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Speech language and oro-motor exiguity in multifocal frontoparietal epilepsy of juvenescence: A case study

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Abstract

The brain encompasses millions of nerve cells that use electrical signals to steer body's functions, senses and thoughts. If signals are defaced, the individual experiences atypical brain activity. This abnormal brain activity is referred as epilepsy. More than one-half of children with epilepsy have interrelated language, learning, and behavior complications.

Objective: The study aimed to assess the effects of multifocal frontoparietal epilepsy on speech and language of a child and to lay out rehabilitative insights.

Methodology: A 12yr old male with epileptic history was selected as the subject. He had history of epilepsy after 3 days post-partum. An assessment was done by neuro pediatrician, psychologist & Speech language pathologist & provided the target therapy plan.

Results and discussion: Epilepsy imparts significant morbidity through its effects on cognition, speech and language skills. Speech therapy showed drastic improvement in speech language and cognitive skills of the child.

Conclusion: Clinicians encounter a multitude of challenges in treating a tangled disorder of speech. However, well-planned speech & language strategies for motivating the children and parents are needed for better outcomes.

Keywords: Epilepsy, speech, language & oro-motor exiguity

Introduction

The brain encompasses millions of nerve cells that use electrical signals to steer body's functions, senses and thoughts. If signals are defaced, the individual experiences atypical brain activity. This abnormal brain activity is referred as epilepsy. Epilepsy trammels brain operations by cessation and demolition of its indispensable functional course of action. Perpetuating attacks may transmute neural circuits and neurotransmitter compositions. Brain and brain functions matures over the first decades of life. Seizures may impinge with the requisite emerging skills at the age of epilepsy onset and subsequently. The immature brain has the possibilities to redeploy around insulted areas, thus making the harm less blunt. This subsides with maturation. The brain is predominantly susceptible to insults in the earliest years of life. One of every four children with epilepsy may have speech-language problems; it was found that 51 of 200 children with seizures had speech-language problems in screening. The types of problems seen included loss of speech, receptive or expressive language problems, problems in recall, motor speech disturbances, and, most commonly, mixed problems. (International Epilepsy Conference in Oslo, Norway in July 1993). More than one-half of children with epilepsy have interrelated language, learning, and behavior complications; such case has been reported in a child. In this paper we have reported a child with history of multifocal epilepsy having sharp spikes in frontoparietal region predominantly in left region. The region controls important cognitive skills such as problem solving, memory, language, judgment, sexual behaviors and emotional expression. This locale develops individual's personality and render aptness to communicate. The purpose of the study was to scrutinize the speech and language oddity in child with multiform epilepsy and to provide amendatory strategies. Epilepsy is a brain disorder where person has recrudesced seizures. The seizures are triggered by changes in the electrical and chemical brain activity in the brain. The seizures can be caused by anything that maim the brain, including head injuries, infections, and poisoning or even brain development problems preceding birth. Often a cause for the seizures and epilepsy cannot be found. Seizures are generally of two types focal or generalized.

Focal or partial seizure occurs when seizure activity is confined to a part of one brain hemisphere. There is a site or focus where the seizure commences. Generalized seizures occur when there is pervasive seizure activity in the left and right hemispheres of brain. By adulthood, these problems can interfere with socialization and employment (William Svoboda). The seizures may be controlled, but the developmental interference can relentlessly pose problems for health and academics. The brain dynamically develops its neuronal connections especially in the early years of life. Seizures can repress, permute, or deform brain maturation as well as the cognate functions. The child's inherent potentials as well as handicaps can be altered dynamically by early interventions if given the chance (Svoboda, 1979) [4]. Neurological deficits such as epilepsy poses manifold brain irregularities that can affect speech and language, consequently. The study aimed to gauge the effects of multifocal fronto-parietal epilepsy on speech and language of a child and to lay out rehabilitative insight. The study will provide cognizance to speech and language peculiarity and rehabilitative strategies for children with fronto-parietal epilepsy.

