

CASE REPORT

Complete early regression of asymptomatic hindbrain herniation caused by minor head trauma

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Abstract

Very few cases of cerebellar tonsillar herniation resulting from head trauma have previously been reported. We present a case of an 11-month-old girl who suffered a minor head trauma. Computed tomography (CT) scan of the head showed an occipital bone fracture and blood in the fourth ventricle. Magnetic resonance imaging (MRI) scan of the brain 2 days later revealed cerebellar edema and displacement of the cerebellar tonsils 6 mm below the foramen magnum. She was discharged from the hospital without neurological deficits. Repeat brain MRI scan, 1 month after trauma, demonstrated complete regression of the hindbrain herniation. During the hospital stay and at follow-up, no symptoms and signs related to posterior fossa involvement were noted.

INTRODUCTION

Caudal displacement of the cerebellar tonsils into the upper cervical canal, either congenital or acquired, has previously been described [1–3]. Incidental caudal displacement of the cerebellar tonsils on Magnetic Resonance Imaging (MRI) has also been reported in asymptomatic patients or in patients with symptoms unrelated to posterior fossa involvement [2–4]. Few cases of downward displacement of cerebellar tonsils in children following head trauma have been reported in the literature [1, 3–7].

A case of an 11-month-old female with a temporary cerebellar tonsillar herniation due to mild head trauma that totally regressed shortly after the injury is presented.

CASE REPORT

An 11-month-old female with free previous medical history was transferred to the hospital after a fall trauma. Loss of consciousness and vomiting were reported immediately after the

event. On clinical examination, she was slightly lethargic but responsive to voice and could open her eyes. No paresis in the cranial nerves and limbs was noted.

She underwent computed tomography (CT) scan of the brain which demonstrated an occipital bone fracture and a small bleeding in the fourth ventricle associated with a minimal dilatation of the third and lateral ventricles (Fig. 1).

In the first hours following her admission, her neurological status gradually improved and 48 h after the injury she was fully alert and responsive, without any neurological deficits. A brain magnetic resonance imaging (MRI) was performed on the second post-traumatic day which showed small hemorrhagic contusions in the cerebellar tonsils and in the right basal ganglia. In addition, a 6 mm displacement of the cerebellar tonsils through the foramen magnum was noted (Fig. 2).

She was discharged from the hospital on Day 7 following the injury. Four months later, she remained asymptomatic. On

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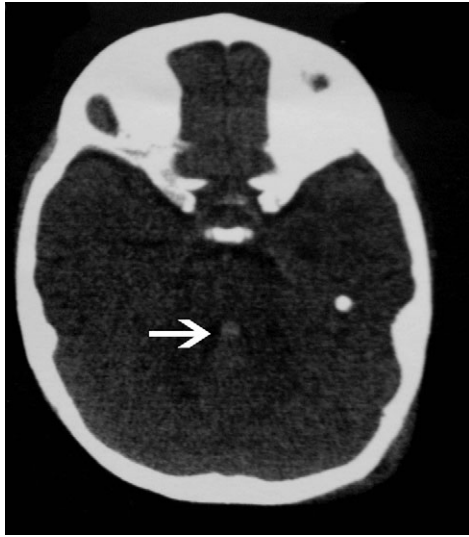


Figure 1: Computed tomography (CT) scan of the head following traumatic brain injury showing blood in the fourth ventricle.

a scheduled follow-up, she underwent a new brain MRI which showed absence of edema and hemorrhage. Complete regression of the tonsillar herniation was also seen (Fig. 3).

DISCUSSION

Chiari I malformation is defined as a downward herniation of the cerebellar tonsils of at least 5 mm through the foramen magnum and it is sometimes accompanied by syringomyelia [1, 2, 5]. The term Chiari malformation can be criticized for being a misnomer as it typically refers to a congenital abnormality. Since it can also be acquired and reversible [1-3], the term hindbrain herniation probably describes more accurately this condition. However, mainly for communication purposes, the name Chiari malformation is frequently used in clinical practice [8].

Acute clinical onset of cerebellar tonsillar herniation is rare with 1.2% of patients admitted to the hospital after a minor head or neck trauma or no trauma at all [4, 9, 10]. It has rarely been reported with acute neurological presentation following head trauma [4, 6]. Minor head trauma associated or not with neck flexion-extension that occurred few hours or days before the presentation of symptoms has been preceded in most cases [1, 3, 4, 9]. Symptoms vary from headache, mild drowsiness, nausea and vomiting to altered level of consciousness, cranial nerve deficits, acute respiratory failure and even sudden death [1, 3, 4, 9].

Cerebellar tonsil contusion in combination with newly diagnosed herniation was found only in four previously reported cases (Table 1) [1-3, 7]. The mechanism of injury was either fall from small height, blunt head trauma or car accident. Some patients presented with impaired level of consciousness, which, in one case, required mechanical ventilation [2].

