

Hemoragična možganska kap pri otrocih – predstavitev primera

Hemorrhagic stroke in children: A case report

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Ključne besede:

hemoragična kap, arteriovenska malformacija, zdravljenje

Key words:

hemorrhagic stroke, arteriovenous malformation, treatment

Članek prispel / Received

13. 8. 2020

Članek sprejet / Accepted

17. 5. 2022

Izvleček

Namen: Namen prispevka je predstaviti klinični primer hemoragične kapi pri otroku.

Priказ primera: V kliničnem primeru predstavljamo 13-letnega otroka s hemoragično kapjo, ki je bila posledica spontane krvavitve iz prirojene arteriovenske malformacije možganskih žil.

Zaključek: Čeprav je možganska kap redka bolezen pri otrocih, je pomemben vzrok za težke okvare in smrt otrok. Natančen, kliničen nevrološki pregled ter slikovna diagnostika so ključni pri prepoznavanju in zdravljenju arteriovenskih malformacij. Te so najpomembnejši vzrok za

Abstract

Purpose: The purpose of this report is to present a case of hemorrhagic stroke in a child.

Case report: We present a 13-year-old child with a hemorrhagic stroke, which resulted from spontaneous bleeding of congenital arteriovenous malformations in the brain.

Conclusion: Although a brain stroke in children is rare, it is an important cause of disability and mortality. Clinical, neurologic, and radiologic examinations are key for the detection and treatment of arteriovenous malformations, which are the most important cause of hemorrhagic stroke in children and may threaten

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hemoragično kap pri otrocih, ki lahko ogrozijo otrokovo življenje. a child's health and life.

INTRODUCTION

Hemorrhagic strokes most often occur in children as a result of arteriovenous irregularities or as a complication of brain tumors, but rarely secondary to hematologic disorders. Additional causes of bleeding include vasculopathies, vasculitis, and cavernous angiomas (1). Unlike intra-brain hemorrhage, subarachnoid bleeding occurs less frequently, with an incidence of 0.3/100,000 children (2). The clinical presentation of a hemorrhagic stroke is characterized by a severe headache and vomiting, followed by focal or generalized seizures (one-third of cases). Hemiparesis occurs in 10%–20% of cases. In such cases it is essential to exclude arteriovenous malformations of the brain, which represent 30%–50% of hemorrhagic strokes in children (1,2). In patients with arteriovenous irregularities, a neurosurgeon with an interventional radiologist and a pediatrician decide on further treatment, especially surgical or endovascular treatment (3,4).

CASE REPORT

A 13-year-old boy was admitted to the Division of Pediatrics due to a disturbance of consciousness, headaches, and vomiting.

At the time of admission, he was fatigued, but spatially-oriented, the vital signs were stable, and there were no signs of infection. The neurologic examination was significant for the following: no lateralization; speech

was poor and dysarthric; and the Glasgow Coma Scale (GCS) score was 13.

Computed tomography (CT) was performed immediately, which revealed a 5x2 cm infratentorial, intracerebral hematoma with surrounding edema (Figure 1a, 1b). Angiography (CTA) was performed, which showed a 2 × 3 cm arteriovenous malformation (AVM) at the bleeding site, which was supplied via the left superior cerebellar artery (SCA).

He was treated in the Department of Intensive Care and Therapy. Due to elevated intracranial pressure, it was necessary to remove the external effluent drainage. Moreover, magnetic resonance angiography (MRA) of the cerebral blood vessels was performed, which showed complex arteriovenous alteration at the bleeding site supplied via the left posterior cerebral artery (PCA) and SCA, and draining into the Galena vein (Spetzler-Martin grade 3; Figure 2a, 2b). Due to the complexity of the AVM (the presence of arteries, which in addition to the AVM supplied the brainstem and the presence of deep venous drainage), and the fact that the AVM nidus was small (3 × 2 cm), an endovascular method was chosen as the most appropriate method of treatment.

Two months later, following digital sub-tractional angiography (DSA; Figure 3a, 3b), an interventional radiologic procedure was made. Endovascular treatment was performed to exclude the vascular malformation from the brain circulation. After the procedure, MRA and DSA were performed, which showed stability after successful closure of the AVM (Figure 4a, 4b).

