Reoperation for Device Infection and Erosion Following Deep Brain Stimulator Implantable Pulse Generator Placement

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Introduction

Infection and erosion following implantable pulse generator (IPG) placements are associated with morbidity and cost for patients with deep brain stimulator (DBS) systems. Recent studies have found that prior DBS replacement and lack of antibiotic prophylaxis may increase risk for infection (1-2). We provide detailed characterization of infection and erosion events in a large cohort who underwent DBS for movement disorders.

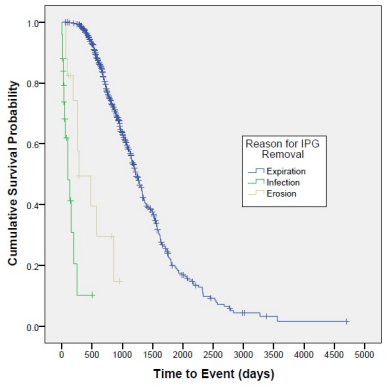
Methods

We retrospectively reviewed consecutive IPG placements and replacements in patients who underwent DBS for movement disorders at the University of Alabama at Birmingham between 2013-2016. Previous IPG procedures occurring before 2013 in these patients were also captured. We performed descriptive statistics, survival analyses, and logistic regression by employing generalized linear mixed effects models to examine risk factors for our primary outcomes: infection within one year or erosion within two years of IPG placement.

Results

We evaluated 384 patients who underwent 995 total IPG procedures (46.4% of these were initial placements) with a median follow up of 2.9 years. Reoperation for infection occurred after 27 (2.7%) procedures in 21 (5.5%) patients. Reoperation for erosion occurred after 16 (1.6%) procedures in 15 (3.9%) patients. Median time to reoperation for infection and erosion was 51 (IQR: 24-129) and 149 (IQR: 112-285) days, respectively (Figure 1).

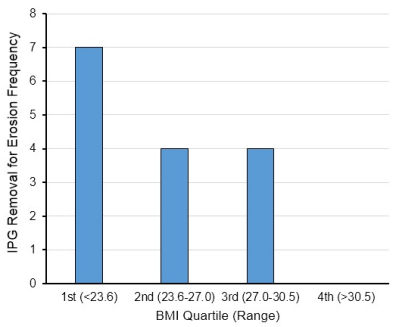
Figure 1: IPG Reoperation Survival Curves



Survival analysis curves for device expiration, erosion, and infection with reoperation-free survival probability plotted on y-axis and time to event in days plotted on x-axis. Censoring is represented by lines perpendicular to survival curves.

On logistic regression, previous infection increased risk for subsequent infection (OR 35.0, 95% CI 7.9-156.2, p<0.0001) and lower patient BMI was a risk factor for erosion (for BMI =< 24: OR 3.1, 95% CI 1.1-8.6, p=0.03). (Figure 2).

Figure 2: IPG Erosion Frequency by BMI Quartile



Patient BMI was inversely related to erosion rate in our patient cohort. This figure displays IPG erosion frequency on the y-axis with BMI quartiles from our patient cohort on the x-axis.

Intraoperative vancomycin powder was used in 158 cases and did not decrease infection risk (3.2% infected with vancomycin v. 2.6% without, p=0.922 by Log-Rank test) (Table 1).

Table 1: Comparison of patient and procedure variables associated with reoperation

Parameter	Infection			Erosion		
	Infected (n=27)*	Non infected (n=968)*	P value	Eroded (n=16)*	Non eroded (n=97)*	P value
Age, years (mean ± SD)	56.2 ± 14.4	60.0 ± 13.6	0.150	61.5 ± 10.6	59.9 ± 13.7	0.637
Male gender, %	77.8	59.1	0.072	75.0	59.3	0.305
N replacements median (IQR)	1 (0.75-3.25)	2 (1-4)	0.487	2 (0.25-4.75)	2 (1-4)	0.991
Patient BMI, median (IQR)	27.2 (22.6-28.8)	27.0 (23.6-30.6)	0.540	23.9 (21.3-29.0)	27.0 (23.6-30.6)	**0.047**
Vancomycin powder use, %	18.5	15.8	0.922	18.8	15.8	0.730

*N provided is number of procedures

Conclusions

IPG infection and erosion following DBS are uncommon but clinically significant events. Their respective timelines and risk factors suggest different etiologies and thus different potential corrective procedures.

References

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2.Thrane JF et al. Increasing Infection Rate in Multiple Implanted Pulse Generator Changes in Movement Disorder Patients Treated with Deep Brain Stimulation. Stereotact Funct Neurosurg. 2014;92(6): 360-364.