CLINICAL UTILITY OF ELECTRORETINOGRAMS FOR EVALUATING VIGABATRIN TOXICITY IN CHILDREN

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INTRODUCTION

BACKGROUND: Vigabatrin (VGB) is an anti-seizure medication approved for refractory complex epileptic seizures in adults, infantile spasms in children between the ages of 1 month and 2 years old, and refractory complex seizures in patients aged 2 to 10 years old due to tuberous sclerosis. VGB has been implicated in many case reports documenting visual field defects, retinal toxicity, and electroretinogram (ERG) abnormalities. Guidelines for visual screening were implemented in response. In non/pre – verbal or uncooperative patients, it is recommended that testing with ERG should be performed within 4 weeks of beginning treatment to establish a baseline, and regularly thereafter to monitor for visual field defects.

STUDY OBJECTIVE: Given the high cost of ERG screening, risks of general anesthesia, and uncertainty of whether ERG results changes management in these patients, this study sought to determine changes in clinical management in pediatric patients taking vigabatrin in response to electroretinogram (ERG) results.

METHODS

- A retrospective IRB approved review was conducted on full-field ERGs completed on patients under general anesthesia at the Children's Hospital of Colorado (April 28th, 2009 – January 13th, 2012).
- Normative ERG values were defined by the manufacturer of the ERG machine (Table 1) (UTAS visual diagnostic test system, LKC Technologies). Any ERG metric that did not meet defined LKC normative values was considered abnormal.
- Indications for ERG, change in treatment based on ERG results, age, and gender were collected.
- One single physician who had additional training in ERG interpretation evaluated and interpreted each ERG.
- Analysis consisted of descriptive statistics reported as frequency and percentage.

RESULTS

- A total of 170 ERGs were performed on 138 patients under general anesthesia. The clinical characteristics of the cohort are shown in Table 2.
- In patients screened specifically for retinal toxicity due to VGB use, 30 ERGs performed on 26 patients were available for analysis.
- Only 2 patients had normal ERGs, while 28 ERGs were abnormal. The patients who had normal ERGs continued taking VGB. Figure 1 illustrates clinical management in response to abnormal results.

TABLE 1: Low Limits of Normal ERG Values per LKC Guidelines.

	Scotopic White 24 dB Flash	Scotopic White 0dB Flash	Oscillatory Potentials	Photopic White 0dB Flash	White 0 dB Flicker 30-Hz
<10 years old	Amp[a]: ≥164 uV	Amp: ≥342 uV IT[b]: ≤ 52.5 ms	Amp: ≥104 uV	Amp: ≥88 uV IT: ≤ 32 ms	Amp: ≥59 uV IT: ≤ 30 ms
>10 years old	Amp: ≥147 uV	Amp: ≥329 uV IT: ≤ 52.5 ms	Amp: ≥87 uV	Amp: ≥80 uV IT: ≤ 32 ms	Amp: ≥53 uV IT: ≤ 30.2 ms

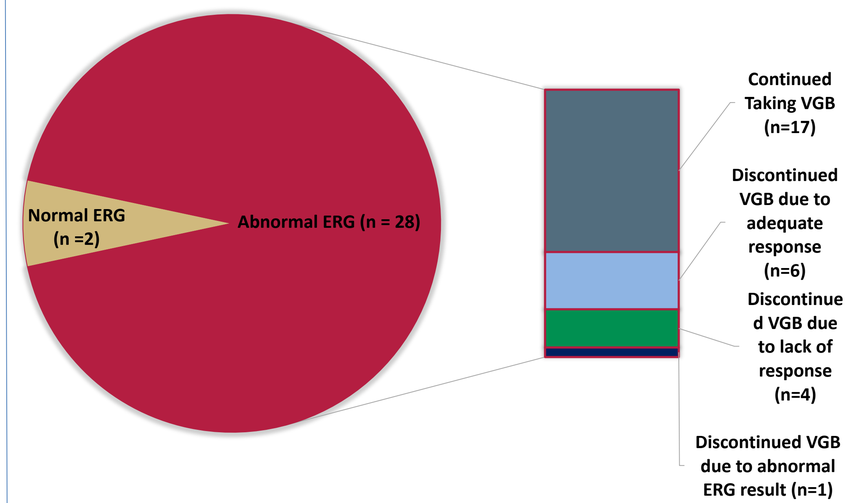
[a]Amp = amplitude
[b]IT = Implicit Time

TABLE 2: Clinical Characteristics of the Patients (n = 138)

Characteristic	n	%
Gender		
Male	32	23.1%
Female	41	29.7%
Unknown	65	47.1%
Indication for ERG[a]		
Vigabatrin	29	21.01%
Low vision	31	22.4%
Nystagmus	36	26.08%
Smith-Lemli-Opitz	8	5.79%
Syndrome	18	13.04%
Abnormal fundus exam	15	10.86%
Other syndrome	1	0.72%
Unknown		
Repeated Subjects		
Number of patients with multiple ERGs	24	17.3%
Mean ± Standard Deviation		
Age	5.19	±6.21

[a]ERG = Electroretinogram

Figure 1: Electroretinogram results (n = 30)



KEY FINDINGS

- Within our cohort, the majority of patients screened for VGB induced retinal toxicity had abnormal ERG results.
- Only 1 patient stopped taking VGB in response to their abnormal ERG results.

CONCLUSIONS

- This study details how clinical management of patients on VGB changes in the face of abnormal screening results. Our findings suggest that in many of the children on VGB, the medication is continued despite abnormal ERG results.
- Our results further contribute to a growing body of knowledge arguing that ERG should not be used to guide the management of pediatric patients taking VGB.
- Clinicians should engage in conversation with patients and their families on results and their influence on medical management prior to proceeding with ERG testing.
- Further studies are needed to investigate the role of retinal imaging techniques in children to evaluate retinal toxicity from VGB.

DISCLOSURES

The authors have no conflicts of interest.

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