DISCUSSION

Brain AVMs are innate vascular changes due to errors in embryogenesis, that result in direct arteriovenous connections leading to arterial blood flowing directly into the drainage veins. Even though brain AVMs are congenital, they are rarely detected. The clinical presentation depends on the age of the child and the localization of vascular malformations. During the neonatal period, brain AVMs are associated with heart failure and hydrocephalus. In elderly children, brain AVMs may be suggested by intracranial or subarachnoid bleeding with headaches, seizures, or focal neurologic outbreaks (4).

The most common first symptom of a brain AVM is a headache (50%-70 % of cases). Other common symptoms include disturbances of consciousness, vomiting, focal neurologic outbreaks, and seizures. Diagnostic treatment requires accurate clinical and neurologic examinations and radiologic diagnostics (5). During the examination, attention is paid to the symptoms and signs of an elevated intracranial pressure. Imaging tests include CT, CTA, and magnetic resonance imaging (MRI). The gold standard of diagnosis and treatment planning is digital subtraction catheter angiography (6,7).

The optimal hemorrhagic stroke treatment team includes a neurosurgeon. In the acute phase it is essential to prevent brain herniation or treat the elevated intracranial pressure according to the same principles applied to head injuries (deep sedation, relaxation, head rest for 30°, maintenance of normal serum osmolality, and cooling if necessary).

The ICP is measured invasively. In patients with an elevated ICP, a neurosurgical consultation, possible hematoma drainage, external ventricular drainage, or a craniectomy are required (7,8).

Different methods are used to treat AVMs, such as embolization, stereotactic surgery, and microsurgery. The choice of treatment method depends on the age of the child, characteristics of the vascular malformation, and the experience of the surgeon or interventional radiologist. Given the complexity of the AVM and the fact that the nidus is small, as in our case, the most appropriate method is endovascular, rather than a surgical procedure because the

brainstem circulation can be compromised (8). The endovascular method does not always lead to complete removal of the AVM, so the endovascular method can be followed by surgical removal as a definitive method of AVM removal.

CONCLUSION

Although a brain stroke in children is rare, it is an important cause of disability and child mortality. The causes and risk factors are different in children than adults. Clinical, neurologic, and imaging examinations are key for the detection and treatment of the AVM, which are the most important cause of hemorrhagic stroke in children and may endanger a child's health and life.

ABBREVIATIONS

AVM- arteriovenous malformation
 CT- computed tomography
 CTA- computed angiography
 DSA- digital subtraction angiography
 GCS- Glasgow Coma Scale
 ICP- intracranial pressure
 MR- magnetic resonance imaging
 MRA- magnetic resonance angiography
 PCA- posterior cerebral artery
 SCA- superior cerebellar artery

