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Ischemic stroke due to minor head trauma in a child: a case report

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ABSTRACT

Head trauma usually causes hemorrhage, but in children ischemia of basal ganglia may develop. Traumatic stroke occasionally develops after dissection of brain vessels, leading to disseminated cerebral embolism. Stretching forces in cerebral intraparenchymal arteries can cause vascular damage followed by an occluding thrombus. An 18-month-old girl presented to our emergency department with the complaint of head trauma after falling down while playing. Her parents recognized the weakness of her left site extremity after 6 hours after the event. After initial physical examination and further imaging studies brain magnetic resonance imaging (MRI) showed an infarct affecting the caudate nucleus in the right cerebral hemisphere. In childhood, ischemic stroke due to mild head trauma is an exceedingly rare event and may be overlooked in emergency medicine practice. We aimed to emphasize that mild head trauma may cause critical situations such as acute infarct in children.

Keywords: cerebral infarction, head trauma, traumatic stroke

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Trauma can cause many vascular complications. Recognition of childhood stroke is difficult and in children under 18 months is a frequently skipped diagnosis. It is caused by vasospasm of the lenticulostriat arteries in childhood which are disrupted by head injury [1]. Ischemic stroke is an important clinical problem in childhood affecting around 5/100.000 children each year. Although detailed investigation usually reveals risk factors for stroke in the majority of affected children, there is a small group of whom no risk factors can identified. In head injuries the connection between the underlying brain injury and neurological symptoms are usually obvious, and the severity of trauma correlates with the clinical symptoms. Minor head injuries are common accidents and usually cause no severe complications [2]. We present an 18-month girl with hemiparesis due to a post-traumatic infarction in the territory of the right lenticulostriat artery.

CASE PRESENTATION

An 18 month-old girl was referred to our observation following a head injury involving the left zygomatic region. She fell while running onto a thinly carpeted floor. The child did not lose consciousness and had no history of seizures. After 6 hours her parents recognized the weakness in her left arm and leg. Clinical examination confirmed a left hemiparesis

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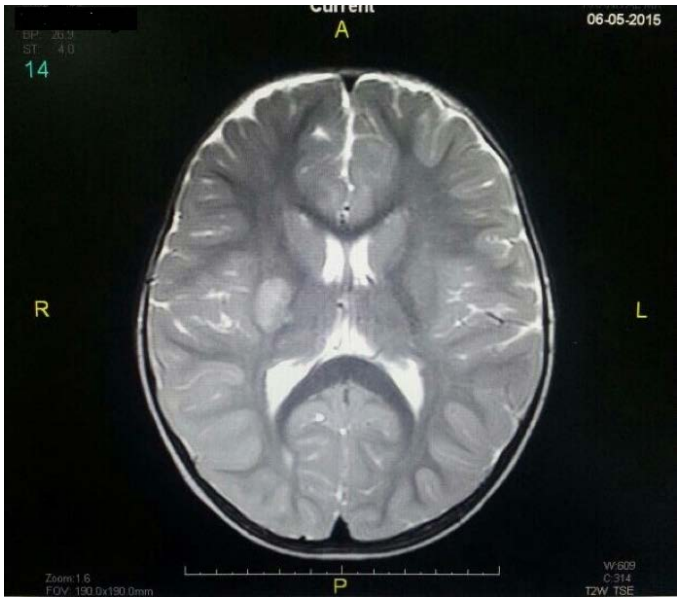

Figure 1. Magnetic resonance imaging (T2 sequence) shows a sharply demarcated high signal intensity lesion.