Methodology

A twelve year old male with epileptic history was selected as the subject. Evaluation was done by neuropeditrician it revealed client had history of epilepsy 3 days post-partum. Spiral NCCT of the brain was done. Unenhanced spiral sections of 3 and 10mm thickness have been obtained from the base of skull to vertex. The cerebellum and brain stem were normal in appearance. The fourth ventricle was normal. Basal cisterns and C.P angles were clear. The supratentorial brain parenchyma was normal in density and appearance. The gray white matter attenuation and patterns were maintained. The third and both lateral ventricles were normal in size and shape. There was no evidence of any hemorrhage or midline shift. The second and third episode of epilepsy was encountered at the age of 4 and 7 years respectively. Sleep EEG was done on both the occasions and it revealed bilateral independent sharp waves/spikes in frontoparietal region (left>right) suggestive of multifocal epilepsy. Client was on anticonvulsant drugs since then. Psychologist assessed the intellectual ability behaviors of social skills using Wechsler Intelligence scale for children Revised (WISC-R; 1974), and Indian adaptation and Social Maturity Scale (VSMS; Malin, 1992) respectively. Results revealed that average level of IQ.

Speech & language assessment: Subject's birth history was full term normal delivery at the hospital. Birth weight was 3 kg. Subject had history of delayed birth cry, birth asphyxia and cyanosis hence was admitted in NICU for 1 month for observation. Antenatal history included history of miscarriage at 2 month of gestation. Client was conceived with the aid of fertility treatment. The developmental milestones (motor and speech) were severely delayed. The subject achieved vocalization at the age of 1.5 years. Babbling was established at the age of 2 years. First word was achieved at the age of 3 years and the client finally began utterances from 4 years onwards. It has been reported that client's utterances were effortful with blocks, repetitions and hesitations accompanying slurred speech output. Client possessed breathing difficulties, weakness in oro motor structures and lower limbs. Motor milestones

were also delayed. Client attained sitting at the age of 10 months, walking at the age of 4 years with active assistance of prosthesis. By the age of 6 years the client eventually began to walk independently unescorted by any aid oral peripheral mechanism, cranial nerve examination, Frenchay Dysarthria Assessment (Enderby, Pamela 2011) was administered, the affected areas were respiration, and inhalation and exhalation were shallow with difficulty in inhaling deeply. Picture articulation test (PAT; AYJNISHDM, India, 2004) was administered. Stuttering severity instrument (Glyndon D Riley, 2009) revealed severe stuttering. Neurogenic stuttering assessment protocol confirmed neurogenic stuttering. Consensus auditory perceptual evaluation of voice (CAPE-V; ASHA, 2009) was administered interjudge reliability of 3 judges revealed moderate hoarse voices were administered.

Result and Discussion

In this presentation client possessed complaints of unclear speech output such as slurred speech, effortful production accompanying hesitations, blocks and repetitions. Involuntary lip movements (tardive dyskinesia) and fasciculation of the tongue was observed at rest as well as during speech. The client possessed clavicular breathing associated with excess tension in neck and shoulders. The posture was slumped, head and shoulder appeared tensed. Inadequate breathing pattern and scarce respiration was observed.

Table 1: Results of Cranial Nerves

Trigeminal Nerve	Inadequate Jaw Pressure, Presence of Pain sensation, Presence of corneal reflex, inability to whistle.
Glossopharyngeal Nerve	Hypo-gag reflex was present, normal elevation of soft palate, presence of taste sensation.
Hypoglossal Nerve	Normal force, No deviations, Presence of tremors at rest as well as during movement, Increased tone.

Table 2: Results of speech motor tasks

Speech Motor Behaviors	Interpretation
Maximum repetition rate (MRR) for single syllable and tri syllabic sequence (e.g.,/pAtAkA/etc.)	Affected
Alternate motion rate	Affected
Maximum sound prolongations of vowels	Affected
Non- word repetitions (NWR)	Affected

FDA was administered, the affected areas were respiration, and inhalation and exhalation were shallow with difficulty in inhaling deeply. Lips possessed tardive dyskinesia at rest as well in task. There was occasional air leakage and break in lip seal. Client had faltering rhyme and variability in rounding and spreading of lips. Some weakness and briskness was observed during conversation. Laryngeal function was affected; client was able to represent four distinct pitch changes with uneven progression when asked to sing a scale of 6. Tongue at rest was noticeably shrunken to one side and fasciculation were apparent. Tongue movements in non-speech task were irregular, laborious accompanied by facial grimace and noticeable tremor. There was slight in coordination in performing alternate and sequential movements.

