

Time to Referral for Epilepsy Surgery Evaluation is Longer in Older Children with Intractable Epilepsy A Potential Opportunity for Improvement

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Introduction

Shorter duration to surgery is a modifiable contributor to adverse outcomes of intractable epilepsy, yet surgery is often delayed many years. Using a large, prospective, multicenter, pediatric epilepsy surgery database, we sought to describe characteristics of children referred for epilepsy surgery evaluation based on age and to identify factors which may lead to referral within 1 year of intractability.

Methods

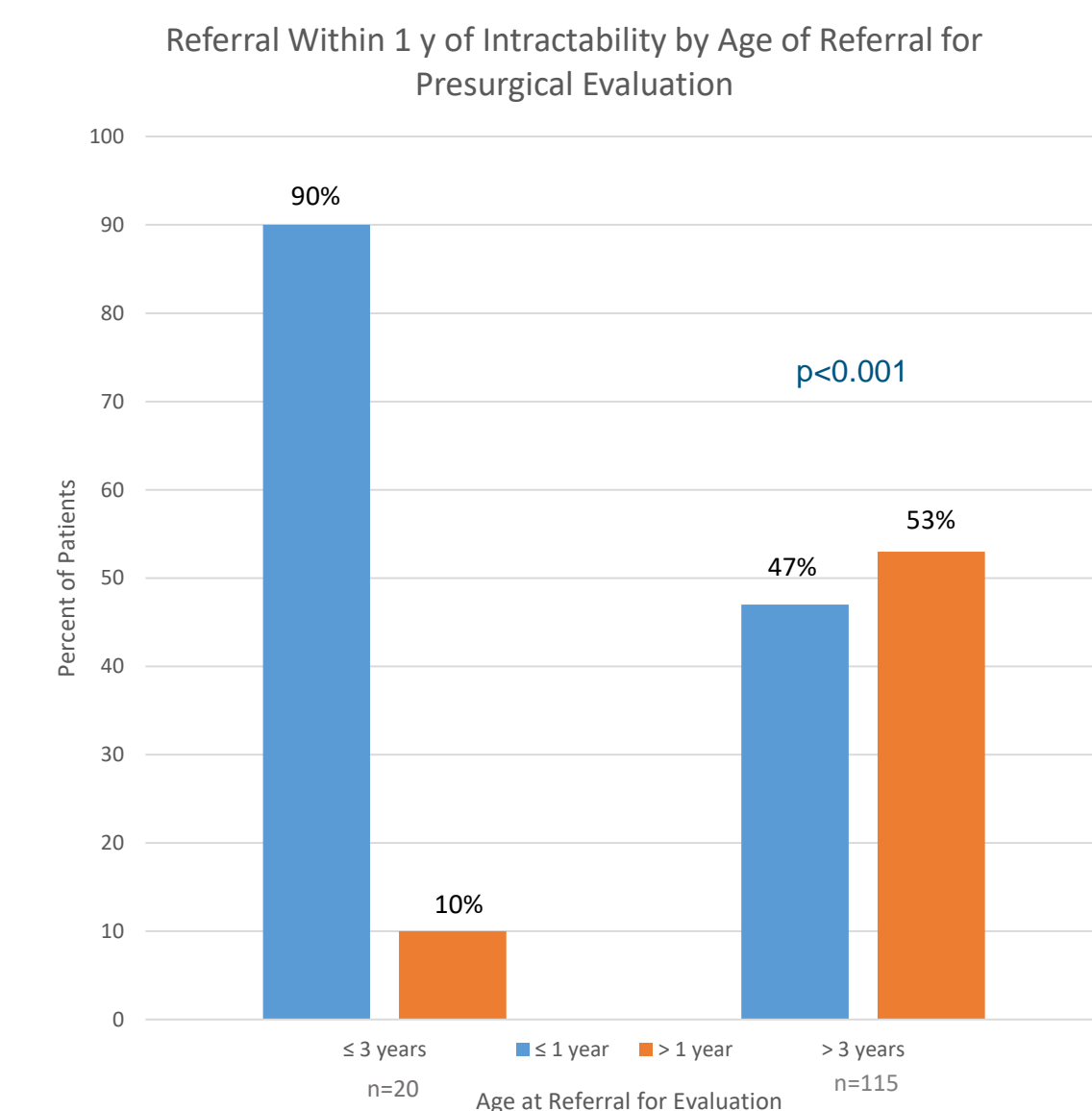
- Patients 0-18 years (y) undergoing epilepsy surgery evaluation were enrolled prospectively into a shared REDCap database as part of the PERC Epilepsy Surgery Project
- Predefined variables including demographics, epilepsy characteristics, pre-surgical evaluation, surgical therapy, and outcome were collected
- Data was collected from 1/1/18 to 4/30/19 for analysis
- Patients grouped based on age of pre-surgical evaluation ($\leq 3y$ vs $>3y$) and compared for differences in sociodemographic and epilepsy characteristics
- Patients with known age of intractability (i.e. failure of 2nd ASM) were compared for characteristics leading to rapid ($\leq 1y$) vs delayed referral for surgical evaluation based on age