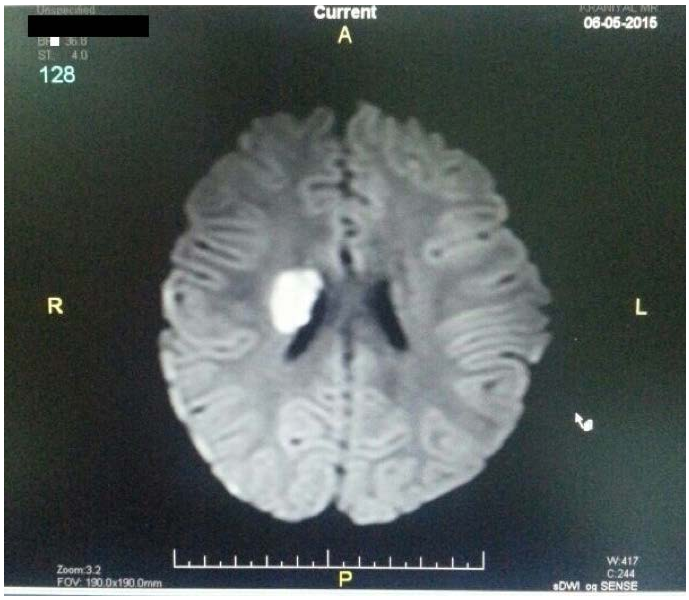

Figure 2. Magnetic resonance imaging (Flair sequence) shows a sharply demarcated high signal intensity lesion.

with 3/5 muscle tone and positive Babinski reflex on left site. Immediately cerebral CT and extremity X-ray showed no abnormalities. Further imaging studies were obtained to find the etiology of hemiparesis. Brain MRI showed an infarct affecting the caudate nucleus and corona radiata in the right cerebral hemisphere. Diffusion-weighted images showed a sharply demarcated high signal intensity lesion in a similar area on T2 weighted and fluid-attenuated inversion recovery sequences images (Figures 1 and 2). In brain MR angiography normal blood flow pattern has been determined. There was no additional finding in her blood count and coagulation parameters. She admitted to pediatric neurology service for anticoagulant therapy and follow-up. Cardiological and immunological tests were in normal range but in her genetic tests Factor V (G1691A, Leiden) and MTHFR (A1298C), mutations were positive. Conservative therapy resulted in symptomatic improvements and the patient discharged with a hemiparesis on the nineteenth day of her admission.

DISCUSSION

Whether ischemic stroke related to minor head trauma is seen in 5/100,000 children each year, it is an important diagnosis [1]. Children are particularly vulnerable to, stretching and shearing forces effects on the vessels because of the high moment of brain meninges. This leads to a traumatic endothelial intimal lesion, followed by fibrin accumulation, leukocyte reaction, and a formation of a white thrombus occluding the lumen. The obstruction causes ischemia of cerebral parenchyma with clinical symptoms after a symptomless latency period [2]. Common conditions predisposing to stroke include embolism associated with congenital or acquired heart disease, or arterial malformations as in the Ehler Danlos syndrome, and fibromuscular dysplasia. Further risk factors are sickle cell disease, dehydration, meningitis, varicella infection, homocystinuria and hemolytic uremic syndrome [3]. It is mandatory to exclude all possible secondary causes before classifying a cerebral infarction in children as idiopathic. Therefore CT scan, brain MRI with diffusion weighted imaging, angio MRI, carotid doppler imaging, echocardiogram and complete blood workup should be performed.

Prothrombotic polymorphisms, such as the substitution of arginine with glutamine at amino acid residue 506 in coagulation factor V (factor V Leiden [FVL]) and a G-to-A transition at position 20210 of the 39 untranslated region of the factor II gene (FII G20210A), have been found to be the most common risk factors for venous thromboembolism [3-5]. Increased prevalence of FVL was observed in some

reports on pediatric arterial thromboses and stroke [6, 7] but many other studies have no similar outcomes. Similarly, the association between FII G20210A and childhood stroke is controversial [7, 8]. In addition, the homozygous state for the C-to-T transition at nucleotide 677 (C677T) polymorphism of 5,10-methylenetetrahydrofolate reductase (MTHFR) gene was not found to be a risk factor for stroke in children [6-8].

Mild head injuries may cause cerebral infarction at the internal capsule due to mechanical vasospasm or thrombosis of the perforating vessels, although ischemic symptoms are not so severe and tend to disappear in the early period by conservative therapy. Rapid reversal or attenuation of neurological symptoms may be attributed to the resolution of vasospasm [4, 5].

In general practise minor head travma is a comman cause of emergency admissions. Most cases have no clinical sign or symptoms for acute brain injury. Presence of pathologic findings on physical examination traumatic hemorrhage is the expected result.

CONCLUSION

Emergency physicians must be aware of lenticulostriat infarction as a rare complication of mild trauma in young children and early diagnosis can prevent possible permanent neurological damage.

Informed consent

Written informed consent was obtained from the patient's family for publication of this case report and any accompanying images.

Conflict of interest

The authors declared that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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