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Severe Motor Regression Following Post-Mumps Meningoencephalitis in a Previously Normally Developing Child: A Neurorehabilitation Case Report

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Case Report

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Abstract

Background:

Post-mumps meningoencephalitis is a rare but serious neurological complication that may result in acquired brain injury and regression of previously attained developmental milestones in children. Inflammation-induced neuronal damage can lead to significant motor impairment and long-term functional dependence. Early neurorehabilitation is critical to promote neuroplasticity and optimize recovery.

Case Presentation:

A 6-year-old girl with previously normal developmental milestones presented with severe motor and speech regression following post-mumps meningoencephalitis. Neuroimaging revealed ventricular dilatation with mild neuroparenchymal atrophy. Clinical examination demonstrated hypotonia with dystonic features, poor trunk control, inability to sit or stand independently, and preserved sensory and cognitive responsiveness. Functional assessment showed severe impairment (GMFM-88 score: 18%; GMFCS Level V; Paediatric Berg Balance Scale: 3/56; WeeFIM: 32/126), indicating high dependence.

Intervention:

A structured, neurodevelopmentally oriented physiotherapy program was implemented, including bed mobility training, prone and quadruped positioning, vestibular stimulation, sitting balance training, proprioceptive facilitation, and supported standing. The intervention focused on improving postural control, trunk stability, balance, and functional mobility.

Outcomes:

Gradual improvements were observed in head control, voluntary limb movements, postural responses, and environmental interaction, reflecting emerging motor recovery.

Conclusion:

Post-mumps meningoencephalitis can result in profound motor regression in previously normally developing children. Early, structured, and targeted physiotherapy plays a pivotal role in promoting neuroplasticity, restoring functional abilities, and preventing secondary complications. This case highlights the importance of timely rehabilitation in pediatric post-infectious acquired brain injury.

INTRODUCTION

Mumps is an acute, highly infectious viral infection caused by the mumps virus, a member of the Paramyxoviridaefamily. It spread from person to person through direct contact with contaminated saliva or respiratory droplets from an infected individual.It typically affects children, particularly those of school-going age, and mostly involves the salivary glands, particularly the parotid glands, which leads to

the distinctive painful swelling known as parotitis.[1]Although mumps is typically considered a reversible condition with a good prognosis, it may occasionally develop to significant consequences involving other organ systems.Out of these, neurological complications such as meningitis, encephalitis, and meningoencephalitis are rare but significant, occurring due to viral penetration and infection of the central nervous system, which can result in neurological impairments, motor impairments, and long-term disabilities in affected kids.[2]

Meningoencephalitis is described as the simultaneous inflammation of the brain parenchyma and its surrounding meninges, resulting in hybrid characteristics of meningitis and encephalitis with various degrees of neurological impairments.[3]In mumps infection, the virus can penetrate the central nervous system either through hematogenous dissemination or direct propagation, resulting to inflammatory alterations within neural tissue and meningeal layers.The resultant neural inflammation and neuronal injury can show up as motor weakness, decline of previously achieved motor milestones, changes in muscle tone such as hypotonia or hypertonia, poor postural control, and varying degrees of functional disability, particularly in the paediatric population where developing neural circuits are prone to damage. [4]

In paediatric individuals, these injuries can lead to regression of previously obtained developmental milestones, even in children who had achieved normal motor growth and development.The injury to motor areas of the brain and accompanying neural networks may result in loss of head control, impaired sitting and standing balance, and inability to walk, consequently greatly compromising gross motor function. [5, 2]Such limitations generally lead to decreased functional independence and higher dependency on the caregivers for routine activities.

Neurorehabilitation plays an integral part in the management of children with acquired brain injuriesas early and targeted physiotherapy interventions are essential for improving motor recovery and functional outcomes.[6]Physiotherapy aims to enhance motor control through task-specific training, promotion of normal movement patterns, and postural re-education, while simultaneously developing neuroplasticity by stimulating adaptive restructuring within the central nervous system. Evidence shows that repetitive, goal-oriented motor exercises increase cortical re-mapping and functional restoration in paediatric neurological disorders.[7]Additionally, these interventions assist prevent secondary problems such as contractures, muscular atrophy, pressure sores, and respiratory impairment, hence preserving musculoskeletal integrity.Through neurodevelopmental rehabilitation strategies, physiotherapy also contributes to achieving functional independence in activities of daily living as well as improving overall quality of life in children who are impacted. [8, 7]

This disorder illustrates the sensitivity of the developing brain to viral infections and the possibility for considerable loss of motor functions following central nervous system involvement. Awareness of such consequences is limited, particularly regarding the danger of acquired motor regression in normally developing youngsters. Therefore, this case report primarily aims to provide insight into the threat of motor regression following post-mumps meningoencephalitis and to highlight the vital role of early

identification and physiotherapy rehabilitation for enhancing functional recovery and long-term outcomes in affected kids.

