ABDUCENS NERVE PALSY AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES - A DIAGNOSTIC PITFALL

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Abstract
Thrombosis of the cerebral veins and sinuses is an infrequent cerebrovascular disorder. Because the highly variable symptoms, recent neuroimaging plays a key role in the diagnosis. Abducens nerve palsy as a focal neurological deficit is a rare clinical manifestation in these patients. We present two cases with sudden onset of diplopia and headache.

Case 1: A 3-year old girl with B cell lymphoblastic leukemia developed bilateral abducens deficit and bilateral optic disc edema after treatment including L-asparaginase. Thrombosis of the right jugular vein, sagittal and right sigmoid sinuses was visualized on magnetic resonance imaging (MRI) and magnetic resonance venography (MRV). Symptoms gradually resolved after treatment with enoxiparine and MRV demonstrated recanalization.

Case 2: A 75-year old female with medical history of arterial hypertension presented with headache and sudden left abduction deficit. Computerized tomography (CT) scan was normal. MRI and MRV revealed aging brain and disruption of venous flow at the left internal jugular vein, suspecting thrombosis. Extracranial colour duplex sonography and CT angiography proved haemodynamic equivalent of left internal jugular vein thrombosis due to sclerotic pathology of aortic arch.

Our first case illustrates the role of improved neuroimaging techniques as the best method for diagnosis of cerebral veins and sinuses thrombosis, presenting with abducens nerve palsy. With second case the potential neuroimaging pitfalls concerning the accurate diagnosis of these cerebrovascular disorders with neuro-ophthalmologic manifestation are discussed.

Key words: abducens nerve palsy, cerebral veins and sinuses thrombosis, diagnostic pitfall

Introduction
Thrombosis of the cerebral veins and sinuses is an infrequent cerebrovascular disorder. Prothrombogenic risk factors or direct causes are often identified, e.g. oral contraceptives, L-asparaginase, head injury, lumbar punctation, systemic or local infections (otitis, mastoiditis) (2, 3, 4, 6, 8, 10, 11, 12, 15). The most frequent, but least specific clinical symptom of cerebral veins and sinus thrombosis, is severe headache. The neurologic stroke-like signs depend on the cerebral lesion’s localization, as well as the adequacy of venous collateral circulation: hemiparesis, aphasis, seizures, delirium, amnesia, mutism, coma and eye symptoms (periorbital edema, proptosis, chemosis, and paralysis of eye movements) (5, 14). Abducens nerve palsy, as a focal neurological deficit, is a rare clinical manifestation in these patients (7, 9). Isolated intracranial hypertension is characterized by headache with diplopia due to sixth nerve involvement and funduscopic presentation of papilledema. Because the highly variable symptoms, recent neuroimaging plays a key role in the diagnosis. Potential diagnostic and technical pitfalls related to image interpretation are discussed in the literature (1, 13). The best treatment options are anticoagulation to arrest the thrombotic process and dehydration to reduce the intracranial pressure (i.e. diplopia and papilledema) (5, 14).

We present two cases with sudden onset of diplopia and headache.

Cases Report
Case 1.
A 3-year old girl with one day headache and horizontal diplopia was presented at our neuro-ophthalmological section. She had a medical history of precursor B cell lymphoblastic leukemia without CNS involvement. Treatment according to the ALL BFM 2000 protocol, including L-asparaginase was started. A remission was registered. During the final of the first induction phase she suffered sudden headache and double vision. Neuro-ophthalmological examination showed bilateral abducens nerve palsy and funduscopy revealed bilateral optic disc edema. The coagulation state showed markedly elevation in factor VIII, but without presence of thrombophilic defects;
antithrombin III and protein C levels were within the normal range. Brain imaging was performed to look for possible intracranial complication of leukemia as the cause of neuro-ophthalmological manifestation. Thrombosis of the right jugular vein, sagittal and right sigmoid sinuses was visualized on magnetic resonance venography (MRV) (fig. 1) and computerized tomography venography (CTV) (fig. 2). Symptoms gradually resolved after treatment with IV infusions of mannitol and SC low molecular weight heparin injections. CTV demonstrated recanalization one month later (fig. 3).

**Case 2.**

A 75-year old female with medical history of arterial hypertension presented with headache and sudden double vision. Neuro-ophthalmologic examination showed abducens deficit in the left eye and intact other cranial nerves; normal visual acuity and Humphrey visual field test bilaterally; dilated funduscopy was within normal limits. MRV revealed aging brain and disruption of venous flow at the left internal jugular vein, suspecting thrombosis (fig. 4). Extracranial colour duplex sonography and CTV proved haemodinamic equivalent of left internal jugular vein thrombosis due to sclerotic pathology of aortic arch (fig. 5). Ischemic nature with atherosclerotic comorbidity of abducens nerve palsy was discussed. Adequate vascular therapy was administered. The left abducens palsy recovered gradually and two months later she had normal ocular movements.

**DISCUSSION**

Most isolated abducens nerve palsies are ischemic in nature. However there are other causes which require aggressive diagnostic and therapeutic management (7, 9). Thrombosis of the cerebral veins and sinuses, with highly variable symptoms and causes, most often affects young adults and children, but about 75% of the adult patients are women (3,4,6,8,10). All these patients with isolated intracranial hypertension have headache with diplopia, due to involvement of the sixth nerve, and papilledema on funduscopic testing (5, 14). The most sensitive examination techniques, leading to the correct diagnosis in these cases, are MRI, MRV, and CTV, but expert radiologic judgment is required to avoid diagnostic and technical pitfalls (1, 13). The accurate diagnosis helps to determine the more effective treatment and to improve the disease prognosis (9, 11, 15). In our first case it was important for the management and prognosis to identify the abducens nerves palsy and papilledema as symptoms of CNS involvement of the leukemia or as signs of veins and sinuses thrombosis, following L-asparaginase therapy. The exact imaging interpretation in the second case, revealed the appropriate therapeutic procedures.
**Fig. 2.** Computerized tomography venography: thrombosis of the right jugular vein, sagittal and right sigmoid sinuses.

**Fig. 3.** CTV demonstrated recanalization of right jugular vein, sagittal and right sigmoid sinuses.

**Fig. 4.** MRV: disruption of venous flow at the left internal jugular vein, suspecting thrombosis.
REFERENCES:


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