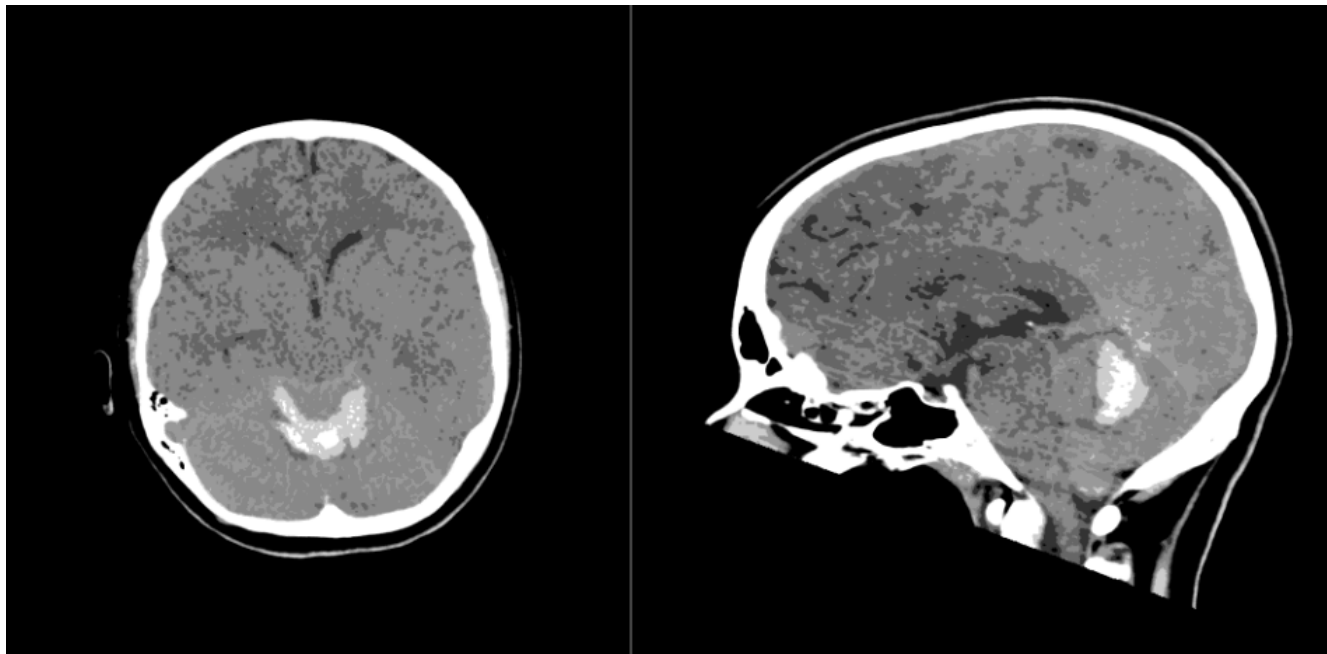


Figure 1a (left), 1b (right). Computed tomography (CT) showed a 5x2 cm infratentorial, intracerebral hematoma with surrounding edema.

