

# Corpus Callosotomy is More Effective than Vagus Nerve Stimulation for Atonic Seizures

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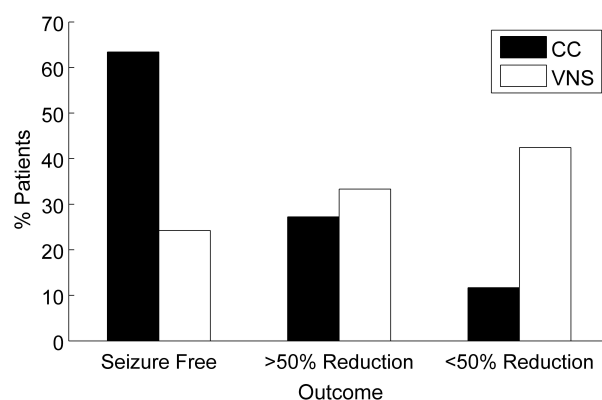
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## Introduction

The two dominant treatments for refractory atonic seizures are corpus callosotomy (CC) and vagus nerve stimulation (VNS). Several studies examining the efficacy these treatments individually exist, but to date there have been no systematic comparisons.

### Surgical Outcomes



Outcomes compared between CC (black bars) and VNS (white bars).

## Methods

PubMed was queried using the following Boolean terms: 1) for CC—"callosotomy" AND (seizure OR seizures OR epilepsy) AND (atonic OR "drop attack")—and 2) for VNS: (vagus OR vagal) AND (stimulation OR stimulator) AND (seizure OR seizures OR epilepsy) AND (atonic OR "drop attack"). Only those articles with outcome data specific for atonic seizures were included. Statistics were processed using SPSS 21 (IBM, Armonk, NY). Relative risks were computed with a chi-square test. 95% confidence intervals are shown.

### CC Complications

Complication	% Patients
Transient akinesia	3.2
Disconnection	2.3
Superficial infection	1.6
Aseptic ventriculitis	1.1
Epidural hematoma	0.9
Status epilepticus	0.7
Subdural hematoma	0.7
Pneumonia	0.5
Intraparenchymal hematoma	0.5
Tracheostomy	0.5
Aphasia	0.2
Ataxia	0.2
Hemiparesis	0.2
Pulmonary edema	0.2
Hand amputation (from arterial line complication)	0.2

## Results

Thirteen articles were identified for VNS and 56 for CC. Of these, 16 articles on CC and 6 on VNS met inclusion criteria [1-20], corresponding to 257 patients undergoing CC and 33 undergoing VNS. Median follow up was 2 years for CC patients and 1 year for VNS. Significantly more patients were seizure free after undergoing CC (163 patients, 63.4%) than VNS (8 patients, 24.2%), with a risk ratio (RR) of 2.6 (95% CI 1.4, 4.7). CC was also more effective when looking at patients with >50% reduction in seizures: 233 CC patients (90.7%) vs. 19 VNS (57.6%; RR 1.5, 95% CI 1.1, 2.1). Adverse events were far more common with VNS (e.g., 22% hoarseness and voice changes), but were generally less severe than those of CC (e.g., 0.9% epidural hematomas requiring surgical intervention).

## Conclusions

Far more patients achieved freedom from atonic seizures after CC than VNS. Moreover, VNS generated far more adverse events, though the complications of CC were more serious. Ultimately, further studies are needed to determine whether the weaker seizure control of VNS is counterbalanced by its relatively benign (though frequent) side effects.

### VNS Complications

Complication	% Patients
Hoarseness	22.2
Drooling	4.9
Throat pain	4.1
Status epilepticus	2.1
Dyspnea	1.4
SUDEP	1.4
Vocal cord paralysis	1.4
Dysphagia	1.4
Cough	1.4
Transient asystole	0.7
Transient hypotension	0.7
Tachycardia	0.7
Enuresis	0.7
Photophobia	0.7
Fever	0.7
Headaches	0.7
Wound infection	0.7

## References

1. Ben-Menachem E, Hellstrom K, Waldton C, Augustinsson LE: Evaluation of refractory epilepsy treated with vagus nerve stimulation for up to 5 years. *Neurology* 52:1265-1267, 1999
2. Buoni S, Mariottini A, Pieri S, Zalaffi A, Farnetani MA, Strambi M, et al: Vagus nerve stimulation for drug-resistant epilepsy in children and young adults. *Brain Dev* 26:158-163, 2004
3. Cendes F, Ragazzo PC, da Costa V, Martins LF: Corpus callosotomy in treatment of medically resistant epilepsy: preliminary results in a pediatric population. *Epilepsia*