UDC 616-053.2; 616.8
IRSTI 76.29.47; 76.29.51

A clinical case report

Ischemic stroke in a pediatric patient: A case study

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Abstract

Pediatric ischemic stroke is an extremely rare but vital life condition that needs early diagnosis and effective intervention.

The case reported here is of a 15-year-old young male presenting with acute-onset left-sided hemiparesis, facial asymmetry, and dysarthria. Imaging studies confirmed acute ischemic stroke in the right thalamic region with intracranial hypertension. Due to the lack of pediatric protocols, thrombolytic therapy was adapted using recombinant tissue plasminogen activator (rt-PA) within adult guidelines.

The supportive approach included oxygen therapy, optimization of blood pressure, and early rehabilitation. The child improved significantly with restoration of motor function, resolution of dysarthria, and a reduced NIHSS score at discharge. The case thus underlines the importance of timely multidisciplinary management, rehabilitation, and standardized pediatric stroke guidelines.

Keywords: pediatric ischemic stroke, thrombolytic therapy, hemiparesis, rehabilitation, hypertension.

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2025; 18-1: 46-50
Recieved: 29-01-2025
Accepted: 15-03-2025

Introdcution

Pediatric arterial ischemic stroke (AIS) is a rare but severe cause of neurological morbidity in children with an estimated prevalence of 1.2 to 13 per 100.000 per year [1]. Pediatric AIS is rare but has significant implications for children who have it, often leading to chronic neurological impairment, cognitive dysfunction, and reduced quality of life [2]. Prognosis is highly variable depending on severity of stroke, etiology, and timeliness of treatment. The majority of survivors retain residual cognitive or motor deficits that compromise their ability to function to execute daily activities and achieve developmental milestones [3].

The etiology of pediatric AIS is multifactorial and encompasses congenital heart disease, infections, and prothrombotic disorders as major factors [4]. Early and accurate diagnosis remains challenging with the unpredictable and sometimes subtle presentation in children. In spite of this, neuroimaging has greatly improved the identification and description of pediatric AIS, enabling faster and more accurate diagnosis [5].

Pediatric AIS management tactics are all but borrowed from stroke protocols in adults with some modifications to accommodate pediatric-specific considerations. Recent consensus guidelines favor an individualized treatment approach that involves supportive care, antithrombotic therapy, and rehabilitation, all in modified form based on the child's specific needs [6]. Even with such advances, a need still exists for evidence in the form of high-quality data guiding pediatric AIS management, evidencing a persistent need to facilitate research resulting in the refinement of the treatment algorithm and results in this vulnerable population [1].

The present case reveals a new and clinically significant presentation of pediatric AIS, adding valuable information to its diagnosis and treatment. From the analysis of this case, we will emphasize key issues regarding early diagnosis and treatment and emphasize the importance of individualized therapeutic approaches to improve patient outcome.

Clinical case demonstration

Patient History: A 15-year-old male was brought to the emergency department with sudden-onset left-sided weakness, facial asymmetry, slurred speech, and a severe headache. The symptoms started suddenly, which prompted immediate medical attention. On admission, blood pressure was 155/60 mmHg. Neurological examination showed left-sided hemiparesis progressing to plegia, dysarthria, and central cranial nerve VII and XII involvement.

Past Medical History: He had never had stroke, seizures, or serious infections. Her family history was negative for congenital heart disease, prothrombotic states, collagen vascular disease, and drug abuse; immunizations were current, and head trauma, substance abuse, and smoking were denied.

Physical Examination: On examination, the patient's general condition was determined to be severe.

Vital signs: heart rate 100 beats/min, respiratory rate 20 breaths/min, temperature 36.4°C, SpO_2 98%.

Neurological examination: NIHSS at 12, left-sided hemiparesis with 0/5 strength of the left arm and 2/5 in the left leg, slurring of speech, and Babinski reflex positive on the left side.

Other systems: Within normal limits, with no evidence of systemic infections, joint abnormalities, or cardiovascular irregularities.