CASE REPORT

A 6-year-old girl was diagnosed with post-mumps meningoencephalitis after indicating severe motor regression.She was born on March 15-2020 as the second child of non-consanguineous parents,with the mother aged 25 years and the father 32 years at the time of conception.The 9-year-old kid who is her older sibling has a typical developmental history. Regular prenatal medical examinations were conducted, although the first-trimester scan revealed a lower foetal weight.Pregnancy-related recurrent vomiting led to a reduction in maternal nutritional supplementation. At the fifth month of pregnancy, foetal movements were observed.She was delivered at full term (9 months of gestation) by emergency lower segment caesarean section at 1:30 PM when the foetal heart rate abruptly stopped after around seven hours of labour. She weighed 2200 grams at birth. There were no serious birth issues, the sucking reflex was normal, and there was an immediate cry. She had not had the Measles-Mumps-Rubella (MMR) vaccination, which is frequently recommended between the ages of 9 and 12 months, with a booster dose at 15 to 18 months.

Developmentally, the child achieved age-appropriate motor, fine motor, and social milestones prior to illness.She gained neck control at 5 months, rolled over at 7 months, sat without support at 1 year, walked independently at 1.5 years, and climbed stairs at 2 years of age.Fine motor abilities were appropriate, with object transfer at 7 months, pincer grasp at 1 year, scribbling at 1.5 years, and drawing horizontal lines by 2 years.Social smile was observed at 3 months, stranger awareness at 9 months, and group play behaviour by 3 years.Although slight speech delay was noticed till 3 years of age, she later acquired meaningful speech.Prior to the onset of sickness, she was functionally active in age-appropriate activities.Her body weight one year before she got the illness was 11 kg, which ascended to 20 kg over the next year.

At the age of 5 years, on January 10, 2025, she suffered right-sided ear ache, for which her parents looked for medical consultation at nearbyHospital.Topical analgesic ointment and paracetamol were provided to her.Over the next few days, she had severe headache, fever, and swelling in the parotid region, prompting referral to Government Medical college Hospitalon January 17, 2025.Soon after arrival, she developed her first episode of seizure and required ventilatory assistance for 10 days.She spent a total of 26 days in the hospital. Positive Mumps IgM antibodies were found in laboratory tests. Mild diffuse cerebral oedema with characteristics suggestive of early obstructive hydrocephalus was revealed by neuroimaging using a CT scan. Bilateral frontotemporal areas showed modest diffuse electrical impairment with epileptic activity, according to EEG results. An MRI showed a normal fourth ventricle, bilateral lateral ventricle dilatation, and mild neuroparenchymal atrophy, all of which were indicative of obstructive hydrocephalus, most likely due to aqueductal outflow restriction.She also had a history of cardiogenic shock during her hospital stay.Genetic testing revealed that the paternal lineage had

Alazami syndrome. Her diagnosis was post-mumps meningoencephalitis based on imaging, laboratory, and clinical results.

After discharge, no further seizure events were noted, however she continues on antiepileptic drugs.A substantial regression of previously achieved motor and verbal milestones was noticed from January 17, 2025. She lost her ability to stand, sit upright, control her head, and walk independently. She is currently unable to express her requirements verbally, and speech regression was also seen. She was kept on a liquid diet at first since she had trouble swallowing, but with time, she was able to move on to solid food. She received constant physical therapy for a year in a hospital, and since February 2026, she has been undergoing continued rehabilitation in our institution.

On present observation, the child is aware but occasionally agitated and crying. She has a mesomorphic body built, with a weight of 20 kg and height of 110 cm. Motor assessment demonstrates hypotonia with signs of dystonia.Gross and fine motor functions are greatly compromised.Head control is progressively improving, and she is capable to roll side to side in bed; yet she is unable to sit or stand without support and shows poor trunk control. She can respond to verbal orders and move all four limbs when in a supine position. While clonus is present in the lower limbs, deep tendon reflexes are normal in the upper limbs. Both deep and superficial sensations are spared. Although there is no intentional control, bowel and bladder functions are physiologically normal. Both Oro motor and cardiorespiratory functions are within normal ranges. She occasionally displays upward eye rolling and periods of Vacant staring. She responds to play activities, recognizes family members, and maintains awareness of her surroundings while maintaining a sociable smile despite having severe motor impairments.

To determine her present functional status, outcome measures were evaluated. The Gross Motor Function Measure (GMFM-88) score was 18% that is level 5,which indicates a severe impairment in gross motor abilities. With a score of 3 out of 56 on the Paediatric Berg Balance Scale, the child's balance was seriously impaired, and they were unable to stand or sit independently. The Functional Independence Measure for Children (WeeFIM) was used to measure functional independence. A total score of 32 out of 126 indicated total dependence in the areas of mobility, self-care, and transfers, with partial assistance needed in the domains of social interaction and communication.