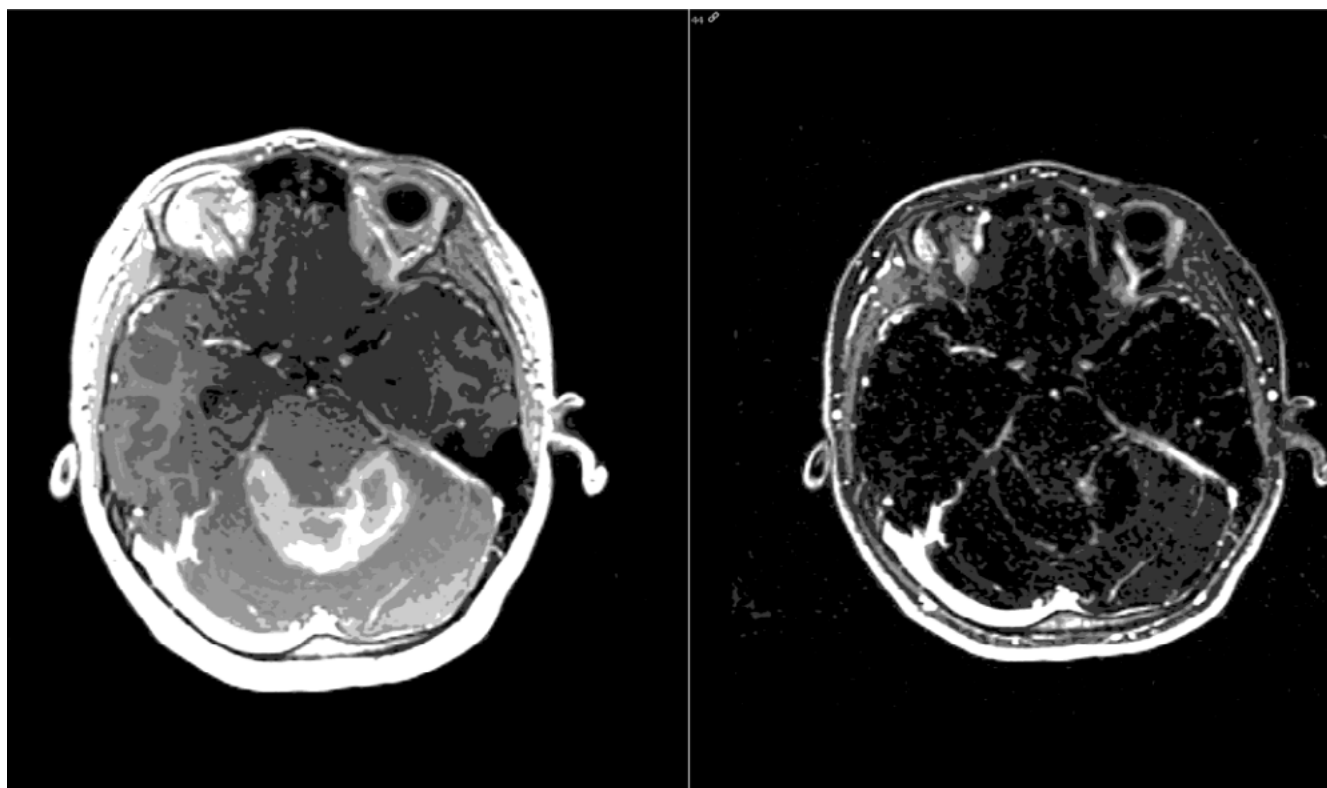


Figure 2a (left). MRI SPGR T1 after contrast application. Complex arteriovenous alteration at the site of bleeding supplied via the left PCA and SCA, and draining into the Galena vein (left picture). **Figure 2b (right).** MRI after deducting the pre - contrast image.

