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Case Report

A combination of TMS (Transcranial Magnetic Stimulation) and TPS (Transcranial Pulse Stimulation) to treat speech delay in a five-year-old patient with ASD (autism spectrum disorder)

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Abstract

Background: Delays in language, social communication, play, and behavior in children can arise from various causes, including genetic predisposition and neurological conditions such as seizures or structural brain abnormalities. Standard interventions—speech therapy, occupational therapy, play therapy, and behavioral training—often offer improvements but are not always sufficient.

We report the case of a five-year-old boy with autism spectrum disorder who was largely non-verbal at age three and showed significant deficits in speech and social interaction. Initial therapeutic interventions and Ritalin medication did not lead to meaningful progress and were associated with undesirable side effects. The child also had a history of seizures at fifteen months of age.

A combined treatment approach using Transcranial Magnetic Stimulation (TMS), Transcranial Pulse Stimulation (TPS), and a newly prescribed medication led to marked improvements in verbal communication and behavioral regulation. The observed progress suggests that this combined neuromodulation and pharmacological strategy may enhance activity in neural networks associated with speech and support functional brain reorganization. To our knowledge, this is the first reported case of symptom improvement in an ASD patient using a combined TMS–TPS approach, highlighting the need for further investigation into its therapeutic potential [1,2,3].

Key words: treatment of inability to speak in children; insufficient speech; behavioral skills in children; tms,tps; new medication; effective on neurons; rearrangement of the neuronal dna [10,11,12]

Introduction

Children's intellectual and language development delays have been a topic of concern for parents and educators for centuries. While the understanding of these delays has evolved over time, the impact on children and their families remains significant. Historically, intellectual and language development delays were often attributed to external factors such as parenting style or environmental influences. However, as our understanding of child development has advanced, it has become evident that a combination of genetic, neurological, and environmental factors can contribute to these delays. The causes of intellectual and language development delays can vary widely from child to child. Genetic factors, such as chromosomal abnormalities or genetic disorders, can play a significant role [14]. Additionally, environmental factors, including lack of exposure to language or cognitive stimulation, can also contribute to delays in development [13,14]. Treatment for children with intellectual and language development delays often involves a multidisciplinary approach, including speech therapy, occupational therapy, and early intervention programs. These treatments are designed to address the specific needs of each child and to help them reach their full potential. While the understanding and treatment of intellectual and language development delays have come a long way, there is still much to be learned. By continuing to research and invest in early intervention programs, we can better support children with these delays and help them thrive.

Case Presentation

A 5-year-old child, residing in switzerland, started experiencing seizures and recurrent fevers at the age of 15 months. Subsequent medical examinations revealed no issues with his brain scans. The patient was referred to a

physician due to delays in language development and social skills, difficulty in adaptive and cognitive abilities, global developmental delay, and autism, An evaluation was conducted at the age of 3 years and 1 month, and the results are as follows:

Speech, Language and Communication

Currently, he is still largely non-verbal and would request by taking an adult's hand to the location of the desired item. If something is out of reach he would retrieve it himself. It was felt that he can point with eye gaze referencing and at times he could get upset and cry in frustration. He does not show items of interest. When he is in public places such as the local shopping centre he would be curious about other children and would observe them rather than communicate or approach them for social exchange [7,8].

Gross Motor Skills

He can catch, kick and throw a small bal. In the playground he enjoys swings. He can go up and down stairs independently. He is not yet able to jump off the ground with both feet. He is not yet able to ride a bike with support wheels or stand on one leg yet. He can run with changes in directions without slowing down.

