering DBS for movement disorders.

Resources

1. Okun MS. Deep-brain stimulation for Parkinson's disease. N Engl J Med. 2012 Oct 18;367(16):1529-38. doi: 10.1056/NEJMct1208070. PMID: 23075179.
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4. Bodle J, Emmady PD. Man In A Barrel Syndrome. 2020 Dec 12. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan–. PMID: 32644612.

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