



Case Report: Liu Pediatric Neurological Rehabilitation Acupuncture Therapy for Child with Autism Spectrum Disorder

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Abstract

Importance: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by social communication deficits, restricted and repetitive behaviors (RRB), and narrow interests. It imposes a significant burden on families and society due to its high prevalence and lack of specific pharmacological treatments. Acupuncture has shown promising results in improving clinical symptoms of ASD.

Case Presentation: Here, we present a case of a child diagnosed with ASD who received Liu Pediatric Neurological Rehabilitation Acupuncture Therapy (PNRAT) for treatment. The child, aged 2 years and 9 months, initially presented with profound deficits in language development and social interaction. After undergoing Liu PNRAT treatment for over 2 years, significant improvements were observed. The child progressed from a state of no verbal communication and marked social difficulties to functioning as a typical child, successfully integrating into mainstream schooling and daily life activities.

Conclusions and Relevance: The application of Liu Pediatric Neurological Rehabilitation Acupuncture Therapy resulted in significant improvements in the patient's cognitive and social functioning, leading to successful integration into mainstream schooling. This highlights the potential of acupuncture as an effective treatment approach for ASD, addressing the critical need for interventions targeting core symptoms and enhancing overall quality of life for individuals with ASD.

Keywords: Autism Spectrum Disorder; Acupuncture; Liu Pediatric Neurological Rehabilitation Acupuncture Therapy

Introduction

Autism Spectrum Disorder (ASD) presents a significant global health challenge, characterized by deficits in social communication, restricted interests, and repetitive behaviors. Its prevalence has been steadily increasing, with profound implications for affected

individuals, families, and society at large [1-3]. Despite extensive research efforts, specific pharmacological interventions targeting core symptoms of ASD remain elusive, underscoring the urgent need for novel therapeutic approaches [2]. In response to this challenge, complementary and alternative medicine modalities

such as acupuncture have garnered attention for their potential in ameliorating symptoms and enhancing quality of life for individuals with ASD [4].

Liu Pediatric Neurological Rehabilitation Acupuncture Therapy (PNRAT), spearheaded by Professor Liu Zhenhuan since 1985, draws from established acupuncture methodologies such as the WHO acupuncture standards, Jiao's acupuncture, Zhu's acupuncture, and Jin's acupuncture. Professor Liu has developed specialized acupuncture protocols tailored to enhance cognitive function and alertness in pediatric patients. With over 37 years of clinical experience, he is one of the earliest experts to apply acupuncture to pediatric neurological disorders, having treated over 40,000 cases of cerebral palsy, autism spectrum disorder (ASD), intellectual developmental disorders, language delays, and attention deficit hyperactivity disorder (ADHD). His innovative techniques, including the Cognitive Rehabilitation Jiuzhen Needle Therapy and Visual Cognitive Acupuncture Therapy, have demonstrated promising results in improving cognitive function and language development in children with neurological conditions. Through the integration of traditional Chinese medicine principles and modern neurorehabilitation techniques, Liu PNRAT offers a promising avenue for enhancing therapeutic outcomes and fostering positive developmental trajectories in children with neurological disorders [5,6].

Case Presentation

Medical History and General Information

A boy, delivered via normal childbirth at 36 weeks gestation, weighed 3.05kg at birth. He began walking independently at the age of 14 months. On December 1st, 2019, at 2 years and 9 months of age, he was brought to the clinic due to tendencies to tiptoe while walking, excessive running around, poor response to commands, limited eye contact, and hyperactivity. There is no reported family history of similar conditions or history of seizures.

Clinical Manifestations and Assessment

Initial assessment on December 2nd, 2019:

- **Communication attitude:** Poor. Manifestation: Poor response to verbal cues, limited eye contact, minimal response to gestures and calling by others, evident emotional fluctuations.

- **Language comprehension:** Matching objects to words at a level equivalent to less than 1-year-old. Language Expression: Limited to single syllables, equivalent to a 1-year-old. Basic cognitive processes: Ability to distinguish between 6 shapes, stack blocks, and draw simple patterns such as “| ” and “-”. Grouping relations recognized. Group A: Limited understanding of verbal nouns.
- **Autism behavior checklist (ABC) score:** 69; Childhood Autism Rating Scale (CARS) Score: 33. Fine Motor Assessment Score: 24, indicating a mild impairment. Social Life Skills Assessment: Standard Score: 8, indicating mild impairment.
- **Developmental assessment:** DA = 19.5M, DQ = 58, indicating abnormalities. Gross Motor DQ = 72 (24M), Fine Motor DQ = 72 (24M), Adaptive Skills DQ = 63 (21M), Language DQ = 36 (12M), Personal Social Behavior DQ = 50 (16.5M).
- **Examination of articulatory organs:** Able to protrude the tongue beyond the lips. Possible oral sensory perception disorder noted. Other observations: Shows limited interaction with others, prefers solitary play, hyperactive, resistant to transitions, prone to temper tantrums, and struggles with social integration.

