

Acute ischemic Stroke During DBS Surgery of Globus Pallidus Internus: A Rare Complication of Deep Brain Stimulation: Report of 5 Cases

Angela Elizabeth Downes MD; Nader Pouratian MD, PhD

Department of Neurosurgery, University of California, Los Angeles, Los Angeles CA



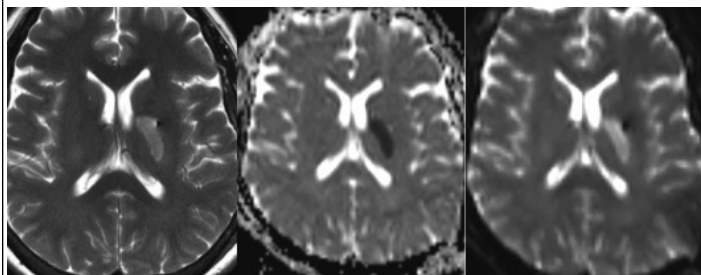
Introduction

Deep brain stimulation (DBS) of the globus pallidus internus (GPI) is a clinically proven efficacious treatment for patients with Parkinson's disease (PD) refractory to medical therapy. Several studies have reported several complications associated with DBS surgery, most commonly addressing infection and hemorrhage; however, reports of acute cerebral ischemic infarctions during GPI DBS implantation surgery are rare.

Methods

We present a series of five patients who underwent bilateral GPI DBS lead placement for PD complicated by clinically significant ischemic strokes during surgery. All surgeries were performed with single tracks for both microelectrode recording and macroelectrode placement. A literature review was performed to evaluate the incidence of ischemic stroke during DBS surgery.

Case 1

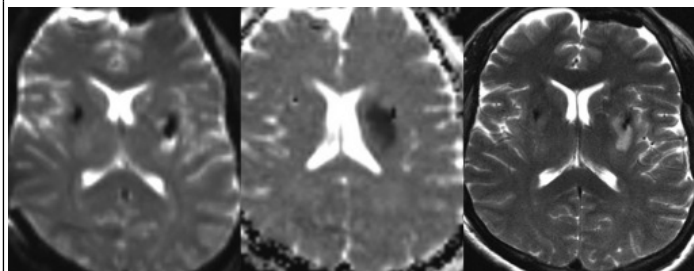


A. Axial T2-weighted MRI obtained within 1 hour post-operatively showing increased signal of acute stroke in posterior internal capsule. B. ADC map with hypointense area corresponding to area of ischemia shown in C. DWI image.

Results

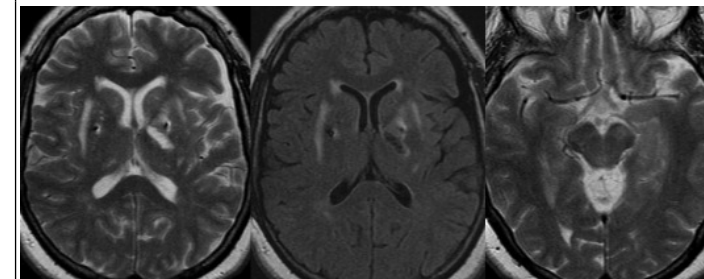
All five patients developed acute onset of lethargy, dysarthria, contralateral facial and/or hemibody weakness at different times during DBS surgery. Patients also experienced abrupt resolution of contralateral tremor and rigidity. Immediate postoperative CTs performed in all cases were negative for hemorrhage. MRIs obtained in three patients revealed ischemia in the posterior limb of the internal capsule, globus pallidus, and lateral putamen.

Case 2



A. DWI MR imaging obtained within 1 hour post-operatively depicting area of ischemia in the basal ganglia around and posterior to the DBS electrode. B. ADC map with corresponding hypointensity. C. Axial T2-weighted MRI showing hyperintensity in basal ganglia.

Case 3



A. Axial T2-weighted MRI 3 months post-stroke showing encephalomalacia in left internal capsule posterior to DBS lead. B. Axial flair MR image with low intensity signal of chronic stroke. C. Axial T2-weighted MRI depicting wallerian degeneration in left cerebral peduncle.

Conclusions

Ischemic stroke is a rare complication of DBS surgery. The authors present a case series of symptomatic ischemic stroke occurring during DBS placement. The mechanism is not clear, but small vessel vasospasm could have occurred due to direct contact or electrical stimulation. Time of symptom onset was different across patients; therefore, defining a unifying theory remains speculative.

Learning Objectives

By the conclusion of this session, participants should be able to describe common complications of DBS and be aware of rare complications.