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CASE REPORT

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Acute Transverse Myelitis with Right Arm Paralysis in a Pediatric Patient: A Rare and Challenging Case Report

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Abstract

Acute transverse myelitis (ATM) is a rare inflammatory spinal cord disorder with varied clinical manifestations, particularly in the pediatric demographic. This report details the case of a 3-year-old child from Dibra, Albania, admitted with fever and sudden paralysis of the right arm. Initial symptoms included fever, fatigue, and anorexia, leading to total paralysis of the right arm. Laboratory findings highlighted elevated neutrophils at 66.6%. Crucially, an MRI of the spine indicated inflammatory lesions in the cervical region, confirming the diagnosis of ATM. The child underwent a comprehensive treatment regimen, including antibiotics, immunoglobulins, antiviral medications, corticosteroids, and physiotherapy. Post-treatment, while there was a marked improvement in the child's general health and a halt in the progression of the disease, significant motor deficits persisted in the right arm. Despite the severity of ATM and challenges in treatment, early intervention showcased a positive impact on the patient's health, emphasizing the critical nature of prompt diagnosis and treatment in pediatric ATM cases. This case offers insight into the clinical presentation, diagnosis, and management of ATM in young children, shedding light on a rare yet impactful neurological disorder.**(International Journal of Biomedicine. 2023;13(4):367-370.)**

Keywords: acute transverse myelitis • young children • MRI • treatment

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Introduction

Acute transverse myelitis (ATM) represents an inflammatory disorder of the spinal cord with significant implications for patient health, especially in pediatric populations. The rarity of this disease in children makes understanding its nuances imperative for timely diagnosis and treatment.

The evidence has highlighted that the prevalence of ATM in the pediatric population stands at around 1-2 new cases per million children each year.[(1)] Timely detection of the disorder is critical due to the potential for rapid neurological deterioration when untreated.

A majority of ATM cases in children can be traced back to a preceding viral or bacterial infection. Pidcock et al. reported that roughly one-third of pediatric patients with ATM had experienced an illness or had recently been vaccinated prior to the onset of symptoms, suggesting a possible post-infectious or post-immunization etiology.[(2)] Infections leading to ATM include but are not limited to West Nile virus, herpes viruses, enteroviruses, HIV, Zika virus, Lyme neuroborreliosis, human T-cell leukemia virus type 1, *Mycoplasma* spp., and *Treponema pallidum*.[(3)] However, the exact cause of ATM remains largely unknown, and further exploration into its origins is warranted.

The spectrum of clinical manifestations of ATM is broad, and the symptoms can range from milder presentations,

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such as back pain, to severe cases of paralysis.[4] This diversity in clinical presentation underscores the importance of a comprehensive diagnostic approach, as exemplified in our current case of the 3-year-old child with ATM.

MRI is an indispensable tool in the diagnostic arsenal for ATM. Different studies have underscored that MRI findings, which reveal inflammation of the spinal cord, particularly in the cervical region, are crucial for a confirmed diagnosis of ATM.[5,6]

Therapeutically, the administration of high-dose corticosteroids emerges as the primary treatment method, a stance supported by research.[7] In addition to pharmacological interventions, physiotherapy has shown promise in aiding the recovery of motor functions in patients.

While ATM in children is uncommon, it commands significant clinical attention due to its potential to severely impact health outcomes. Effective diagnosis and early treatment interventions are vital for ensuring favorable patient outcomes.

Case Presentation

***Presenting Complaints*:** The child was admitted to the Infectious Disease Clinic (IDC), University Hospital Centre "Mother Teresa," Tirana, on 02.11.2022 with the diagnosis of febrile state and right arm paresis. On admission, the patient manifested symptoms of fatigue, vomiting, fever up to 38.5°C, and an inability to move the right arm.

***Disease History*:** According to the family, the child had been symptomatic for approximately three days before admission. Initial symptoms included fever (38.5°C), fatigue, anorexia, and subsequently, an inability to move the right arm (total paresis). Mild back pain was also reported. This constellation of symptoms prompted the family to seek medical attention at the IDC. Routine laboratory examinations were conducted. Notably, neutrophils were elevated at 66.6%. A chest X-ray revealed bilateral peribronchitis. Echography of the right shoulder and elbow joints was reported as normal. An antibiotic therapy regimen and infusions were initiated.

Post consultation with a pediatric neurologist, it was suggested to carry out MRI scans of the spine and head. The spine MRI displayed areas of hyperintense signal in the cervical spinal cord, indicative of inflammatory lesions (myelitis) (Figures 1 and 2).

Considering the patient's clinical condition and corroborative imaging findings, therapy with high-dose Methylprednisolone was initiated for seven days. Additionally, the child was treated with IgG for five days, Aciclovir, Ceftazidime, Omeprazole, infusions, and physiotherapy. Subsequent observations highlighted an overall improvement in the child's general condition and halting of the disease's progression. Remarkably, during the initial examination, no impairments in vital functions or sphincter functions were observed, and patellar and sensory reflexes were intact. At the end of in-hospital treatment, which included physiotherapy, the child showed slight mobility in the right arm, expected to continue improving with outpatient therapy.

