VAGUS NERVE STIMULATION IN THE TREATMENT OF DRUG-RESISTANT EPILEPSY: PRELIMINARY EXPERIENCE IN A REFERENCE EPILEPSY CENTER IN VENEZUELA

Daza R. Anilu[1], Aroni P. Angélica*, Contreras C. Guilca*, González Z. Rosaly*, Rangel C. Luz M.* Carpio R. Aliria*, Soto R. Arnoldo* and Scholtz G. Herman*.*

*Epilepsy Unit. Centro Médico Docente La Trinidad (CMDLT). Caracas, Venezuela.

[1]Fellowship in Epilepsy. Epilepsy Center, Hospital "J.M. Ramos Mejía" and Hospital "El Cruce", ENyS-CONICET – University of Buenos Aires, Buenos Aires, Argentina

1"E-mail address: aniludaza152@gmail.com

AES 2019 ANNUAL MEETING Dec 6 -10 | Baltimore

AES # 1326

BACKGROUND

Vagus nerve stimulation (VNS) is an accepted therapy for the treatment of drug-resistant epilepsy (DRE). The VNS Aspire SR® model 106, detects the increase of pre-ictal heart rate through the AutoStim mode and automatically stimulates the Vagus Nerve (VN) avoiding seizures.

AIM

To assess the overall efficacy on seizures of VNS model 106 for the DRE in children and adult patients in a reference center of Epilepsy in Caracas, Venezuela: ***Centro Médico Docente la Trinidad (CMDLT).***

PATIENTS AND METHODS

- In this prospective and cross-sectional study, we followed-up patients with this VNS system for 3-6-12-18 and 24 months post-implanted from August 2017 to August 2019, and evaluated the overall effectiveness of VNS therapy to control and reduce the seizures.
- We completed an structured survey from patient (when it was possible) and accompanist (mostly parents).
- Adverse events, complications, frequency of status epilepticus, quality of life of the patients and caregivers burden were also evaluated. We used: Zarit burden interview in caregivers and Barthel Index for Activities of Daily Living (ADL) in patients.

RESULTS

34 patients, 12(35%) women; mean age was 17,5yr (3,7 to 43); 11 (32%) <14yo and 23(68%) ≥14yo. Mean time with Epilepsy: 26,8yr (3,1 to 42). Subjects with neurodevelopmental delay: 25(74%). Mean time with Epilepsy: 26,8yr (3,1 to 42). 25 (74%). Mean previous AED´s: 5(3 to 8) and post-VNS: 3 (1 to 5). Mean age at time of VNS implantation was 17,5yr (3.9 to 42.1). Seizure types most frequently: Mixed (focal an generalized) in 20(58,6%) subjects, the most frequently underlying pathology was epileptic encephalopathy in 16(47%) subjects. (See table N°1)

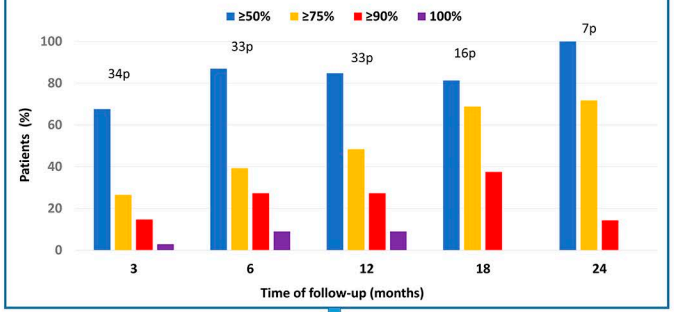
Table N°1. Sociodemographics and clinical features

Sociodemographics and clinical features	Mean (%)
Subjects	34
Age (Media (min-max) / years old	17,5 (3,7 – 43,1)
Sex (n(%))	
☒ Female	12 (35%)
☒ Male	22 (65%)
Neurological delay (n(%))	25 (73,5%)
Age at seizure onset (Mean ±SD) y	4,03 (±14,2)
Mean time with epilepsy (min-max) y	26,8 (3,1 - 42)
Mean Age VNS implantation (min-max) y	17,5 (3,9 - 42,1)
Seizure Types	
☒ Focal onset	6 (17,6%)
☒ Generalized onset	8 (23,5%)
☒ Mixed (focal and generalized)	20 (58,6%)
Underlying cause (pathology) (n(%))	
☒ Epileptic encephalopathy	16 (47%)
☒ Structural	10 (29,4%)
☒ Infectious	4 (11,7%)
☒ Neonatal injury	4 (11,7%)
Mean seizure /month (mean / min - max)	450 (30 - 3000)
Age at first VNS (mean / min-max) y	17,5 (3.1 – 43)
AED´s Pre-VNS therapy (mean / min – max)	5 (3 – 8)
AED´s Post-VNS therapy (mean / min – max)	3 (1 – 5)
Generalized convulsive SE / per month	
☒ Pre-VNS therapy > 5/month	13 (38,3%)
☒ Pos-VNS therapy 0/month (Follow-up 3 and 6m)	4 (11%) // 0 (0
Other benefits: improved behavior, alertness and reactivity (n(%))	29 (85%)