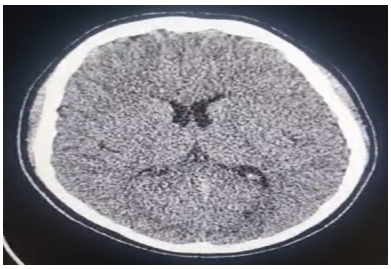

Image 1 - Computed Tomography (CT) upon admission: Demonstrated without organic pathology

Image 2 - Computed Tomography (CT) in 12 hours: Demonstrated ischemic changes in the right thalamic region with signs of intracranial hypertension

Laboratory Results. Blood glucose: 5.3 mmol/L. Coagulation profile: Prothrombin time, 18 seconds; INR, 1.2. Complete blood count: Hemoglobin, 126 g/L; white blood cell count, 5.4 × 10^9/L. Echocardiography: Normal cardiac anatomy and function, with no structural abnormalities. Ultrasound of Brachiocephalic Vessels: No evidence of stenosis or vascular abnormalities.

Management. Given the absence of local pediatric stroke protocols, adult thrombolytic therapy guidelines were adapted. The patient received recombinant tissue plasminogen activator (rt-PA) intravenously: Bolus dose: 5

mg. Continuous infusion: 45 mg over one hour. Supportive Measures: Elevation of the head to 30 degrees.

The administration of oxygen to maintain optimum oxygen saturation. Control of blood pressure with the use of anti-hypertensive drugs.

Rehabilitation. The rehabilitation process was initiated during the time spent in the hospital, which included physiotherapy to restore motor function, occupational therapy to enhance coordination, and speech therapy to alleviate residual dysarthria.

Outcome. The time of discharge saw the patient showing significant improvement: The left arm and leg gained muscle strength to 4/5 and 5/5, respectively; dysarthria resolved; and the NIHSS score decreased from 12 at admission to 2 at discharge. He was thus discharged with a comprehensive rehabilitation plan that included outpatient neurorehabilitation and regular follow-up with a neurologist and cardiologist, recommended further undergo MRA.

Discussion

PediatricAIS is a rare yet critical condition that demands precise management to minimize long-term morbidity. This case underscores key challenges and lessons in managing pediatric AIS, particularly in resource-limited settings where standardized pediatric protocols may be unavailable.

Thrombolytic Therapy in Pediatric AIS: With limited evidence to truly support thrombolysis in children, emerging data would seem to indicate thrombolytic therapy can be safely adapted from adult protocols. Studies such as those by Rivkin et al. and Roach et al. testify to the fact that rt-PA can show its potential efficacy in selective pediatric cases under strict monitoring [7,8]. In this case presented here, cautious management with rt-PA resulted in significant neurological improvement without complication, thus underlining its utility in emergent situations.

Role of Neuroimaging: Early pediatric AIS diagnosis often involves advanced neuroimaging modalities, particularly CT and MRI. MRI with DWI is highly sensitive to early ischemic changes, though resource constraints in many centers mandate the use of CT, which was used here. It is emphasized that not only does early imaging confirm diagnosis but also serves as a guide for therapeutic decision-making, such as thrombolysis[9].

Importance of Multidisciplinary Care: This outcome further illustrates the multidisciplinary approach taken due to the combined inputs of neurologists, radiologists, and rehabilitationists. Multidisciplinary care has been used to achieve more improvements in both functional outcome improvements and ensuring better recoveries among patients with pediatric AIS [6]. A much-needed rehabilitation included fully active physiotherapy for recovering the motor functions and speech therapy, which was necessary due to the dysarthria condition of the patient. Studies support such a belief in children that it is early and continued rehabilitation that brings huge improvement in neurological plasticity with functional outcomes improved [10].

The Need for Pediatric-Specific Guidelines: One glaring omission is that there are no guidelines concerning pediatric stroke. Ongoing and future prospective studies, such as the International Pediatric Stroke Study (IPSS), are designed to produce a plethora of evidence-based policies that must differ because of the uniquely functioning physiology and anatomy of a child compared with an adult [11]. Guidelines would provide a consistency in treatment; with disparity in healthcare resources, results could vastly improve.

Key Takeaways

1. When carefully adapted, thrombolytic therapy can be a viable option for pediatric AIS when pediatric guidelines are not available.

2. Advanced neuroimaging is very useful in the prompt diagnosis of the condition, which otherwise may show nonspecific or atypical presentations.