Intelligibility was poor 4/10 where occasional words are

decipherable. Speech characteristics were short phrases, excess and equal stress, monopitch, increased overall rate, slow AMRs and hoarse voice was noticed.

Articulatory errors for consonants were evident. /p/ and /b/ was omitted at final position. /b^h/ was distorted at final position. /t/ was substituted with /t^h/ at initial and final positions. /t^h/ was distorted at initial position. /d^h/ was substituted with /ḍ / at initial and medial positions. /k/ was substituted with /t/ at medial and final positions. /k^h/ was substituted with /t^h/ at initial medial and final positions. /g/ was substituted with /d/ at initial position. /r/ is distorted. /j/ is substituted with /s/ at final position. Blends were affected. SSI revealed severe stuttering. Neuro-genic stuttering assessment protocol confirmed neurogenic stuttering. Consensus auditory perceptual evaluation of voice (CAPE-V; American speech and language hearing association, 2009) was administered; interjudge reliability of 3 judges revealed moderate hoarse voice. VSMS and DST revealed SQ= 101 and DQ=83 suggestive of average level of IQ. The final diagnosis was developmental dysarthria with neurogenic stuttering secondary to epilepsy.

Tentative therapy plan: Epilepsy imparts significant morbidity through its effects on speech skills. For the better prognosis of the case tentative tailor made therapy plan will be used for the associated speech difficulties. Treatment goals will focus on fluency, articulation, voice followed by oro-motor exercises with using specific therapy techniques. Fluency short term goals are: 1) to slow down the speech rate (saying fewer words on each breath by increasing the duration of the sounds and words). 2) To emphasize a gentle onset of the start of each phrase (starting from a relaxed posture of the speech muscles, beginning with adequate respiratory support, a slow and easy initiation of the exhalation and gentle onset of the first sound). 3) To emphasize a smooth flow of speech production and use of relaxed posture, both in terms of general body posture and for specific speech production muscles. Following tasks will be used for reduction of rate through pacing boards, alphabet boards hand and tapping finger tapping, several stretching exercises of tongue, lip and jaw were also done to reduce the increased muscle tone of articulators and thus execute the range of motion. Articulation short term goals are: 1) to self-identify the disruptions in the speech patterns and thus instructing the client in the use of more appropriate patterns. 2) To increase mouth opening to improve movement of oral structures. 3) To achieve correct articulatory placement in syllables and words. Traditional articulation treatments like intelligibility drill, phonetic placement, exaggerating consonants, minimal contrast drills, may help in increasing the awareness of articulation errors and the production of optimal phonemes. Voice short term goals: To decrease laryngeal tension to reduce harsh strained vocal quality. Resonant voice therapy and few vocal functional exercises will be used for the management of moderate hoarse voice. Management of tonicidity will facilitate by various massages, exercise using block bite and cross bar, movement of articulators from resting position to extreme position and few imitation task. Few behavior based treatments using sensory tricks, relaxation therapy and easy onset of phonation. Oro motor exercises will be done by using following techniques such as horn blow technique, candle blowing technique, bite block, cross bar, dif. Various oro-motor techniques and exercises were

facilitated for the speech clarity which includes straw drinking, single sip cup drinking, gum chewing, humming, tongue blade protrusion and retraction against resistance, tongue tip elevation, depression and pointing. To support the breathing pattern, various respiratory treatments like, speak immediately on exhalation, slow and controlled exhalation and optimal breath group will be used.

Conclusion

Clinicians encounter a multitude of challenges in treating a tangled disorder of speech. However, well-planned strategies for motivating the children and parents are needed for better outcomes. Effective counseling session could help the client to attain confidence and self-esteem thus helps the therapeutic prognosis. Proper tailor made therapy plan helped in achieving adequate speech abilities. Regular speech therapy showed drastic improvement in speech and cognitive skills in this specific case study of developmental dysarthria with Neuro-genic stuttering secondary to epilepsy, awareness and counseling of parents and professionals are helpful to improve the overall quality of life of the child.

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