It should be mentioned that, in two cases, in the follow-up brain MRI scan, the cerebellar tonsillar herniation regressed, partially from 8 to 5 mm in 6 days and completely in 1 month, respectively [1, 2]. In one report, the patient had symptoms related to the herniation, such as oropharyngeal dysfunction [1], while in another report, head trauma resulted in impaired level of consciousness that required mechanical ventilation [2].

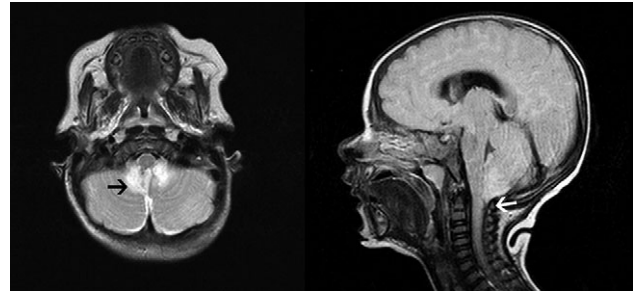


Figure 2: T1- and T2-weighted magnetic resonance imaging (MRI) of the brain showing (left): diffuse hemorrhage and edema in the cerebellar tonsils (right): displacement of cerebellar tonsils 6 mm below foramen magnum.

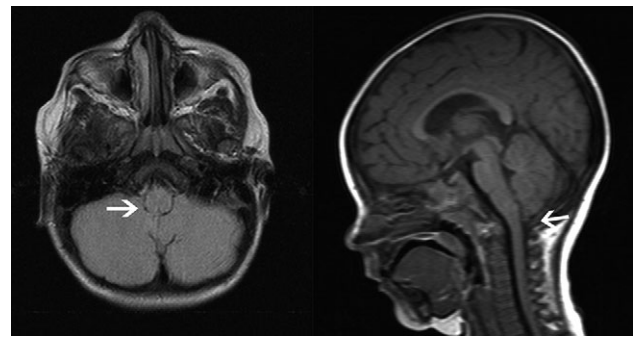


Figure 3: T1-weighted magnetic resonance imaging (MRI) of the brain 1 month following injury showing (left): absence of hemorrhage and edema in the cerebellum (right): complete regression of cerebellar tonsillar herniation.

In the current case, despite head trauma and the radiological diagnosis of hindbrain herniation, no symptoms related to posterior fossa involvement were noted. Although, cerebellar edema and tonsillar displacement were evident, they did not cause relevant clinical signs since for unknown reason head-injury related symptoms prevailed. On the contrary, in other previously reported cases, patients presented to the hospital ataxic, paretic or with acute respiratory failure [1, 2, 5, 6, 9]. No previous brain images were acquired, but, apparently, displacement of the cerebellar tonsils did not pre-exist since it fully regressed soon after the incident. During head trauma that caused posterior fossa contusions and edema, the mechanism of acute flexion-extension injury probably resulted in increased pressure in the posterior fossa that caused the cerebellar herniation. When the pressure decreased and the cerebellar swelling subsided, tonsillar herniation also regressed. It should be mentioned though that since the event of head injury occurred at an age where the child was not able to independently stand and walk, the likelihood of presentation of cerebellar signs and symptoms in later years must be taken into consideration.

In the current case, the possibility of an atypical presentation of traumatic hindbrain herniation that fully regressed shortly is highlighted. The patient suffered a minor head trauma and presented only with minimal symptoms unrelated to the traumatic herniation. Caution is needed when dealing with these patients. The possibility of a temporary hindbrain herniation should also be considered and recognized promptly on radiology, as life-threatening conditions from the involvement of the cerebellum, the brain stem and the craniovertebral junction can occur.

Table 1: Cases with hindbrain herniation in children diagnosed following head trauma

Author, year	Age	Trauma mechanism	Major symptoms	Radiological findings	Degree of tonsillar herniation (mm)	Follow-up (m)	Radiological outcome	Clinical Outcome
Erlich, 1989	32 m	Fall	Upper extremity paralysis	Medulla contusion	Not mentioned	5 m	Remained herniation	Distal upper extremity weakness
Spina, 2015	6 m	Fall	Oropharyngeal dysfunction	Tonsillar edema and contusion	8 mm	6 d	Tonsillar herniation of 5 mm	Full recovery
Serlin, 2016	29 m	Fall	Drowsiness, vomiting	Tonsillar edema and contusion	3.9 mm	8 m	Tonsillar atrophy (Complete regression)	Full recovery
Öğrenci, 2017	15 y	Road accident	Coma	Tonsillar contusion	Not mentioned	3 m	Complete regression	Full recovery
Present case	11 m	Fall	Drowsiness	Tonsillar contusions, intraventricular blood	6 mm	4 m	Complete regression	Full recovery

d, days; m, months; y, years.

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None.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

FUNDING

None.

ETHICAL APPROVAL

No ethical approval was needed for this case report.

CONSENT

Written informed consent was obtained.

GUARANTOR

All authors are the guarantors of this report.

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