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Lloyd J[1], Gill B[1], Pizarro-Berdichevsky J[2], Goldman H[1]
1. *Cleveland Clinic,* ***2.*** *Sotero del Rio Hospital, Chile*

REMOVAL OF SACRAL NERVE STIMULATION DEVICES FOR MAGNETIC RESONANCE IMAGING: WHAT HAPPENS NEXT?

Hypothesis / aims of study

Sacral neuromodulation (SNS) is an effective therapy. However, patients with SNS devices are cautioned not to undergo MRI of sites other than the head[1] due to concern for generator and/or lead migration, heating, changes in the SNS device program, or damage to implanted components.[2] Therefore, when non-head MRIs are required, devices are often removed prior to imaging. When considering the pathology that necessitated the MRI, it is not known how frequently this imaging ultimately changes non-GU management. Furthermore, it is unclear how commonly these patients resume SNS therapy, versus resorting to other strategies for bladder and bowel optimization. This study provides a descriptive analysis of SNS explantations performed for MRI and the related clinical situations.

Study design, materials and methods

A retrospective review of all SNS procedures in the urology department at a tertiary care center from 2009-2015 was performed and explants identified. Cases explanted for MRI were analyzed to collect demographics, clinical characteristics, and post-removal management. Descriptive statistics were calculated and presented as mean(standard deviation), median[interquartile range] or number (percentage), as appropriate.

Results

A total of 90 patients underwent SNS device removal, with 21(23%) occurring for MRI, of which all devices were implanted in 2012 or before. At explant, 20 patients (95%) were female and median age was 66 [52-72] years. Suboptimal symptom control from SNS was noted in 7(33%) of these patients preoperatively. Four patients (19%) had Multiple Sclerosis.

Of those explanted, 6 (29%) required MRI for neurologic and 10 (48%) for orthopedic concerns. The remaining MRI indications included abdominal masses in 2 patients (10%), genitourinary disease in 1 patient (5%), surveillance for prior spinal cord malignancy 1 patient (5%), and cardiac disease 1 patient (5%). Only 16 (76%) patients explanted ultimately underwent MRI, a median of 13 [3-16] days after device removal. MRI results impacted clinical management in 9/16 (56%) of the imaged patients. None of the patients were prescribed new medications; instead, recommendations were for surgical evaluation (6, 38%), physical therapy/rehabilitation (1, 6%), an outpatient procedure (1, 6%), and a headache diary (1, 6%). Only 2 (10%) of explanted patients underwent device replacement, while 7 patients (33%) pursued oral medications, 3 (14%) utilized intermittent self-catheterization or an indwelling catheter, 2 (10%) patients pursued Botulinum toxin, 1 (5%) sought care with a local urologist, and 1 (5%) underwent cystectomy and ileal conduit urinary diversion. Of the remainder, 1 (5%) is deceased and 4 (19%) were lost to follow-up.

Interpretation of results

The current study investigated the situations in which devices were removed to allow for MRI, and the subsequent course of clinical management. Orthopedic and neurologic concerns were the major drivers of device removal. Not all of the patients who underwent device removal ultimately had MRIs, and of those that did have the planned imaging study, management for the condition that warranted imaging and device removal changed in only slightly more than half of the cases (56%, 9/16 patients). In the current study, only 10% of explanted patients ultimately underwent replacement of their SNS systems.

Concluding message

In patients receiving SNS therapy, device removal for MRI is most commonly due to orthopedic and neurologic pathologies. About half of the MRIs performed impacted non-GU clinical management. As SNS replacement was rare in this cohort, research is needed on the safety of various MRI types with SNS devices in vivo

Table 1. Reason for MRI

Reason for MRI	Number	Percentage
Neurologic Disease	6	29%
Headache	1	5%
Vertigo	1	5%
Falls	1	5%
Stroke	1	5%
Seizure	1	5%
Progression of MS	1	5%
Orthopedic Disease	10	48%
Upper extremity	1	5%
Lower extremity	3	14%
Back pain	5	24%
Neck pain	1	5%
Abdominal Mass	2	10%
Genitourinary Disease	1	5%
History of Malignancy - Surveillance	1	5%
Cardiac Disease	1	5%

Table 2. Types of MRI performed

Type of MRI Performed	Number (N/20)	Percentage
Brain	**6**	**30%**
Spine	**6**	**30%**
Abdomen/Pelvis	**3**	**15%**
Extremity	**4**	**20%**
Upper	1	5%
Lower	3	15%
Cardiac	**1**	**5%**

Table 3. Changes in non-GU Management

Did Non-GU Management Change?	Number	% of 16 subjects who underwent MRI
Yes	9	56.3
Medication	0	0.0
Other Intervention	9	56.3
No change after MRI	7	43.8

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