3. Teamwork and multidisciplinary rehabilitation are, therefore, very important to ensure favorable functional recovery.

4. There is a great need for the standardization of pediatric AIS protocols, enabling less complicated, seamless care with better outcomes.

This case adds to the ever-growing evidence in support of adopting adult AIS protocols in pediatric cases, with a reiteration of the dire need for dedicated pediatric stroke research.

Conclusion

This case therefore demonstrates the successful application of thrombolysis protocols in adults in the management of pediatric AIS. Multidisciplinary care, timely diagnosis, and early rehabilitation were important in the achievement of a positive outcome. However, this case also underscores the urgent need for evidence-based guidelines specific to the pediatric population to standardize care and improve outcomes in children with AIS. Future studies of pediatric AIS population must focus again on the expansion of disease understanding of the problem in pediatrics and the evaluation of relative safety and pharmacologic efficacy in kids.

Patient's Perspective: They also extend their gratitude for the timely diagnosis he got and the proper treatment thereafter. The family noted improvement in the patient's motor function: speech improvement has enabled him to do all activities like previously, but with minor limitations. They also emphasize follow-ups and rehabilitation as supportive measures in their journey of recovery.

Acknowledgments. The authors are deeply grateful for the effort the medical team put into diagnosing, treating, and rehabilitating the patient. Appreciation is extended to the joint team effort in handling the case, led by the radiology and neurology departments.

Conflict of Interest Statement. The authors also declare no conflicts of interest related to this case report.

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Педиатриялық науқаста ишемиялық инсульт: Тәжірибедегі жағдайды сипаттау

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Түйіндеме

Балалардағы ишемиялық инсульт – ерте диагностика мен тиімді араласуды қажет ететін өте сирек, бірақ өмірлік маңызды ауру.

Бұл хабарламаның мақсаты: 15 жастағы баладағы ишемиялық инсульт жағдайын сипаттау.

Науқастағы негізгі клиникалық белгілер сол жақтағы әлсіздік, сөйлеудің бұзылуы және қатты бас ауруы болды. Бұл сырқатты диагностикалауда неврологиялық тексерулер мен компьютерлік томография маңызды рөл атқарды. Екінші тексеру кезінде оң жақ таламус аймағында ишемиялық өзгерістер анықталды. Балаларға арналған арнайы хаттамалар болмағандықтан, емдеу ересектердің тромболиздік терапия хаттамаларына негізделіп жүргізілді. Пациентке рекомбинанттық плазминогенін активатор енгізілді. Ерте реабилитация және көп салалы мамандар әркеті оң нәтижелерге қол жеткізуге ықпал етті. Науқастың қозғалыс функциялары мен сөйлеуі қалпына келтірілді.

Баяндама балалар инсультін емдеу бойынша нақты хаттамалардың қажеттілігін баса айтады. Мұндай хаттамалар диагностика мен емдеуді жетілдіруге көмектеседі.

Түйін сөздер: балалар ишемиялық инсульты, тромболитикалық терапия, гемипарез, оңалту, гипертензия.

Ишемический инсульт у педиатрического пациента: Случай из практики

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Резюме

Ишемический инсульт у детей - чрезвычайно редкое, но жизненно важное заболевание, требующее ранней диагностики и эффективного вмешательства.

Цель сообщения: продемонстрировать клинический случай ишемического инсульта у 15-летнего мальчика.

Основные симптомы пациента включали слабость в левой стороне, нарушение речи и сильную головную боль. Диагностика была успешно проведена с использованием неврологических обследований и компьютерной томографии. Во время второго сканирования выявлены ишемические изменения в правой таламусной области. В виду отсутствия протоколов для педиатрических пациентов, лечение пациента основывалось на протоколах тромболитической терапии для взрослых. Пациенту был введен рекомбинантный тканевой активатор плазминогена. Ранняя реабилитация и мультидисциплинарный подход способствовали положительному результату. Восстановлены двигательные функции и речь пациента.

Данный клинический случай подчеркивает необходимость создания протоколов для лечения инсульта у детей. Подобные протоколы позволят улучшить диагностику и лечение ишемического инсульта у педиатрических пациентов.

Ключевые слова: детский ишемический инсульт, тромболитическая терапия, гемипарез, реабилитация, гипертония.