AED: antiepileptic drug

13p had reduction in status epilepticus (SE) after VNS from multiple SE per month to no-one in 3m and 9p were free of them in 6m. 29p (85%) improved behavior, alertness and reactivity

Figure N°1. Seizure Reduction (%)



The average of parameters used with better response at 3 and 6 months of follow-up was: Output Current: 1 to 1,5 mA. Magnet: 1.25 to 1.75 mA: Autostim: 1,125 to 1.625. Signal Frequency: 30 Hz. Pulse Width: 500 µsec . Signal On Time: 30 sec. Signal Off Time: 5.0 min. Sensibility: 2. Threshold: 30.

Follow-up time 3m in 34p; 6m and 12m in 33p, 18m in 16p and 24m in 7p. Mean seizure frequency per month pre-VNS: 450. More than 50%: Seizures reduction post-VNS activation: at 3m 23/34p (68%) and 1p seizure free; at 6m 29/33p (87%)and 3p (9%) seizure free; at 12m 27/33p (84.8%) and 3p seizure free; all of them with shorter seizures and response rate stable at about 80%. (See Figure N°1).

Figure N°2. Transient Adverse Events

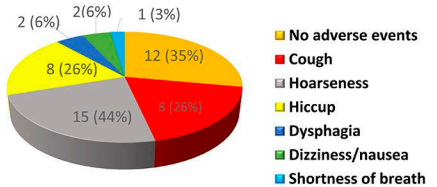
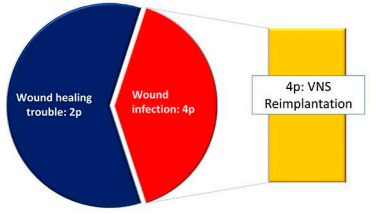


Figure N°3. VNS Complications

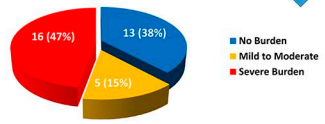


Adverse events in 19p (56%), hoarseness in 15p (44%), cough and hiccup in 8p (26%. 2p (6%) with dysphagia and nausea. VNS complications: 4p had infectious complication (wound infection), 2p with wound healing trouble; the device had to be removed in 2p (6%). VNS reimplantation in 4p. (See Figure N°2 and 3).

Table N°2. Correlation between Zárit Index and Barthel score

Burden Level	Zárit Burden Interview	Caregivers´s burden (Score)	Barthel Index for Activities of Daily Living (ADL)		
			Total/Severe Dependent	Mild/Moderate Dependent	Fully Independent
	Score (total)	N(%) N=34 (100)	N (%) <59	N (%) 60-99	N (%) 100
No Burden	<47	13 (38)	5 (14,7)	4 (11,7)	4 (11,7)
Mild to moderate	47-55	5 (15)	4 (11,7)	1 (2,9)	2 (5,8)
Severe burden	>55	16 (47)	12 (35,3)	1 (2,9)	1 (2,9)

Figure N°4. The Zárit Burden Interview (Burden Level)



Caregivers burden: 38% No burden, 15% mild and 47% severe burden, related to degree of patients´s dependency,

CONCLUSIONS

This preliminary report denotes:

- Positive impact for VNS 106 aspire SR model, by decreasing the frequency and duration of the seizures, the number of generalized convulsive SE and the number of AED´s used.
- Other benefits: Improvement in alertness, behavior and reactivity with the environment.
- The Auto stim system and parameters such as threshold and sensitivity, allow more precise and targeted adjustments to each patient, which gives the caregiver greater independence due to a lower magnet requirement to avoid seizures.

☒ VNS induced a significant reduction of seizure frequency throughout follow-up and is a safe and effective treatment option in patients with DRE who are not candidates for surgery.

☒ This is the first report in Venezuela showing the VNS Aspire SR® model 106 is an effective treatment controlling seizure for DRE in children and adult patients.

RFERENCES

1. Robert S. Fisher; Pegah Afra; Micheal Macke; Daniela N. Minecan; Anto Bagic; Selim R. Benbadis; et cols. Automatic Vagus Nerve Stimulation Triggered by Ictal Tachycardia: Clinical Outcomes and Device Performance—The U.S. E-37 Trial. Neuromodulation 2016; 19: 188–195.
2. Katherine S. Eggleston a, Bryan D. Olin and Robert S. Fisher. Ictal tachycardia: the head-heart connection. Seizure 2014; 23(7):496–505.
3. Kwan P, Arzimanoglou A, Berg AT, et al. Definition of drug resistant epilepsy: consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. Epilepsia. 2010;51(6):1069-1077.