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Case Report

Falls leading to weakness or weakness leading to falls: an eternal dilemma

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ABSTRACT

Falls are common among children. A fall may be the consequence of an underlying stroke, or conversely, a fall itself may precipitate a stroke. Additionally, paediatric stroke can present with varied and nonspecific manifestations, making diagnosis challenging. Urgent diagnosis requires timely identification and starting of therapy, which makes recovery faster. Case 1: An 8-month-old male infant developed acute right-sided hemiparesis following trivial fall. MRI brain showed left lentiform nucleus acute infarct, and linear calcification on CT. Child was treated with aspirin, iron, and physiotherapy, with improvement over three months. Case 2: A 16-month-old boy presented with left-sided weakness after a fall. CT head showed linear hyperdensity in right caudate nucleus. Child was managed with aspirin and physiotherapy, with gradual recovery over six months. Aspirin therapy, along with physiotherapy and supportive treatment led to a good response in both the cases. Importance of considering mineralizing microangiopathy in paediatric patients with unexplained neurological symptoms following trauma is emphasized.

Keywords: Mineralizing microangiopathy, Paediatric stroke, Vasculopathy, Stroke after minor trauma

INTRODUCTION

Falls are one of the most common causes of childhood injury, accounting for a significant proportion of emergency visits. While most falls result in minor trauma, a subset of children may develop disproportionate neurological deficits, necessitating evaluation for underlying pathological causes.

Minor head trauma has been identified as a potential trigger for stroke in predisposed infants and young children.[1] Mineralizing microangiopathy of lenticulostriate arteries has emerged as a distinct clinic-radiological entity associated with basal ganglia infarction following trivial fall. Early recognition is essential to avoid unnecessary extensive investigations and to provide appropriate prognostic counselling, as recurrence risk is low.[1] Despite increasing awareness, this condition remains underdiagnosed.

CASE REPORTS

Case 1

An 8-month-old male infant presented to the outpatient department after allegedly falling from a standing position. Following the fall, the child went to sleep. After waking up after 2 hours, he was not moving his right upper and lower limb. Parents took him to nearby hospital for orthopaedic assessment, where X-ray shoulder and hip were done, which were normal. Because of persistent right-sided hemiparesis, child was referred to our hospital for further investigations. Upon evaluation, there were no previous neurological issues, seizures, or similar family history. The premorbid development was normal. Examination showed mild iron deficiency anaemia. Physical examination showed right-sided hemiparesis (grade 2/5 muscle power), brisk reflexes on the right side, and right facial nerve palsy.

MRI of brain was done, which revealed an acute infarction in the left lentiform nucleus (Figure 1). MR angiography was normal, ruling out large vessel occlusion. A CT head showed linear calcification in the area of hypodensity (Figure 2).

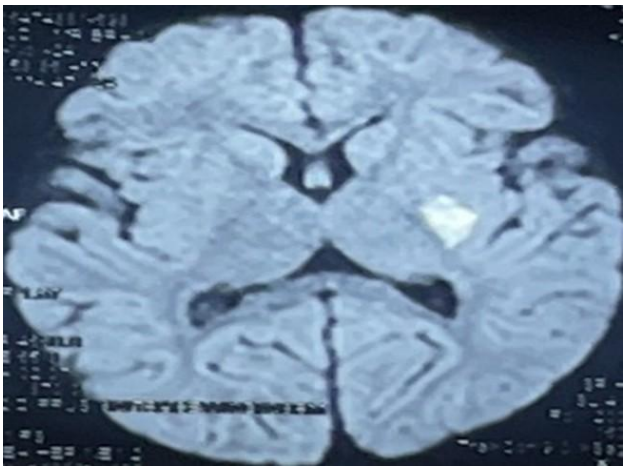

Figure 1: MRI brain diffusion weighted imaging axial cuts showing left lentiform nucleus diffusion restriction.

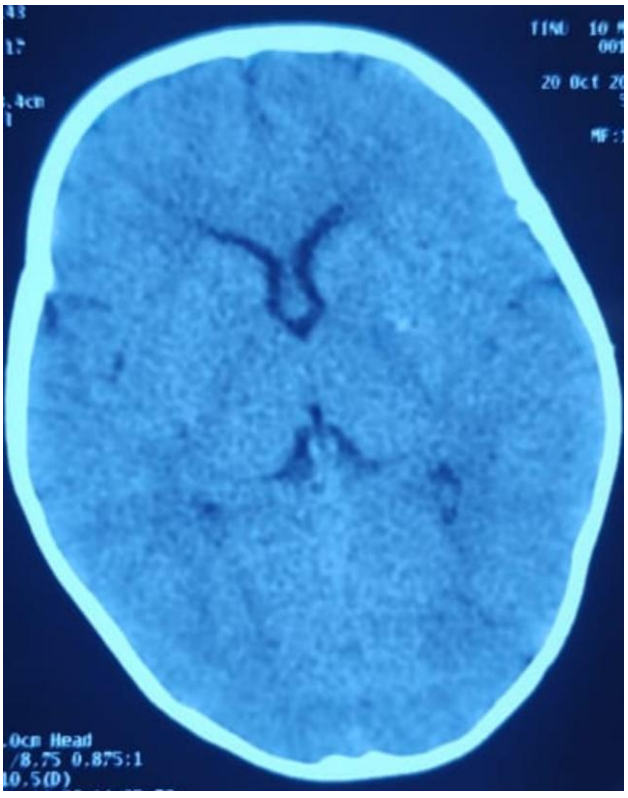

Figure 2: Non contrast CT head showing linear hyperdensity in left lentiform nucleus.