Fine Motor Skills

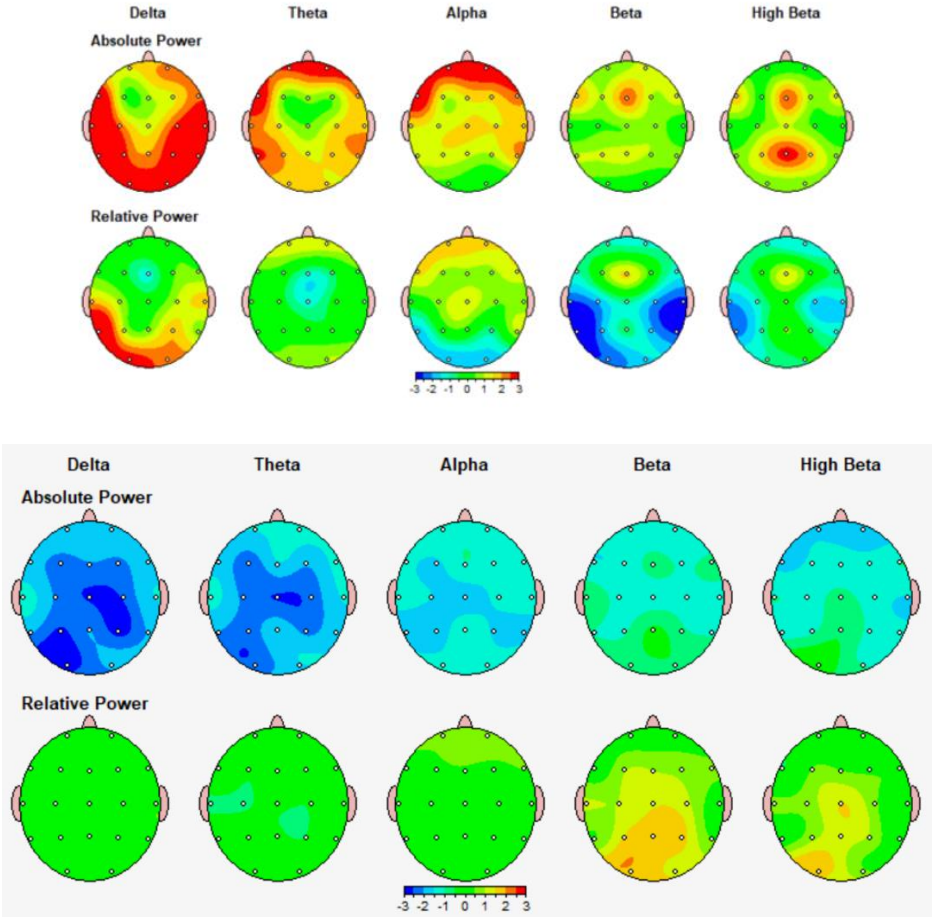
He is more right than left-handed and can scribble lines but is not yet drawing circles. He is not yet cutting with scissors. He can complete a 15 piece puzzle. He can feed himself with a spoon or a fork and drink from an open cup. He is not yet able to indicate that he has done a poo or a wee and is fearful of sitting on the toilet. He tends to wee in the shower and poo in the nappy. He brushes his teeth with supervision. He can undress his top and pants and can pull up his pants if helped halfway. He helps with dressing. In terms of sensory symptoms, he tends to smell food before he eats. He enjoys playing with play dough and if he is excited would "punch" his parents. He enjoys playing with his mother's hair. He is very fearful of dogs but has recently started to pluck up the courage to pat them. He can be unknowingly a bit rough to a small dog. He flaps his hands when he is excited.

Soren's cognitive skills were within the borderline range (2nd percentile, age equivalent 20 months). His combined language skills tested within the extremely low range (<0.1st percentile). Soren's receptive and expressive language skills showed an age equivalent of less than 6 months. Soren's combined motor skills tested in the extremely low range (0. 3 percentiles). His fine and gross motor skills age equivalent was 16 months.

Diagnostic summary

- DSM-5 Autism Spectrum Disorder - level 2 requiring substantial
- support
- Language Disorder: associated with AutismSpectrum Disorder
- DSM-5 Moderate Global Developmental Delay
- QEEG before Treatment:
  It is a real QEEG from our patient in our hospital.
- QEEG after treatment

Image 1: Database Comparison EO (eyes open)



1. Autism Specific interventions services

2. Therapy Intervention

• Continue speech pathology intervention with a focus on language development and social communication. This can be accessed privately supported by the Chronic Disease Management Medicare items (accessed

through your GP) or through early intervention services or other non-government services.

