EEG Categorical Summary

The children presented with neurodevelopmental delays affecting functions of:

Attention/Executive function

Memory

Sensorimotor

Speech/language

Mood

EEG Categorical Summary

- The symptom complex was associated with electrophysiological variants in all the children

EEG Categorical Summary

- Generalized disturbances
  - 5 children: continuous spike-wave discharges in sleep
  - Predominance in
    - Right frontal temporal
    - Left temporal
    - Left temporal central
    - Bilateral temporal
    - Right temporal central

EEG Categorical Summary

- Generalized disturbances
  - 24 children: generalized spike-wave discharges (not continuous)
  - 5 children: generalized slowing

EEG Categorical Summary

- Focal disturbances
  - **8 Left temporal**
  - **9 Bi-temporal**
  - **2 Left anterior temporal**
  - **6 Right temporal**
  - **4 Left frontal, frontal-temporal**
  - **2 Right frontal temporal**
  - **1 Left frontal temporal**
  - **1 Right central temporal**
  - **2 Left occipital**
  - **3 Right occipital**
  - **5 Left central**
  - **4 Right central**
  - **5 Right frontal**

EEG Categorical Summary

Child age	No. of children in study
2 years	1
3 years	2
4 years	5
5 years	11
6 years	8
7 years	11
8 years	5
9 years	6
10 years	1

Presenting Symptoms

- Attention
  - Hyperactivity 23
  - Hypoactivity 11
  - Distractibility 16
  - Staring/Daydreaming 17
  - Nocturnal enuresis 15
  - Sleepwalking 3
  - Rocking/head banging 4
  - Hand flap/swipe movement 4
  - Sensory sensitivity/defensiveness 7
  - Night terrors 6
  - Perseveration/Routine – difficulty with transition 10

Presenting Symptoms

- Sensory/Motor
  - Drooling 2
  - Hand flapping 4
  - Repetitive behavior/tic 6
    - Eye blinking, nose sniffing, throat clearing, facial grimacing
  - Hypotonia 11
  - Left hemiparesis 2
  - Congenital hip disorder 1
  - Fine and/or gross motor variance 17
  - Optic motor/tracking 28
  - Decreased kinetic melody of movement 6
  - Sensory sensitivity/defensiveness 7

Presenting Symptoms

- Speech/Language
  - Language regression 5
    All between ages 2 and 4
  - Dysarthric speech 21
  - Hyperlexia 3
  - Stutter 1
  - Mute 1
  - Generalized issues 37
  - Reading problems 38

Presenting Symptoms

- Memory
  - 100% presented with memory problems
    - "I forget a lot"
    - "I need a lot of repeating"
    - "I can't remember what letters look like"

Presenting Symptoms

- Mood
  - Frustration/labile mood 50
  - Suspicion of Bipolar disorder 2
  - Obsessive-Compulsive Symptoms 4
  - Aggression/temper: 10
    - Asked to leave school prior to age 4 2
  - Sleep disturbance 22
  - Acute depression 15
    - Suicide attempt 1

Presenting Symptoms

- General comments
  - “I don’t know what people say sometimes”
  - “Things go too fast for me”
  - “I feel I could burst”
  - “I get thoughts of hurting myself”

Neurodevelopmental History

- Cerebral Palsy 2
- Intractable Seizure/hemispherectomy 1
- Arteriovenous malformation 1
- Hemiparesis 2
- PDD 12
- Autistic Regression 3
- ADD/LD 30

Neurodevelopmental History

- Abnormal visual evoked potential 1
- Prominent lateral ventrical 3
- Dilation of temporal horn of right lateral ventrical 1
- Prominent cisterna magna 2
- Widening of diploic space-parietal 1
- Cavum septum pellucidum deformity 3

IQ Summary

Very Superior	3
Superior	5
Above average	4
Average	15
Below average	7
Borderline	5
Mild deficiency	5
Moderate deficiency	2
No formal IQ	4

IQ Examples

Note: 90 – 109 = Average

- **Highest verbal IQ** **140**

  PIQ 126 FIQ 139

  5 year old who could not recall letters of the alphabet and presented with 8 month regression of language

  EEG: Epileptic aphasia/Landau-Kleffner syndrome

IQ Examples

- **Highest performance IQ** **130**

  VIQ 100 FIQ 115

  History of language regression

  EEG: consistent with epileptic aphasia

  Sister with seizure disorder

  Cousin with autism

IQ Examples

- Lowest Verbal IQ 46
- Highest Verbal IQ 140

- Lowest Performance IQ 66
- Highest Performance IQ 130

- Lowest Full Scale IQ 54
- Highest Full Scale IQ 139

- Greater than 10 pt V-P discrepancy 23

IQ Examples

- **Case example: VIQ 46 PIQ 69 FIQ 54**
  - 6 year old child with autism and hyperlexia
    Fraternal twin died due to placental infarct
  - Nonverbal cognitive index 5.0 yrs
  - Expressive language index 2.3 yrs
  - Receptive language index 3.5 yrs
  - Social index 3.1 yrs
  - Motor index 4.2 yrs
  - Frequent staring episodes reported
  - EEG: sleep activated right temporal focus with generalization

IQ Examples

- **Case example: 25 pt V-P discrepancy in favor of Verbal scale**
  - VIQ 135 PIQ 110 FIQ 125
  - 6.10 yr old: history decreased left sided motor skills
  - Written expressive language 40% ile
  - Verbal Reasoning 90% ile
  - Frequent staring episodes coupled with dropping what he is holding
  - EEG: generalized paroxysmal sharp activity in sleep

IQ Examples

- **Case study: 46 pt V-P discrepancy in favor of performance IQ**
  - VIQ 74 PIQ 120 FIQ 94
  - 4 yr old
  - Verbal language index 2.5 yrs
  - Nonverbal language index 6.5 yrs
  - Receptive vocabulary 2.10 yrs
  - Spontaneous expressive vocabulary 3.11 yrs
  - Demand expressive vocabulary 2.5 yrs
  - EEG: right frontal and bi-temporal sharp activity/generalized activity in sleep and slow activity in these regions

Indicators Suggesting Need for an EEG

- Pregnancy complications: i.e. Infection, severe stress…
- Birth complications: i.e. low birth weight, pre/post mature
- Trauma: seizure, head injury, infection, environmental: especially infancy/early ages
- Family history of seizure disorders

Symptom Complex Suggesting Need for an EEG

- Sleep disturbances: nighttime awakening, limb movements, sleep walking, night terror, nocturnal enuresis…
- Staring episodes followed by difficulty retrieving attention
- Chronic attention, motor, memory, language, learning and mood difficulties
- Heightened developmental delays
- Major IQ discrepancies

Electrophysiological disturbances increase with the pervasiveness of neurodevelopmental delay

Example: PDD/Autistic spectrum disorders:
> 60% EEG disturbance

INTERDISCIPLINARY INTERVENTION:

Health/Allied Health/Education Model

- Biology: brain structure-electrical-chemical
- Neuropsychology: brain-behavior
- Education: brain-learning