



Impact of Advancing Age on Outcomes of Deep Brain Stimulation for Essential Tremor

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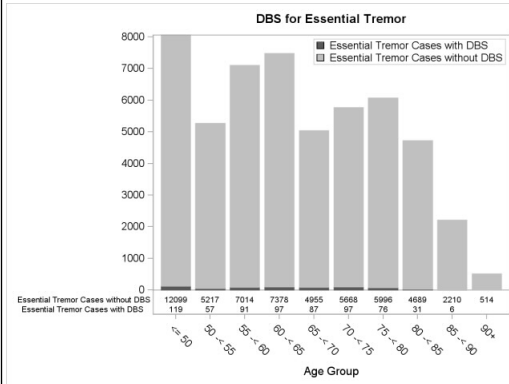
Introduction

- Essential tremor (ET) was the original indication for Deep Brain Stimulation (DBS), with FDA-approval since 1997.
- Given that the prevalence of ET increases nearly 10-fold with age, we evaluated the step-wise impact of increasing age on short-term complications following DBS surgery.
- We hypothesized that increasing age would be associated with an increase in postoperative complications.

Methods

- A large, retrospective, cohort study was performed using the Thomson Reuters MarketScan® national database, examining patients who underwent DBS for ET from 2000-2009.
- Hospital length of stay, aggregate and individual complications within 90-days following surgery were evaluated.
- Multivariate logistic regression analysis was used to calculate complication odds ratios for each 5-year age epoch after controlling for covariates.

Distribution of essential tremor cases with and without deep brain stimulation



Results

A total of 661 patients were included in the analysis. The mean (SD) patient age was 61.9 (14.3) years, with 17% of individuals age 75 or older. Overall, 56.9% of patients were male, and 44.6% had a Charlson Comorbidity Score of one or greater. Additionally, 7.1% of patients experienced at least one complication within 90 days, including wound infections (3.0%), pneumonia (2.4%), hemorrhage or hematoma (1.5%), or pulmonary embolism (0.6%). After adjusting for covariates, increasing age ranging from <50 to 90 years, was not significantly associated with the overall 90-day complication rates (OR 0.89 per 5-year increase; 95% confidence interval (CI) 0.77, 1.02; p=0.102). The risk of the two most common procedure-related complications, hemorrhage and infection, did not significantly increase with age (hemorrhage: OR 1.02; 95%CI 0.77, 1.37; p=0.873, infection: OR 0.88; 95%CI 0.72, 1.07; p=0.203).

Baseline Demographics

Table 1: Baseline Demographics

	Overall
Total, no. (%)	661 (100.0)
Age	
mean (SD)	61.9 (14.3)
median (Q1, Q3)	63.0 (55.0, 72.0)
Age Category, no. (%)	
<= 50	119 (18.0)
50 -< 55	57 (8.6)
55 -< 60	91 (13.8)
60 -< 65	97 (14.7)
65 -< 70	87 (13.2)
70 -< 75	97 (14.7)
75 -< 80	76 (11.5)
80 -< 85	31 (4.7)
85 -< 90	6 (0.9)
Sex, no. (%)	
Male	376 (56.9)
Female	285 (43.1)
Charlson Score, no. (%)	
0	366 (55.4)
1 or higher	295 (44.6)
Insurance Type, no. (%)	
Commercial	290 (43.9)
Medicaid	59 (8.9)
Medicare	312 (47.2)

Learning Objectives

Our findings suggest that age should not be a primary exclusion factor for determining candidacy for DBS and possible expansion of the traditional therapeutic window.

Outcomes stratified by age (younger and older than 75 years)

Table 2. Outcomes stratified by age (younger and older than 75 years)

	Overall, no. (%)	Age < 75, no. (%)	Age ≥ 75, no. (%)
Total	661	548	113
No Complication or Revision within 90 Days	608 (92.0)	503 (91.8)	105 (92.9)
Any Complication within 90 Days	47 (7.1)	40 (7.3)	7 (6.2)
Hemorrhagic Complication within 90 Days	10 (1.5)	8 (1.5)	2 (1.8)
Infection within 90 Days	20 (3.0)	18 (3.3)	2 (1.8)
Pulmonary Embolism within 90 Days	4 (0.6)	4 (0.7)	0 (0.0)
Pneumonia within 90 Days	16 (2.4)	13 (2.4)	3 (2.7)
Lead Revision within 90 Days	2 (0.3)	2 (0.4)	0 (0.0)
Generator Revision within 90 Days	7 (1.1)	7 (1.3)	0 (0.0)
Mortality within 90 Days	1 (0.2)	0 (0.0)	1 (0.9)
Length of Stay following Surgery, > 1 day	13 (2.0)	13 (2.4)	0 (0.0)

Effect of 5-year increase in age on post-operative complications within 90days

Table 3. Effect of 5-year increase in age on post-operative complications within 90 days

Predictor	Outcome	Odds Ratio* (95% CI)	P-value
Age (5-year intervals)	All Complications	0.89 (0.77, 1.02)	0.102
	Hemorrhagic Complications	1.02 (0.77, 1.37)	0.873
	Infectious Complications	0.88 (0.72, 1.07)	0.203
	Pulmonary Embolism Complications	0.86 (0.58, 1.29)	0.470
	Pneumonia Complications	0.77 (0.60, 0.98)	0.037

Conclusions

Among older ET patients, 90-day complication risk and the risk of postoperative hemorrhage or infection remained relatively stable, despite increasing age. Our findings suggest that age should not be a primary exclusion factor for determining candidacy for DBS and possible expansion of the traditional therapeutic window.