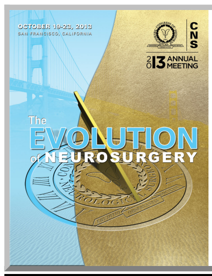

Vagus Nerve Stimulator Revisions - A Review of 526 Revisions and Removals from a Single Center

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Introduction

Vagus nerve stimulation (VNS) is an established adjunctive surgical treatment for medically intractable epilepsy with over 75 thousand devices implanted worldwide. In disproportion to the many reports documenting efficacy, complications and clinical utility there are very few reports concerning VNS revisions.

Methods

We retrospectively reviewed 1144 consecutive VNS procedures performed by a single epilepsy center between 1998 and 2012 of which 526 (46%) were described as revisions or removals.

Results

There were 270 (24%) revisions for battery depletion and 66 (5.8%) for lead malfunction. There were 85 (7.4%) removals for non-efficacy and 54 (3.0%) removals for MRI related issues. Overall infection rate for revisions was 1.2% and average battery life before revision was 4.9 years. There were 6 revisions to manage mechanical issues and 7 miscellaneous procedures that we individually detail.

Table 1

Indication for Revision	Number of Cases
All VNS Cases	1144
All Revisions	526
Generator Battery Deterioration	270
Poor Efficacy	85
Lead Malfunction	66
Needed MRI	54
Infection	19
Post MRI	12
Post Infection	4
Responsive Neurostimulator	3
Malpositioned Generator	6
Miscellaneous	7

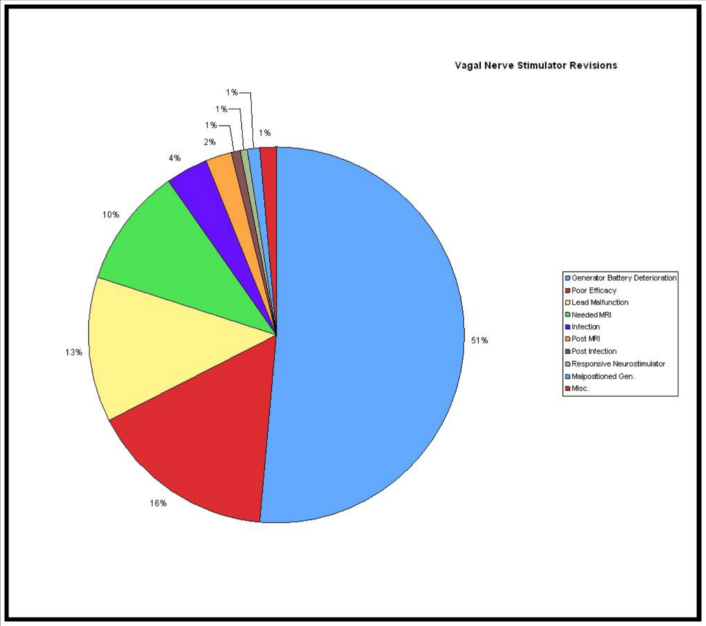

Table 2

Category	Incidence (%)	Overall Results
Generator Battery Deterioration	**270 (51%)**	**23.601%**
Subpectoral Revison of Generator	178 (66%)	
Subcutaneous Revison of Generator	92 (34%)	
Average Life Span of Generator	4.94 years	
Poor Efficacy	**85 (16%)**	**7.430%**
Lead Malfunction	**66 (13%)**	**5.769%**
Wire Fracture	9 (14%)	
Insulation Fracture	9 (14%)	
Unconfirmed	48 (72%)	
Lead Life Range	1.46-12.69 years	
Lead Life Average	5.42 Years	
Needed MRI	**54 (10%)**	
Infection	**19 (4%)**	**1.661%**
Infection after operation by the surgeon involved in this study	12	**1.224%**
Infection after operation by a surgeon outside of this study	4	**0.350%**
Erosion of wire through skin	3	**0.262%**
Post MRI	**12 (2%)**	
Post Infection	**4 (1%)**	
Responsive Neurostimulator	**3 (1%)**	
Malpositioned Gen.	**6 (1%)**	
Miscellaneous	**7 (1%)**	

Conclusions

VNS revisions and removals account for almost one half of all VNS procedures. Our findings describe important long-term expectations for VNS including expected complications and other surgical issues. We discuss our results relating it to efficacy, rational, and long-term expectations in the setting of epilepsy surgery. Review of the literature suggests that this is the only large review of VNS revisions by a single center. Our findings are important to better characterize long-term surgical expectations of VNS therapy. We conclude that VNS therapy retains long-term utility.

Learning Objectives

By the conclusion of this session, participants should be able to: 1)Describe the importance of the long-term expectatoins for VNS including expected complications and surgical issues. 2)Discuss, in small groups the various revision types. 3)Identify an effective surgical treatment when revision is required.

References