

## Introduction

Deep brain stimulation (DBS) is an established treatment for the management of Parkinson's disease (PD), tremor and dystonia. Patient selection, target choice and surgical accuracy are the foundation for a successful DBS outcome. However, in some cases, revision or reimplantation is needed due to limited benefits, device failure or infection involving the hardware. There are relatively few published series describing the outcomes after lead revision or reimplantation. In this study, we present our outcomes after revision or reimplantation surgery in patients with infections, device failure or unsatisfactory results after DBS surgery for PD.

## Methods

We reviewed the data from all DBS intracranial lead removals, revisions or reimplantation among PD patients for a 6-year period at our institution. Demographic data, indication for removal or revision, procedure time, outcomes and lead location for reimplants were analyzed for all patients who underwent DBS for PD between 2010 and 2016. The indications for these procedures were categorized as infection, suboptimal outcome, and device failure. The Movement Disorders Society-Unified Parkinson Disease Rating Scale – Motor subscale (MDS-UPDRS III) scores were compared prior to and 6 months after reimplantation. Lead locations pre and post revision or reimplantation were plotted in a schematic drawing, adapted from the Schaltenbrand and Wahren Atlas (Figure 1).

## Results

In total, 34 leads were removed from 25 patients (19 males/6 females). The mean age for removal was 62.21 years (SD=9.97). Thirteen patients had eighteen leads reimplanted after removal. Seven leads were replaced after an infection, nine leads were replaced because of suboptimal outcome, and two leads were replaced due to device failures. There was significant improvement in the motor scores after the revision surgery among the patients who had the lead revised for a suboptimal outcome ( $p=.025$ ). The mean vector distance of the new lead location compared to the previous location was 2.16mm (SD=1.17), measured on an axial plane 3.5 mm below the AC-PC line. When these leads were analyzed by subgroup, the mean distance was 1.67 mm (SD=0.83) among patients treated for infection and 2.73 mm (SD=1.31) for those with suboptimal outcomes.

**Figure 1**

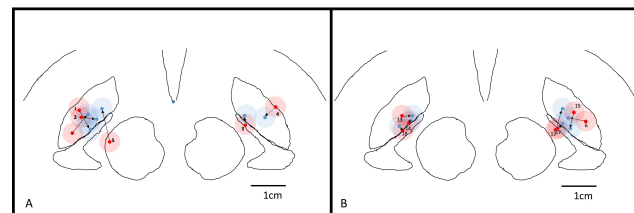


Diagram based on Schaltenbrand and Wahren Atlas in a plan 3.5 mm below the AC-PC line. Lead locations before and after revision for suboptimal outcome (A) and infection (B) were plotted.

## Learning Objectives

Review the outcomes and complications after DBS lead revision or reimplant. Discuss outcomes in patients with suboptimal outcomes who underwent lead revision.

## Conclusions

Patients with Parkinson's disease who underwent reimplantation surgery due to suboptimal outcome may experience significant benefits. Reimplantation after surgical infection seems feasible and overall safe.

## References

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