Results

Table 1: Characteristics of Patients Referred for Epilepsy Surgery Evaluation

(N)	< 3 years of age	≥ 3 years of age	p-value
Sex (242)			0.47
Male	16 (48%)	116 (56%)	
Female	17 (52%)	93 (44%)	
Race (242)			0.5
Asian	1 (3%)	4 (2%)	
African American	6 (18%)	23 (11%)	
White	22 (67%)	146 (70%)	
More Than One Race	1 (3%)	2 (1%)	
Unknown	3 (9%)	34 (16%)	
Ethnicity (242)			0.29
Hispanic or Latino	5 (15%)	23 (11%)	
Not Hispanic or Latino	28 (85%)	173 (83%)	
Unknown	0 (0%)	13 (6%)	
Distance to referral center (242)			0.19
<50 miles	19 (58%)	92 (44%)	
51-100 miles	9 (27%)	40 (19%)	
101-500 miles	4 (12%)	63 (30%)	
>500 miles	1 (3%)	13 (6%)	
International	0 (0%)	1 (0%)	
Insurance (242)			0.23
Public	17 (52%)	79 (38%)	
Private	15 (45%)	127 (61%)	
Self-Pay	1 (3%)	3 (1%)	
Neurological Exam (240)			0.09
Normal	13 (39%)	114 (55%)	
Abnormal	20 (61%)	93 (45%)	
Number of failed ASM prior to phase I (173)			0.28
≤ 2	18 (64%)	77 (53%)	
>2	10 (36%)	68 (47%)	
Frequency of Seizures (241)			0.003
Daily	21 (64%)	67 (32%)	
Weekly	8 (24%)	64 (31%)	
Monthly	2 (6%)	53 (25%)	
>Monthly	2 (6%)	24 (12%)	
Type of Seizure (241)			0.56
Focal	26 (79%)	177 (85%)	
Generalized	6 (18%)	24 (12%)	
Unknown	1 (3%)	7 (3%)	
Type of focal seizure (204)			0.02
Aware	1 (4%)	41 (23%)	
Impaired Awareness	25 (96%)	137 (77%)	
MRI result (232)			0.09
Normal	5 (15%)	60 (30%)	
Abnormal	27 (84%)	140 (70%)	

- 13 centers enrolled 242 patients
- 33/242 (14%) were ≤ 3 y old at the time of presurgical evaluation
- Children $\leq 3y$ were more likely to have daily seizures, abnormal MRIs and neurological exams (Table)
- Children ≥ 3 y had delayed referrals ($p < 0.01$) (Figure)
- In intractable children $\leq 3y$, abnormal neuro exams ($p = 0.032$), daily seizures ($p = 0.004$) and public insurance ($p = 0.040$) predicted rapid referral
- Intractable children $\geq 3y$ were referred more rapidly with normal exams and private insurance



Conclusions

- Among patients referred for epilepsy surgery evaluation, patients ≤ 3 years of age at time of referral have more frequent seizures and tend to have abnormal neurological exams and MRI findings.
- Time to referral for evaluation is longer in children > 3 years of age
- Despite being intractable at age ≤ 3 years, children may have delayed referral if they have normal exams or less than daily seizures.
- However, children intractable after age 3 years may be delayed if their exam is abnormal or they have public insurance.
- This suggests a shift in threshold to refer for epilepsy surgery evaluation based on age and patient characteristics. These findings highlight an opportunity to decrease time to referral for epilepsy surgery in children.