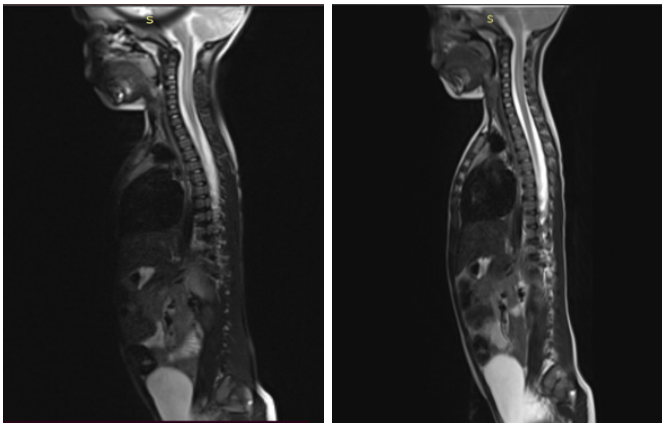

Fig. 1&2. *MRI scans of the spine and head before the initiation of the treatment.*

Increased T2 signal and expansion of the chord are seen extending between C7 and T12. The T2 signal abnormality involves central grey matter and dorsal columns. Linear sagittally oriented enhancement is seen posteriorly within the cord in the mid and lower thoracic cord.

Post-hospitalization, the child was prescribed a tapering dose of Prednisolone for four weeks, oral Omeprazole, oral Aciclovir for a week, and continuation of physiotherapy. Three months later, a follow-up MRI of the spine was advised by the neuroradiologist, which displayed no radiological sequelae (Figures 3 and 4).

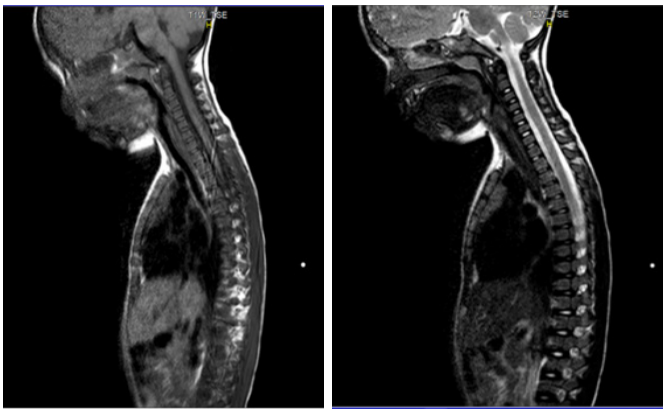

Fig. 3&4. *MRI scans of the spine and head after the completion of treatment.*

However, clinically, the right arm still exhibited a pronounced motor deficit despite ongoing physiotherapy. An electromyography (EMG) of the right arm, conducted in March 2023, indicated the absence of motor parameters registration in the upper right side, while sensory parameters were within normal limits.

Family History: The family denied any history of neurological disorders in close relatives.

Physical Examination: Upon examination, the child appeared stable and responded appropriately for his biological age. Mild headaches and transient dizziness upon standing were reported. Reflexes were present in both extremities. The examination revealed a pronounced deficit in the right arm,

characterized by restricted mobility, inability to raise the arm or move the fingers, and an absence of the right cubital reflex. However, sphincter functions were well-controlled. Cardiac auscultation presented clear tones. Lung auscultation showed vesicular breathing. The abdomen was soft, with the liver and spleen within normal limits. The child's blood pressure was recorded at 120/80 mmHg.

Laboratory Investigations: A detailed blood panel was conducted. Notable findings included elevated neutrophil count at 66.6%, a slight elevation in ESR (16 mm/h), and other parameters that largely remained within normal limits.

Imaging Findings: The MRI of the spine revealed hyperintense signals in the cervical region, suggesting inflammatory lesions typical of myelitis. Specifically, the areas of hypersignal were located in the cervical region and the medullary cone. These findings were instrumental in solidifying the diagnosis. In contrast, the MRI of the head displayed no abnormalities.

A chest X-ray further supported the clinical presentation, revealing bilateral peribronchitis. An echography of the right scapulohumeral and cubital articulation was performed to rule out any local joint or soft tissue pathologies that could be contributing to the right arm paresis. The results were within normal parameters, eliminating orthopedic causes.

Treatment Course: In response to the myelitis diagnosis and to counteract the inflammatory process, high-dose intravenous Methylprednisolone (400 mg daily) was administered for seven days. Antiviral therapy was provided in the form of Aciclovir (150 mg, three times daily), given the potential viral etiologies of myelitis. The child also received Ceftazidime, an antibiotic to manage potential bacterial infections that might be contributing to the febrile state.