Theoretical Basis for Selecting Liu Pediatric Neurological Rehabilitation Acupuncture Therapy (PNRAT) as a Treatment Method

- **Neurobiological mechanisms of autism spectrum disorder (ASD):** Neuroimaging, electrophysiological, and autopsy analyses of ASD patients suggest that brain abnormalities, especially atypical brain neural connections, play a significant role in the development of ASD [7]. ASD patients exhibit accelerated head growth during infancy and increased overall brain size. Compared to non-ASD individuals, ASD patients demonstrate differences in total and regional gray and white matter volumes, sulci anatomy, brain chemical concentrations, neural networks, cortical structures, and compositions, as well as brain lateralization [8].
- **Mechanisms of acupuncture on brain neurology:** Studies [9] have shown that acupuncture stimulation of the skin, fascia, muscles, and periosteum of the head can activate the

functional areas of the cerebral cortex through the midbrain, thalamus, and brainstem, producing effects. Stimulating the trigeminal nerve can regulate abnormal superficial and deep sensations in the brain; stimulating the fascia can evoke its autoregulatory effect, promoting stem cell transformation into functional cells; stimulating muscles can induce the generation of central compensation effects in the cortex, activating the excitability of the cerebral motor cortex; stimulating the periosteum can produce stimulating currents in the cerebral cortex, release neurotransmitters, and promote the release of various hormones.

- Theoretical basis of liu pediatric neurological rehabilitation acupuncture therapy:** Liu Pediatric Neurological Rehabilitation Acupuncture Therapy for pediatric brain disorders is based on Brodmann's 52-brain functional partitioning and Von Economo's brain functional localization, accurately locating the developmental patterns of the child's brain and cortical function, followed by needling. Different needle placement schemes are selected based on different age groups.

Treatment Plan

Description of Liu pediatric neurological rehabilitation acupuncture therapy technique

First, precise positioning of the functional areas of the cerebral cortex is achieved using a soft skin ruler and a positioning pen according to bone measurement and the same body inch method. Secondly, utilizing characteristics of painless needle insertion for children, the needle insertion technique is stable, accurate, and fast, with a needle angle of 15-30° for rapid insertion without reaching the periosteum (Figure 1). Lastly, implementing repeated transcranial acupuncture stimulation: during each needling process, the needle technique is performed with twisting motions three times, inhaling and exhaling three times, combined with electroacupuncture stimulation to achieve multiple needling effects.

Frequency and duration of acupuncture treatment

Once every other day, with 10 needles each time, followed by a 15-day rest period, totaling 30 sessions per course.

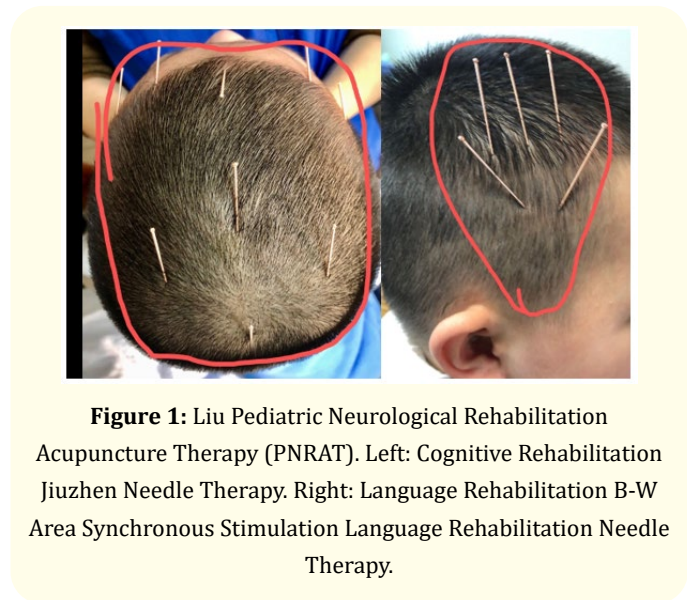


Figure 1: Liu Pediatric Neurological Rehabilitation Acupuncture Therapy (PNRAT). Left: Cognitive Rehabilitation Jiuzhen Needle Therapy. Right: Language Rehabilitation B-W Area Synchronous Stimulation Language Rehabilitation Needle Therapy.

