The Impact of Increasing Age on Outcomes Following Deep Brain Stimulation for Parkinson's Disease: A Retrospective Cohort Analysis

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Introduction

Deep Brain Stimulation (DBS) is a well-established modality for the treatment of advanced Parkinson's Disease (PD), but some centers exclude older patients. In this study, we evaluated the impact of increasing age on complications associated with DBS surgery.

Methods

A retrospective, cohort study was performed using the Thomson Reuters MarketScan® database, examining patients who underwent DBS for PD from 2000-2009. Primary outcomes included aggregate and individual complications within 30 and 90 days following surgery. Multivariate logistic regression analysis was used to calculate complication odds ratios for age after controlling for patient demographics and comorbidity scores.

Results

-Of the 1,635 patients included in the study, the 90-day cumulative incidence of complications was 8.3%, with a mortality rate of 0.4%.

-Advancing age was associated with increasing frequency of complications (65-69 years, 6.9%; 70-74 years, 12.1%; 75-79 years, 8.2%; 80-84 years, 16.7%) and mortality (65-69 years, 0.5%; 70-74 years, 0.5%; 75-79 years, 2.4%).

-Overall, 135 (8.3%) patients experienced at least one complication within 90 days, including wound infections (3.6%), pneumonia (3.1%), hemorrhage or hematoma (1.7%), or pulmonary embolism (0.7%).

-After adjusting for covariates, increasing age was associated with a higher 90-day complication rate (OR 1.13 per 5-year increase; 95% CI 0.98, 1.31; P = 0.082), which was largely attributable to increased pneumonia rates (OR 1.37 per 5-year increase; 95% CI 1.07, 1.77; P = 0.014).

-The two most common early complications, hemorrhage and infection, had no detectable increase with age (hemorrhage OR 0.87; 95% CI 0.67, 1.14; P = 0.319, infection OR 1.09; 95% CI 0.89, 1.34; P = 0.416).

Effect of Increasing Age on 30 and 90 Day Complication Rates

Adjusted Effect of Age (5-year Linear Change) for All Models

Model	30-day unadjusted Odds Ratio (95% CI)	30-day unadjusted P-value	30-day Odds Ratio (95% CI)*	30-day P-value
All Complications	1.066 (0.951 , 1.196)	0.2714	1.047 (0.878 , 1.249)	0.6068
Hemorrhagic Complications	0.936 (0.756 , 1.160)	0.5485	0.841 (0.620 , 1.140)	0.2644
Infectious Complications	0.826 (0.676 , 1.008)	0.0604	0.892 (0.668 , 1.190)	0.4365
Pneumonia Complications	1.350 (1.121 , 1.626)	0.0016	1.325 (0.978 , 1.794)	0.0689

* Adjusted for Charlson score, insurance type, and gender

Adjusted Effect of Age (5-year Linear Change) for All Models

Model	90-day unadjusted Odds Ratio (95% CI)	90-day unadjusted P-value	90-day Odds Ratio (95% CI)*	90-day P-value
All Complications	1.089 (0.996 , 1.192)	0.0618	1.134 (0.984 , 1.307)	0.0818
Hemorrhagic Complications	0.942 (0.782 , 1.134)	0.5268	0.872 (0.665 , 1.142)	0.3191
Infectious Complications	0.944 (0.831 , 1.073)	0.3803	1.088 (0.888 , 1.335)	0.4156
Pulmonary Complications	1.439 (1.034 , 2.001)	0.0308	1.936 (1.087 , 3.450)	0.0249
Pneumonia Complications	1.410 (1.205 , 1.650)	<.0001	1.373 (1.067 , 1.767)	0.0136

* Adjusted for Charlson score, insurance type, and gender

The impact of a 5 year increase in age on 30 day (top) and 90 day (bottom) complication rates, both unadjusted and adjusted for covariates.

Conclusions

Among older PD patients (>75 years), the risk of postoperative hemorrhage or infection remains relatively stable, despite increasing age, suggesting possible expansion of the therapeutic window traditionally considered as candidates for DBS. The risk of developing postoperative pneumonia does significantly increase with age, similar to other surgical interventions. These age-related risks should be considered when counseling older PD patients regarding DBS surgery.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Discuss the impact of age on the risk of complication following deep brain stimulation surgery for Parkinson's disease, and 2) Better counsel patients on the risks of deep brain stimulation surgery for older patients.