To support the child's overall health and prevent gastric complications from high-dose corticosteroids, intravenous Omeprazole (20 mg, twice daily) was provided. IgG was administered for five days to modulate the immune response and offer potential therapeutic benefits in inflammatory conditions. Daily infusions of 0.9% sodium chloride and 5% glucose solution were given to maintain hydration and energy. Vitamin therapy was provided to support the child's nutritional needs, given the anorexic state. Moreover, physiotherapy was introduced early during the in-patient phase to encourage motor function recovery.

Post-Hospitalization Management: Upon discharge, outpatient management was crucial to ensure continued recovery. The child was prescribed oral Prednisolone, which was to be tapered over four weeks. This step was essential to reduce inflammation further while managing potential rebound effects. Aciclovir syrup was continued for a week to ensure complete antiviral coverage. Oral Omeprazole was given as a gastroprotective agent against potential gastric ulcers from prolonged steroid use. Emphasis was also placed on continuing physiotherapy to aid in the gradual recovery of right arm function. The introduction of vitamin therapy was maintained to ensure adequate nutrition.

Follow-up and Prognosis: A subsequent MRI three months post-hospitalization, advised by the neuroradiologist, showed no concerning radiological signs, indicating the inflammatory lesions had resolved. However, despite ongoing physiotherapy, the child's right arm still showed significant motor deficits. Electromyography (EMG) of the right arm highlighted this motor deficit, particularly in the upper right segment, though sensory parameters remained intact.

Given the comprehensive treatment and physiotherapy, the expectation is for continued, albeit gradual, recovery. However, long-term monitoring is crucial due to the unpredictable nature of myelitis and the potential for recurrences or complications.

Discussion

ATM in pediatric populations presents a unique diagnostic challenge due to its rarity, broad spectrum of clinical manifestations, and potential to lead to severe disability if not promptly treated. This case of a 3-year-old male presenting with ATM and paralysis of the right arm underscores the importance of early diagnosis, aggressive treatment, and comprehensive follow-up care.

Our case is similar to previously reported pediatric ATM cases in terms of presentation. ATM often manifests with motor, sensory, and autonomic dysfunction related to the level of the spinal cord affected.[8] While our patient presented predominantly with right arm paralysis, many patients manifest with symptoms corresponding to the affected segment of the spinal cord, including paraparesis, quadriparesis, and sensory level.

The majority of ATM cases in children are known to have a preceding trigger, most commonly a viral or bacterial infection. This post-infectious etiology suggests an immune-mediated pathogenesis, wherein an aberrant immune response following infection affects the spinal cord.[2] In our case, though the child presented with fever and elevated neutrophils, pinpointing a specific preceding infection proved challenging.

As the literature highlights, MRI plays a pivotal role in diagnosing ATM.[4,5] Our findings of inflammatory lesions in the cervical spinal region echo those of other reports, emphasizing the diagnostic significance of MRI in ATM. While typical ATM cases usually display longitudinally extensive lesions spanning multiple vertebral segments, our patient had a localized cervical involvement, making it a relatively unusual presentation.

Therapeutic management of ATM largely revolves around high-dose corticosteroids, as they have demonstrated efficacy in reducing inflammation and improving outcomes.[9] In line with this, our patient underwent high-dose Methylprednisolone therapy. However, despite the pharmacological intervention, the child exhibited persistent motor deficits in the right arm, highlighting that some patients might exhibit residual symptoms post-treatment.

The use of adjunct therapies like IgG and antiviral medications, as in our case, is driven by the underlying suspected etiology and the clinical presentation of the patient. There's evidence that therapies like IgG can modulate the immune response and provide potential benefits, especially in inflammatory conditions.[10]

Furthermore, physiotherapy plays a pivotal role in the recovery phase. Our patient's slight improvement in the

right arm mobility at the end of in-patient treatment can be attributed to the early initiation of physiotherapy. This is in line with findings from Greenberg et al.,[11] who emphasized the importance of rehabilitation in improving functional outcomes for ATM patients. There is a chance that about 5% to 10% of patients with TM will develop multiple sclerosis.[12] It is therefore important that an inter-professional team that provides a holistic and integrated approach to acute and post-acute patient care with transverse myelitis can help achieve the best possible outcomes. While similarities can be drawn from existing literature, each case adds valuable insights to the ever-evolving understanding of ATM.

Conclusion

This case report highlights the challenges in diagnosing and managing acute transverse myelitis in pediatric patients. The disorder's diverse clinical presentation, rapid progression, and potential long-term motor deficits necessitate a comprehensive and multidisciplinary approach to care.

Early recognition, prompt initiation of high-dose corticosteroids, and appropriate supportive therapy, including physiotherapy, play a crucial role in achieving favorable outcomes in children with acute transverse myelitis. However, long-term follow-up and rehabilitation are essential to address persistent neurological deficits and promote functional recovery.

Further research and case studies are needed to better understand the etiology, pathophysiology, and optimal management strategies for pediatric patients with acute transverse myelitis. The lessons learned from this case can contribute to the development of evidence-based guidelines for the diagnosis and treatment of this rare neurological condition in children.

Competing Interests

The authors declare that they have no competing interests.

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