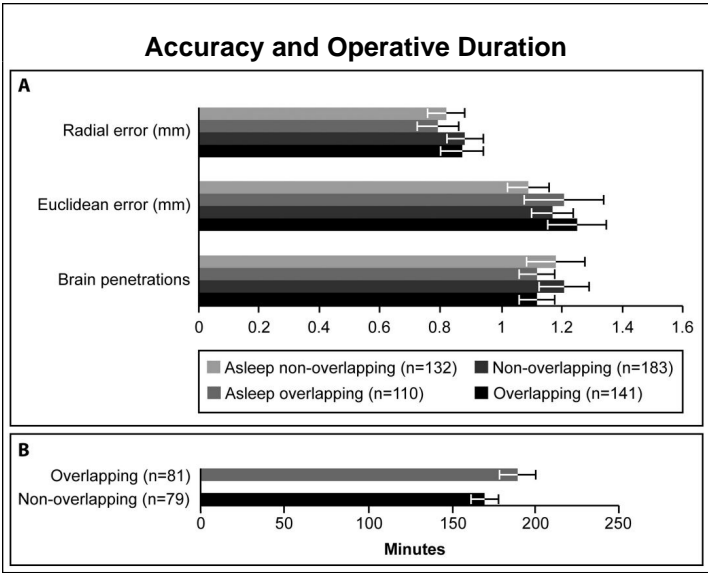


Introduction

Many surgeons utilize assistants to perform procedures in more than one operating room at a given time, a practice known as overlapping surgery. This single-surgeon retrospective analysis examines the effect of overlapping surgery on clinically relevant endpoints in deep brain stimulation (DBS) surgery for movement disorders.

Methods

DBS electrode placements performed by the primary surgeon at the Barrow Neurological Institute were retrospectively evaluated. Recorded case times for each DBS surgery were evaluated for any overlap with another case of the primary surgeon on the same day. Stereotactic accuracy, operative duration, length of hospital stay, and rates of hemorrhage, wound-related complications, and hardware-related complications requiring a revision (e.g. post-operative high impedance) were noted and compared between overlapping and non-overlapping cases.



Results

Of 324 cases, 141 were overlapping and 183 were non-overlapping. Stereotactic error, the number of brain penetrations per electrode, and post-operative length of stay did not differ significantly between overlapping and non-overlapping cases. There was also no significant difference when “asleep” DBS cases were considered as a separate subgroup. Mean operative duration was significantly longer in overlapping cases for the most common permutation of the procedure (asleep, bilateral electrode placement with a pulse generator; 190 minutes vs 170 minutes, p=0.004). Hemorrhage and wound-related complication rates did not differ significantly, but the rate of hardware-related complications requiring revision was significantly higher in the overlapping group (7/141 vs 0/183; p = 0.002).

Accuracy, Brain Penetrations, and Length of Stay			
Table 2. Overlapping Versus Non-overlapping DBS Electrode Placement Accuracy* and Hospital Length of Stay*			
	Overlapping cases (n=141)	Non-overlapping cases (n=183)	P-value†
All cases			
Radial error (mm)	0.87±0.07	0.88±0.06	0.80
Euclidean error (mm)	1.25±0.10	1.17±0.07	0.21
Brain penetrations (no.)	1.12±0.06	1.21±0.08	0.08
Length of stay (day)	1.65±0.25	1.67±0.16	0.86
Asleep cases			
Radial error (mm)	0.79±0.07	0.82±0.06	0.59
Euclidean error (mm)	1.21±0.13	1.09±0.07	0.11
Brain penetrations (no.)	1.12±0.06	1.18±0.10	0.28
Length of stay (day)	1.68±0.29	1.77±0.21	0.63
Awake cases			
Radial error (mm)	1.13±0.18	1.04±0.15	0.44
Euclidean error (mm)	1.36±0.17	1.39±0.17	0.85
Brain penetrations (no.)	1.13±0.14	1.28±0.16	0.15
Length of stay (day)	1.55±0.44	1.43±0.20	0.63

*Data are shown as mean±(1.96 × SEM).
†P<0.05 is significant (t test).

Table 2: Overlapping Versus Non-overlapping DBS Electrode Placement Accuracy and Hospital Length of Stay

Complications by Type			
Table 4. Comparison of Complications between Overlapping and Non-overlapping Cases			
Variable	Overlapping cases No. (%)	Non-overlapping cases No. (%)	P-value†
Hemorrhage	1 (0.7%)	2 (1.1%)	0.72
Wound-Related	6 (4.3%)	5 (2.7%)	0.45
Wound-Related Requiring Surgery	2 (1.4%)	2 (1.1%)	0.79
Hardware-Related	7 (5.0%)	0 (0.0%)	0.002

*Data are shown as mean±(1.96 × SEM).
†P<0.05 are significant (test of equal proportions).

Table 4: Comparison of Complications between Overlapping and Non-Overlapping Cases

Conclusions

Stereotactic accuracy, brain penetration, hospital length of stay, hemorrhage rates and wound-related complication rates were comparable for overlapping and non-overlapping DBS electrode placements. Overlapping DBS electrode placements had a longer operative duration and demonstrated a higher rate of hardware-related complications requiring revision. Overlapping DBS surgery can be performed safely and accurately but attention to detail remains critical for optimal outcomes for this elective procedure.

Learning Objectives

- By the conclusion of this session, participants should be able to:
- 1) Understand DBS surgery in the context of overlapping surgery.
 - 2) Understand in which ways overlapping surgery scheduling did not affect patient outcomes in our series.
 - 3) Describe possible pitfalls of overlapping surgery identified in our series.