Blood tests indicated microcytic hypochromic anaemia, and iron studies confirmed low serum iron and ferritin levels, consistent with iron deficiency anaemia. Stroke workup done including echocardiography and pro-coagulant profile was normal. The final diagnosis was acute left basal ganglia infarction, likely secondary to mineralizing microangiopathy, with iron deficiency anaemia. Child was started on iron supplementation, aspirin and physiotherapy. Gradually child improved over 3 months with resolution of right hemiparesis**.**

Case 2

A 16-month boy presented with excessive crying following fall from bed. Then child went to sleep. Upon awakening 3 hours later, child developed weakness of left side of body. Child had normal premorbid development with adequate nutrition and normal growth up to age. There was no family history of stroke. On the basis of history, differentials made were traumatic brain injury, metabolic abnormalities or infection. NCCT done revealed focal linear hyperdensity in right caudate nucleus. MRI brain revealed acute infarct involving body of right caudate nucleus, internal capsule and corona radiata, with normal MR angiography. Stroke workup done including echocardiography, anaemia profile, and procoagulant workup were normal. Metabolic workup and sepsis markers also came negative. Child was started on aspirin and physiotherapy, following which the weakness improved over 6 months.

Both children were followed up in the outpatient department and received regular physiotherapy and occupational therapy. The first child was followed for 10 months and regained age-appropriate developmental milestones. The second child was followed up to 20 months and showed mild paucity of movements. Although aspirin is widely used in the management of ischemic stroke, previous literature suggests that outcomes in paediatric patients not treated with aspirin may be comparable to those receiving aspirin. Aspirin is also associated with potential adverse effects, including the risk of Reye syndrome and bleeding. At our centre, aspirin is routinely used in the management of such patients.

DISCUSSION

This case highlights a rare but increasingly recognized phenomenon of basal ganglia infarction following minor trauma in infants.[1] While falls in children typically result in orthopaedic injuries such as fractures or sprains, in certain cases, they may also lead to more severe conditions like stroke. The pathophysiology of stroke in this context often involves pre-existing vascular abnormalities, such as mineralizing microangiopathy of the lenticulostriate arteries, which predisposes the child to ischemic events after trauma.[2,3] Mineralizing microangiopathy is characterized by the calcification of small arteries, such as the lenticulostriate arteries, which supply blood to the basal ganglia. This condition can increase the risk of thrombus formation and ischemic stroke, particularly after minor trauma.[4,5] In the first case, patient's MRI findings of an acute infarction in the left

lentiform nucleus support the diagnosis of basal ganglia stroke secondary to mineralizing microangiopathy. Basal ganglia strokes in infants are rare but have been increasingly recognized, particularly in those with underlying vascular abnormalities.[1] Iron deficiency anaemia, a common condition in infants, can also contribute to a hypercoagulable state, increasing the risk of thrombosis.[6] In this case, the infant's low iron and ferritin levels may have played a role in the development of the stroke. Iron deficiency anaemia has been associated with thrombophilia, and its co-occurrence with mineralizing microangiopathy likely exacerbated the risk of ischemic events in this patient.

The management of such cases requires a multifaceted approach. In both cases, aspirin therapy was initiated to reduce the risk of recurrent strokes. Iron supplementation was also prescribed to address the underlying iron deficiency anaemia. Physical therapy was started to assist in the rehabilitation of the child, focusing on the recovery of motor function. These cases underscore the importance of recognizing atypical presentations of stroke in infants. Paediatric falls, especially those leading to neurological deficits like hemiparesis, should prompt a thorough evaluation to identify potential underlying causes such as vascular abnormalities or coagulopathies.[7] Initial imaging may not always reveal significant abnormalities, so a high index of suspicion is necessary when the clinical presentation is concerning.

Learning points

Paediatric falls, while common, should always be evaluated comprehensively to identify not only orthopaedic injuries but also neurological or systemic conditions that may predispose to more severe outcomes, such as stroke. A multidisciplinary approach, including imaging, laboratory tests, and rehabilitation, is crucial in managing complex cases of paediatric stroke.

CONCLUSION

Falls are common in childhood, but presence of persistent weakness after a fall should lead to not only orthopaedic, but also neurology consultation. Strokes in childhood, especially in infancy commonly present after a fall. Additionally, iron deficiency is rampant in children from low- and middle-income countries, which potentiates the occurrence of stroke in this population. Recognizing stroke early has treatment implications as early institution of anti-platelet or anti-coagulant therapy along with physical rehabilitation and correction of anaemia helps in faster recovery of such cases.

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