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Abstracts

Responsive Neurostimulation (RNS) of the Centromedian Nucleus of the Thalamus for the Treatment of Drug Resistant Idiopathic Generalized Epilepsy

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Rationale: Idiopathic generalized epilepsy (IGE) accounts for approximately one-third of all epilepsies. The majority of people with IGE achieve seizure-freedom from treatment with anti-seizure

medications (ASM). However, up to 25% of people with IGE continue to experience seizures despite adequate ASM trials. In patients with drug resistant IGE, neuromodulation with responsive neurostimulation (RNS) in the bilateral centromedian nucleus (CMN) of the thalamus may be an effective treatment option.

Methods: Five patients with drug resistant IGE were evaluated through the Beaumont Adult Comprehensive Epilepsy Center and underwent an epilepsy presurgical evaluation including video-EEG monitoring in the epilepsy monitoring unit, brain MRI, and neuropsychology evaluation. Cases were presented individually at the weekly multidisciplinary patient management conference, and a consensus was made to offer RNS implantation within the bilateral CMN of the thalamus. Four patients underwent RNS implantation through Spectrum Health, while 1 patient was implanted with RNS at Beaumont Health. Following RNS implantation, electrocorticography (ECoG) data were reviewed by the treating epileptologists, and adjustments to detection and therapy settings were implemented to optimize seizure control. Retrospective review was then completed for patient seizure outcomes. Quality of life (QoL) was assessed at clinic visits with a subjective questionnaire in which patients were asked if their QoL was much better, better, same, worse, or much worse after RNS implantation.

Results: Patient demographics are presented in Table 1. The average age of epilepsy onset was 13 years old (range, 2-38 years old) and the average at RNS implantation was 36.6 years old (range, 25-51 years old). The average number of ASM trials was 6 (range, 2-10). At the time of implantation, patients were taking, on average, 3 ASM (range, 2-4). The average follow-up after RNS implantation was 18 months (range, 8-32 months). There were no operative or perioperative complications. At last follow-up, all 5 patients reported at least a 75% reduction in the frequency of disabling seizures (Table 2). Two patients remained free of GTCS following RNS implantation. On a subjective QoL questionnaire, all patients reported QoL was “much better” or “better” after RNS implantation.

Conclusions: Drug resistant IGE is common and, in the past, surgical treatment options have been limited. In this case series, 5 patients with IGE underwent RNS implantation within the bilateral CMN of the thalamus. There were no operative or perioperative complications. All 5 patients experienced at least a 75% reduction in the frequency of disabling seizures, and 2 patients remained free of GTCS following RNS implantation. In addition, QoL was improved after RNS implantation. Responsive neurostimulation within the bilateral CMN of the thalamus may be a safe and efficacious treatment option for people with drug resistant IGE.

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Neurophysiology

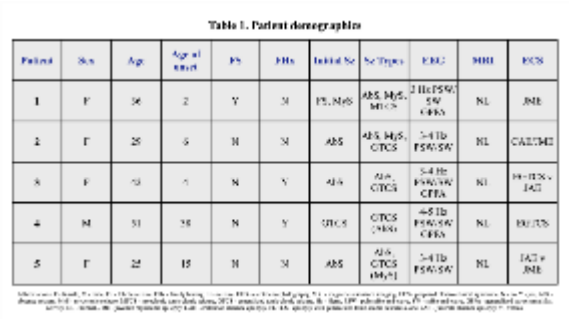

Table 1. Patient demographics

Patient	Sex	Age	Age at onset	PS	FHx	Initial Sz	Sz Types	EEG	MRI	EOS
1	F	56	2	Y	N	FS, MyS	ABS, MyS, GTCS	2 Hz PSW; SW CPFA	NL	JME
2	F	25	6	N	N	ABS	ABS, MyS, GTCS	3-4 Hz PSW/SW	NL	CAE/JAE
3	F	53	5	N	Y	ABS	ABS, GTCS	3-4 Hz PSW/SW CPFA	NL	JAE+GTCS+ JAE
4	M	51	38	N	Y	GTCS	GTCS (NREM)	4-5 Hz PSW/SW CPFA	NL	EE/JME
5	F	22	15	N	N	ABS	ABS, GTCS (NREM)	3-4 Hz PSW/SW	NL	JAE + JME

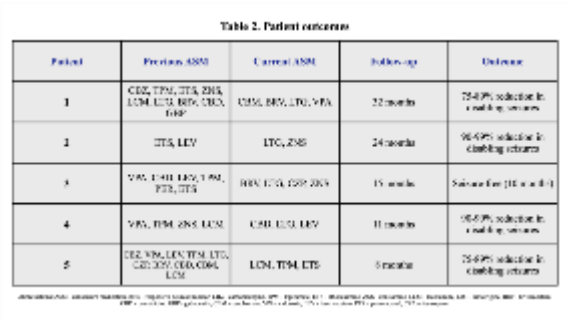

Table 2. Patient outcomes

Patient	Previous ASM	Current ASM	Follow-up	Outcome
1	CBZ, TPM, ZNS, LCM, LTG, BRV, CBZ, OXC	CBZ, BRV, LTG, VPA	32 months	75-95% reduction in disabling seizures
2	ZNS, LEV	LTG, ZNS	24 months	90-95% reduction in disabling seizures
3	VPA, PHT, LEV, TPM, PER, ZNS	BRV, LTG, ESL, ZNS	15 months	Seizure free (18 months)
4	VPA, TPM, ZNS, LCM	CBZ, LTG, LEV	11 months	95-97% reduction in disabling seizures
5	CBZ, VPA, LEV, TPM, LTG, CZP, ZNS, OXB, OXC, LCM	LCM, TPM, ETS	5 months	75-95% reduction in disabling seizures