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Asleep Deep Brain Stimulation with Intraoperative MR-Guidance--A Single Institution Experience

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Introduction

Deep brain stimulation (DBS) implantation is usually performed as an awake procedure with intra-operative testing, but can performed under general anesthesia with intra-operative MRI (iMRI) guidance. iMRI allows for high target accuracy, a single electrode pass, reduced operative time, direct intra-operative confirmation of electrode placement, assessment of potential intraoperative complications, and improved patient comfort [1 -3]. We describe the largest single-surgeon published series of iMRI guided DBS.

Methods

52 consecutive DBS electrode implantation procedures were performed by a single surgeon (GRC) under general anesthesia using the Clearpoint system, with iMRI guidance in a 3T magnet [4]. All but one patient was implanted bilaterally.

Results

Average age was 64+/-8 years, and 62% were male. Indications for DBS were PD (67%), essential tremor (29%) and dystonia (4%). Targets included subthalamic nucleus (STN, 54%), ventral intermedius nucleus of the thalamus (Vim, 29%) and globus-pallidus internus (GPi, 17%). Time under anesthesia and operative time were 4.92-hours (4.42-6.04) and 3.65-hours (3.39-4.14), respectively. Operative time decreased significantly with increasing institutional and surgeon experience—median OR time for the first and last 10 cases were 4.27 hours (3.99-4.65) and 3.28 (2.92-3.47), respectively. Cases involving prior hardware explantation were excluded from this calculation. Estimated blood loss was <50cc. All electrodes were placed with a single pass. A total of 103 leads were safely placed in 51 patients by a single surgeon under iMRI guidance with no instances of intra-operative complications. Two patients underwent reoperation: (1) replacement of infected battery and lead wire, (2) conversion of GPi stimulation to bilateral STN stimulation due to suboptimal effect. Median follow-up time was 28 weeks (8.4-66.9). Long term clinical efficacy appears consistent with prior experience.

Conclusions

DBS placement under general anesthesia with iMRI guidance appears to be a safe and effective procedure.

Learning Objectives

By the conclusion of this session, participants should be able to
1) Describe the differences in patient experience between awake and asleep DBS
2) Describe the differences in localization approach between awake and asleep DBS
3) Identify potential complications of DBS treatment

References

1.Chen T, Mirzadeh Z, Chapple K, Lambert M, Dhall R, Ponce FA. "Asleep" deep brain stimulation for essential tremor. http://dxdoiorgezp-prod1hulharvardedu/103171/20156JNS15526. November 2015. doi:10.3171/2015.6.JNS15526.

2.Philip A Starr, Alastair J Martin, Jill L Ostrem, Pekka Talke, Nadja Levesque, Paul S Larson. Subthalamic nucleus deep brain stimulator placement using high-field interventional magnetic resonance imaging and a skull-mounted aiming device: technique and application accuracy. http://dxdoiorgezp-prod1hulharvardedu/103171/20096JNS081161. 2010;112(3):479-490. doi:10.3171/2009.6.JNS081161.

3.Martin AJ, Larson PS, Ziman N, et al. Deep brain stimulator implantation in a diagnostic MRI suite: infection history over a 10-year period. Journal of Neurosurgery. 2017;126(1):108-113. doi:10.3171/2015.7.JNS15750.

4.Tempany CMC, Jayender J, Kapur T, et al. Multimodal imaging for improved diagnosis and treatment of cancers. Cancer. 2015;121(6):817-827. doi:10.1002/cncr.29012.

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