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PREDICTORS OF LONGTERM SACRAL NERVE STIMULATION FAILURES

Hypothesis / aims of study
Some patients with a sacral nerve stimulator (SNS) for voiding dysfunction lose efficacy over time. We reviewed our SNS patients and compared clinical and urodynamic characteristics between those who had maintained efficacy and those who lost efficacy over the long term to determine if there are any predictors of long term failures.

Study design, materials and methods
This is a retrospective chart review of patients who underwent SNS implantation (successful test stimulation and subsequent implant) for the management of refractory voiding dysfunction. Patients who had the device explanted unrelated to symptoms (e.g. infection, need for MRI) were excluded. Clinical characteristics (including age, sex, primary indication for SNS, prior pelvic surgery, underlying neurologic condition) and urodynamic variables (e.g. bladder hypersensitivity, detrusor overactivity) were abstracted. We then compared the variables in patients who had ongoing symptom improvement to those who failed (return of symptoms despite a functioning system) and calculated hazard ratios (HR) for predicting the long term failure risk.

Results
140 patients were analyzed with a mean follow up of 46 months. 89/140 (64%) patients had ongoing symptom improvement whereas 51 (36%) experienced long term failure. On univariate analysis we found no significant differences between success and failures with respect to indication for SNS, clinical/demographic variables or urodynamic findings. However, on multivariate analysis, the indication of overactive bladder (OAB) and a prior hysterectomy had HR<1 whereas an underlying neurologic condition and the need for surgical revision (HR of 2.9 and 2.7, respectively) appeared to be associated with long term failure.

	Success (N=89)	Failure (N=51)	Univariate Analysis P-Value	Multivariate Analysis P-Value	Hazard Ratio
Age	50.1	48.3	0.51		
Female	88%	87%	0.92	0.21	0.51 (0.2-1.5)
Depression or Anxiety	55%	45%	0.26	0.07	1.75 (0.95-3.26)
OAB	81%	82%	0.83	0.01	0.30 (0.1-0.75)
Urinary retention	19%	20%	0.94		
MUI	30%	27%	0.83		
SUI Surgery	18%	14%	0.51		
UUI	45%	51%	0.50		
Smoking	44%	47%	0.71		
Diabetes	21%	27%	0.43		
Interstitial Cystitis	9%	15%	0.61		
Prior Hysterectomy	40%	33%	0.40	0.02	0.44 (0.22-0.87)
Prolapse Surgery	12%	10%	0.64		
Neurological History	16%	27%	0.11	0.002	2.9 (1.5-5.8)
Spinal Disease	19%	31%	0.12	0.26	1.4 (0.8-2.7)
Underwent Revisions	42%	53%	0.97	<0.001	0.49 (0.33-0.72)
Revisions in first year	12%	20%	0.29	0.01	2.7 (1.3-5.7)
Hypersensate Bladder	36%	27%	0.35		
Detrusor Overactivity	34%	49%	0.06	0.10	1.8 (0.9-3.6)

Interpretation of results
That both an underlying neurologic condition and the need for surgical revision of the SNS were associated with long term failure is understandable. A neurologic condition can affect how nerves respond to stimulation and there is the potential for deterioration of the condition over time with resultant reduced efficacy of SNS. SNS revision is typically done for a reduction in a previously efficacious system. In some cases the loss off efficacy is due to lead migration and there is a return of efficacy following the revision. However in other cases no obvious lead migration has occurred and despite the revision the efficacy may not return. Perhaps the responsiveness of the nerves has simply deteriorated over time such that SNS is no longer therapeutic.

Concluding message
After 4 years, approximately 36% of SNS patients lost efficacy. The presence of an underlying neurologic condition and the need for surgical revision may be associated with an increased risk for long term failure whereas OAB and a prior hysterectomy may be associated with less long term failure.

Disclosures
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