DISCUSSION

The Mumps virus causes an acute viral illness that mostly affects the salivary glands, but it can also cause significant neurological problems like meningoencephalitis, especially in children who are not vaccinated.[9]Even though mumps is usually thought to be a self-limiting illness, involvement of the central nervous system can cause serious neurological complications, including convulsions, motor impairment, and developmental regression. The youngster in this case was probably more vulnerable to illness and its sequelae since she had not received the recommended Measles-Mumps-Rubella (MMR) vaccination. Followinga mumps infection, meningoencephalitis cause diffuse brain involvement, as seen

by MRI findings of ventricular dilatation and neuroparenchymal atrophy. This explains the significant regression of previously achieved speech and motor milestones.

After viral meningoencephalitis, inflammation-induced neuronal damage, disruption of neural connections, and dysfunction of motor control centres lead to motor regression.[10]Both cortical and subcortical motor systems are implicated in this child's hypotonia, dystonia, poor trunk control, and loss of functional mobility. Secondary issues include muscle weakness, decreased endurance, and worse postural control may also have been caused by extended hospital stays, ventilator assistance, and decreased physical exercise. The speech regression seen in this instance might also points to the involvement of frontal lobe.

For children with post-infectious neurological abnormalities, physiotherapy is essential to their rehabilitation. Early and ongoing physiotherapy interventions enhance functional independence, assist motor relearning, and support neuroplasticity. To enhance motor function and avoid subsequent consequences including contractures, muscular atrophy, and postural deformities, neurodevelopmental therapy techniques, postural control training, balance exercises, and functional mobility training are crucial. Additionally, task-oriented training and sensory-motor stimulation improve motor coordination and functional recovery.[11]Continuous physical therapy for a year helped the patient in this instance gradually develop their head control and voluntary limb motions.

Early therapies included bed mobility training performed for 8–10 repetitions on each side, in 2 sessions per daymaking it easier to roll from supine to side-lying, which improved trunk activation and transitional motions.[11]Prone positioning with head elevation, as well as prone-on-elbows and prone-on-hands exercises, were given daily for 15–20 minutes per session, divided into 3–5 minute holds with adequate rest intervals, twice daily to improve antigravity muscle activation, cervical extension, shoulder stability, and postural control. The transition to quadruped placement was implemented for 10–15 minutes per session, with assisted maintenance of position for 10–30 secondsto allow for weight bearing through the upper limbs, increase trunk stability, and prepare the infant for improved functional mobility. [12]Vestibular stimulation with a therapy ball (Swiss ball) for 10–15 minutes per session, including gentle anterior-posterior, lateral, and circular movements, repeated 8–12 times in each directionwas used to improve balance, postural responses, and sensory integration by providing controlled multidirectional movement inputs.[13] Supported transitions from supine to extended sitting were used to improve trunk control, coordination, and independence with positional changes. Structured sitting exercises with proper support were given 15–20 minutes per session used to enhance static and dynamic sitting balance, midline orientation, and trunk stability.Proprioceptive training, which includes joint compression, weight-bearing activities, and positional awareness exercises, was given for daily 10–15 minutes per session, with 8–12 repetitions per activityused to increase sensory-motor integration, body awareness, and motor control.[14]Standing frame training was also implemented for about 20 minutes per session to encourage weight bearing in the lower limbs, increase bone mineral density, improve postural alignment, and stimulate extensor muscle activation. Standing frame use also helps to minimize secondary issues

such contractures, muscular shortening, and postural abnormalities, while increasing cardiopulmonary function and circulation.[15]

This case emphasizes how crucial it is to recognize and treat neurological issues as soon as possible after acquiring the mumps infection. Additionally, it highlights how important physiotherapy is to reducing impairment, encouraging functional rehabilitation, and enhancing the quality of life for impacted kids. This case also emphasizes how crucial it is to receive the MMR vaccine on time in order to avoid such serious neurological aftereffects. Such rare casesdocumentation adds significant clinical evidence and supports the application of interdisciplinary rehabilitationespecially, physical therapyin the treatment of pediatric populations post-infectious motor regression.

CONCLUSION

This case report presents a rare occurrence of motor and speech regression following post-mumps meningoencephalitis in a previously normally developing infant. Early diagnosis, effective medical management, and continued physiotherapy rehabilitation played a vital role in improving neurological recovery and minimizing secondary problems.Gradual gains in head control, voluntary limb motions, and reactivity to the environment reflect the effectiveness of physiotherapy in fostering neuroplasticity and functional restoration.

Declarations

The parent provided written informed consent for participating the child in the study and publish the clinical findings

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