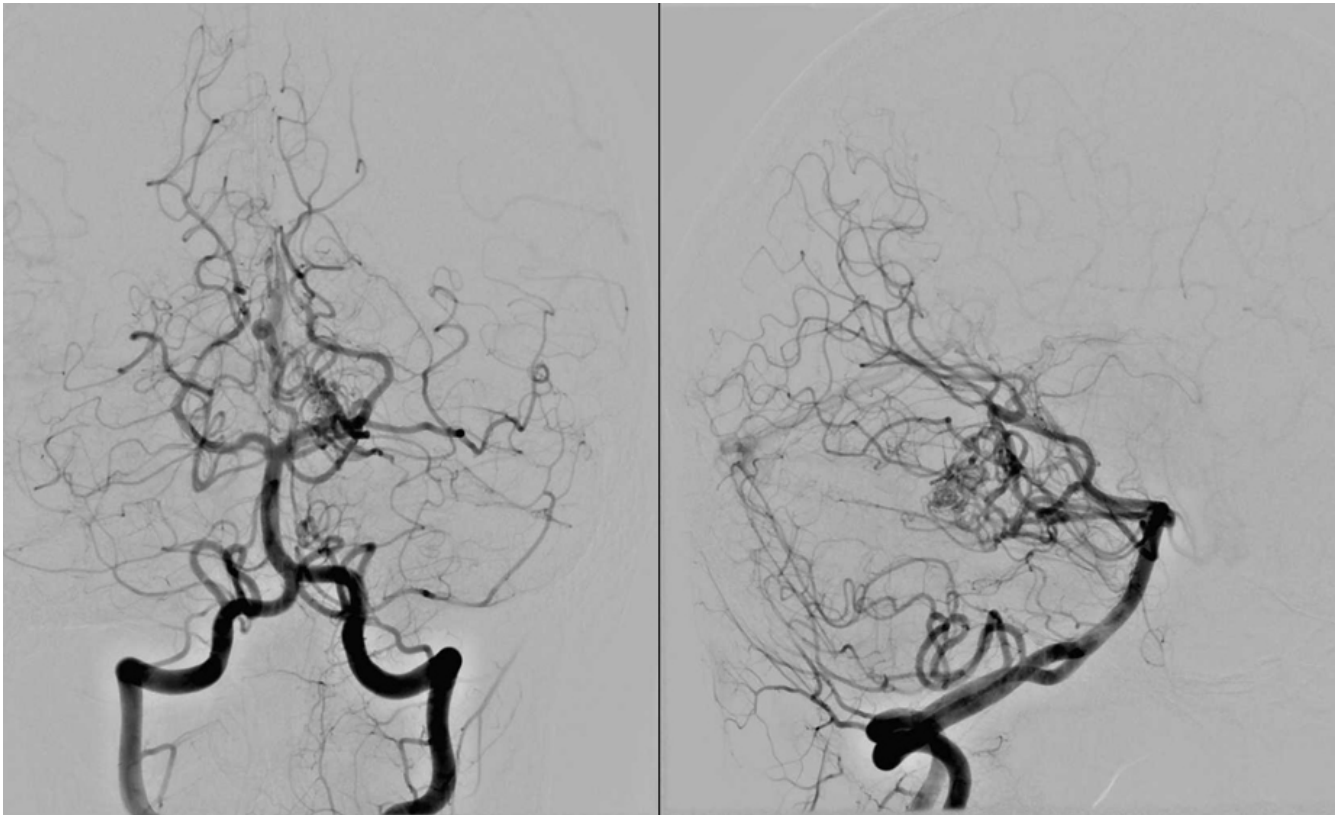


Figure 3a (left), 3b (right). DSA before interventional radiologic procedure.

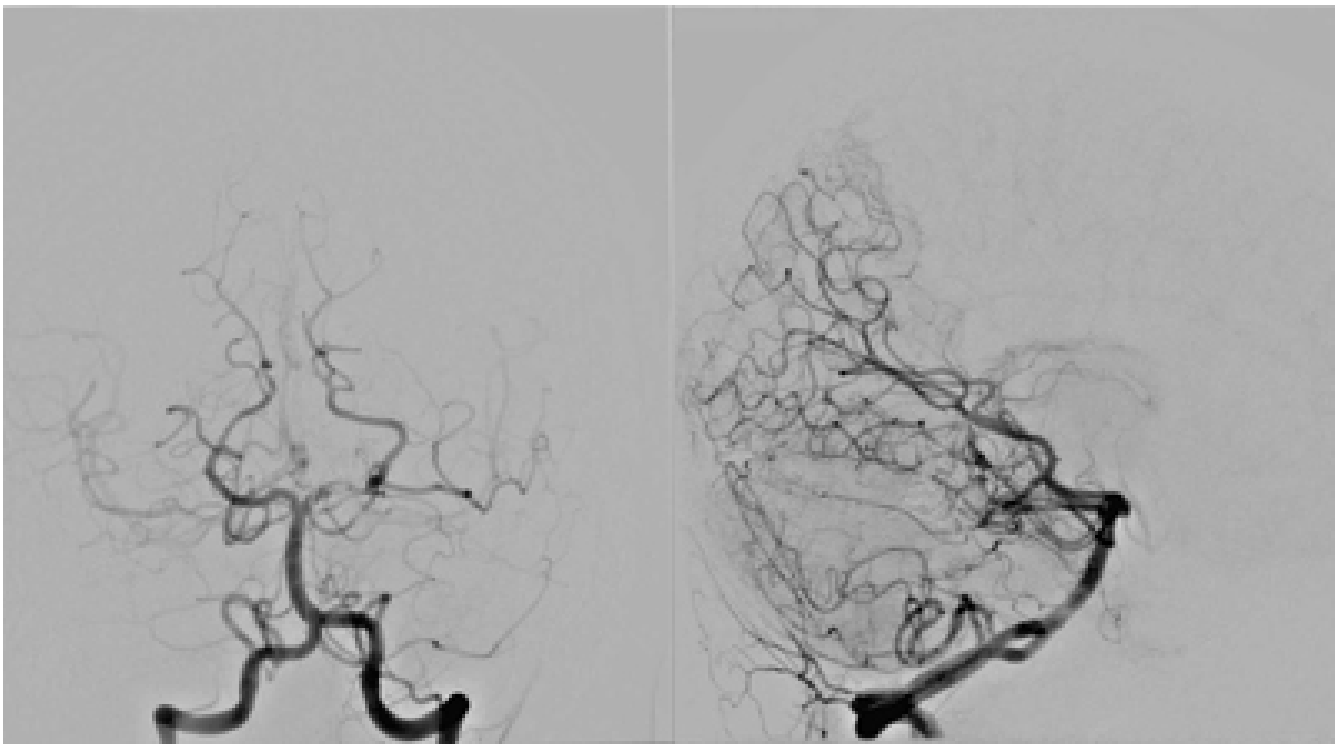


Figure 4a (left), 4b (right). DSA after interventional radiologic procedure.

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