• Commence occupational therapy intervention with a focus on play skills and self-care. This can be accessed privately supported by the Chronic Disease Management Medicare items or Better Access to Mental Health Medicare items (accessed through your GP) or through early intervention services or other non-government services.

• Referral to psychologist for parenting strategies and intervention with a focus on challenging behaviours. This can be accessed privately supported by the Better Access to Mental Health Medicare items (accessed through your GP) or through early intervention services or other non- government services. At the age of 4 years and 4 months, He underwent a reevaluation, which indicated that there had been no particular progress in his speech and language skills. The following is an excerpt from the relevant medical report: He responds to sounds and his parent's voice as well as some nonverbal communication such as pointing, facial expressions, and gestures, however, he does not yet consistently respond to his name when called. He understands about fifty words and the meaning of the words yes and no. He identifie basic body parts (eye, ears, mouth) but not yet everyday objects. He often responds appropriately to the tone of spoken words but he does not yet respond to questions beginning with what, where or when. Soren is beginning to make sounds and repeat some words but he mostly gestures to get his parent's attention. He does not yet say Mama, Dada or other words. He holds a book correctly for reading and recognises symbols such as the stop sign. He does not yet recognise letters of the alphabet or his name in print [15,16].

Discussion

This case describes a child with autism spectrum disorder, severe language delay, and a history of early-life seizures who showed minimal improvement despite extensive early intervention, including speech therapy, occupational therapy, behavioral support, and pharmacological treatment. His developmental profile, as measured by standardized assessments, indicated extremely low receptive and expressive language abilities, borderline cognitive functioning, and global developmental delay. Although early intervention remains the gold-standard approach for developmental and language delays, some children with ASD show limited response despite consistent therapy, reflecting the heterogeneity of developmental trajectories reported in the literature.

The introduction of Transcranial Magnetic Stimulation (TMS) and Transcranial Pulse Stimulation (TPS), combined with a newly prescribed medication, was associated with measurable improvements in the child's verbal communication and behavioral regulation. While TMS has been studied for its potential to modulate cortical excitability and enhance neural network connectivity in neurodevelopmental disorders, TPS is an emerging modality that uses low-intensity acoustic pulses to influence deeper brain structures. The combined use of these two neuromodulation techniques has not been previously described in ASD, and the observed changes in this case may reflect complementary mechanisms influencing neuroplasticity.

It is not possible to determine causality in a single case, and several factors must be considered. Improvements may be partly related to natural developmental progression, increased maturation of neural circuits, or cumulative effects of ongoing therapy. However, the timing and magnitude of the observed gains—following a prolonged plateau despite sustained intervention—suggest that neuromodulation may have contributed meaningfully to the child's progress. The case therefore raises clinically relevant questions about whether combining TMS and TPS could offer synergistic benefits for children with severe language impairments, especially those who have not responded to conventional treatment.

The findings also highlight the need for systematic studies evaluating safety, optimal stimulation parameters, age-related considerations, and long-term outcomes of TMS and TPS in pediatric populations. At present, evidence for neuromodulation in ASD remains limited, and rigorous clinical trials will be necessary to confirm whether the promising results observed in this case can be replicated in larger samples.

Conclusion

This case report describes what appears to be the first documented instance of combined TMS and TPS therapy used in a child with autism spectrum disorder and severe language delay, followed by notable improvements in verbal communication and behavioral functioning. Although the findings cannot establish causality, the child's progress after an extended period of minimal response to standard therapies suggests that neuromodulation may hold therapeutic potential for selected cases of ASD and developmental language disorders.

The promising outcome observed here underscores the importance of further research into combined neuromodulation approaches, particularly for children who show limited progress with conventional early intervention. Controlled studies are needed to evaluate efficacy, safety, and mechanisms of action, as well as to identify which subgroups of children may benefit most. This case contributes preliminary evidence that integrated neuromodulation and pharmacological strategies may support functional improvements in neural systems associated with speech, communication, and behavior.

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