Additional treatments

Combined with routine rehabilitation interventions in pediatric rehabilitation departments, such as language and cognitive training, sensory integration training, and guidance for active social communication and parent-child interactions.

Progress and Results

- Clinical Changes:** Following treatment, the patient returned to regular primary school and achieved excellent grades in all subjects in the first grade.
- Patient's Subjective Experience and Feedback During Treatment.** The patient responded well to acupuncture treatment without crying or discomfort.
- Treatment Efficacy Evaluation Based on Standardized Measures**

Evaluation report on October 5th, 2023

Childhood ADHD Behavior Scale: Total score of 4, with no positive items for attention-deficit hyperactivity disorder (ADHD) diagnosis. Autism Behavior Checklist (ABC) score of 5, indicating no symptoms of autism spectrum disorder (ASD). Childhood Autism Rating Scale (CARS) score of 16, indicating no symptoms of autism.

Wechsler Intelligence Scale for Children: Verbal comprehension: 99, Visual-spatial: 132, Fluid reasoning: 120, Working memory: 103, Processing speed: 112, Total IQ: 118. Social life skills assessment score of 10, indicating normal functioning.

Discussion

The unique aspect of Liu PNRAT lies in its targeted approach to improving language communication and expression functions in children with neurodevelopmental disorders, particularly autism spectrum disorder (ASD). By synchronously stimulating the Broca and Wernicke areas, known for their roles in language processing, Liu PNRAT facilitates the simultaneous development of cognitive abilities and language skills in these children. This approach sets Liu PNRAT apart from conventional acupuncture methods, as it directly addresses the core deficits in language and communication often observed in ASD and other neurodevelopmental disorders.

Liu PNRAT operates on a precise understanding of child brain development and cortical function, employing tailored treatment protocols based on different developmental stages. For instance, during the critical period of language development at ages 1-2, the B-W area synchronous acupuncture therapy for language development is proposed. For the peak cognitive development phase at ages 2-3, techniques such as Cognitive Jiuzhen Needle Therapy and Cognitive Qi Needle Therapy are introduced. Similarly, during the peak period of psychological and behavioral development at ages 4-7, techniques like the Wake Brain Calming Needle Therapy are recommended. This nuanced approach ensures that the treatment targets the specific developmental needs of children at different stages.

An inherent challenge encountered during the treatment process is the fear of acupuncture among children, which can be attributed to innate psychological factors. Overcoming this fear and ensuring the cooperation of pediatric patients during acupuncture sessions can pose a significant obstacle in the effective implementation of Liu PNRAT. Additionally, the individualized nature of treatment protocols tailored to different developmental stages necessitates a thorough understanding of child psychology and neurodevelopmental milestones, adding complexity to the treatment process. These challenges highlight the importance of holistic and patient-centered approaches in pediatric acupuncture therapy to optimize treatment outcomes.

Conclusion

The Liu Pediatric Neurological Rehabilitation Acupuncture Therapy (PNRAT) has shown remarkable promise in the treatment of children with autism spectrum disorder (ASD), as evidenced by a comprehensive case study spanning over two years. The patient, initially presenting with language deficits and significant social impairments at 2 years and 9 months of age, underwent Liu PNRAT treatment and experienced transformative outcomes. Over the treatment period, the child transitioned to a state of normalcy, exhibiting improvements in language development and social integration, ultimately thriving in a mainstream elementary school environment. These encouraging results underscore the potential of Liu PNRAT as a transformative intervention for children with neurodevelopmental disorders. Moreover, the clinical practice and outcomes of Liu PNRAT offer valuable insights for future research endeavors in pediatric acupuncture therapy, emphasizing the need for further exploration of its mechanisms and optimization of treatment protocols. With its targeted approach to cortical stimulation and proven efficacy in improving functional brain regions, Liu PNRAT holds immense potential for enhancing therapeutic outcomes in children with developmental delays and neurological disorders, paving the way for continued advancements in pediatric neurorehabilitation.

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