CEREBRAL VASCULAR MALFORMATION – AN INCIDENTAL DISCOVERY AFTER A TRAUMATIC BRAIN INJURY

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Abstract: *We present the case of a 50-year old patient, with no history of illness, who is brought to the emergency department suffering from a mild traumatic brain injury having fallen at home. The neurological exam was normal. An emergency native cerebral CT scan showed a fine hyperdense band in the right frontal lobe which persisted at a follow-up CT after 48 hours. The MRI scan revealed incidentally a vascular malformation in the right frontal lobe. Conclusion: Incidental findings at a native tomography scans should be thoroughly investigated using more sensitive imaging techniques.*

INTRODUCTION

Vascular malformations are a heterogeneous group of rare vascular lesions of the brain, spinal cord or dura mater. Some remain asymptomatic (static lesions), others enlarge and become hemorrhagic.

CASE REPORT

We present the case of a 50-year old female patient, with no history of illnesses, who is brought to the emergency department suffering from a mild traumatic brain injury. She fell at home and the episode was not followed by a loss of consciousness, but headache and vertigo was present at the time of admission.

On presentation in the emergency department she is hemodynamically stable, has a right frontal epicranian hematoma, Glasgow coma scale of 15 points, no meningeal irritation signs, no cranial nerve palsies and no other lateralization signs.

An emergency cranial CT showed at the time of admission a fine hyperdense band localized in the right frontal lobe and a right frontal epicranian hematoma (figure no. 1).

Figure no. 1. Native cerebral CT scan showing the right frontal hyperdensity (axial section)

The patient's condition evolved favourably under conservative treatment and a second cerebral CT scan was ordered for follow-up at 48 hours and it revealed the persisting hyperdensity.

The patient was scheduled for a cerebral MRI-scan because of the unknown origin of the persisting hyperdensity. The contrast enhanced cerebral MRI scan showed fine vascular formations converging into a vein which drains into the superior sagittal sinus.

Figure no. 2. Series of contrast enhanced MRI sequences (axial sections)

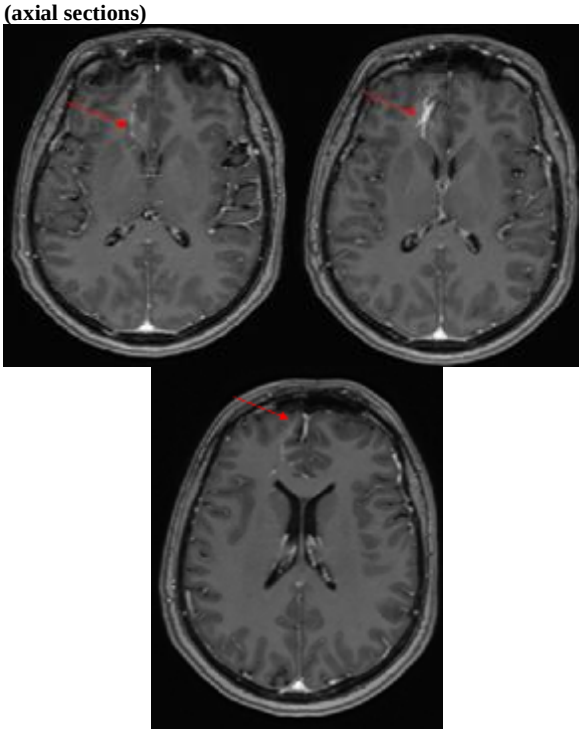

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Figure no. 3. Contrast enhanced MRI scan in coronal section showing the right frontal drainage vein

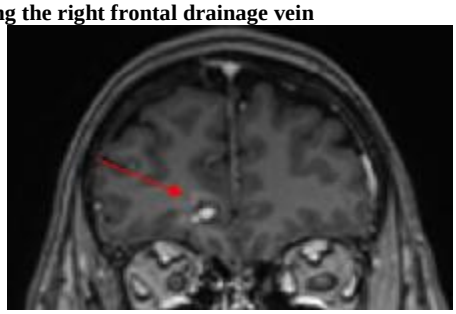


Figure no. 4. Contrast enhanced MRI scan in sagittal section showing the vascular malformation

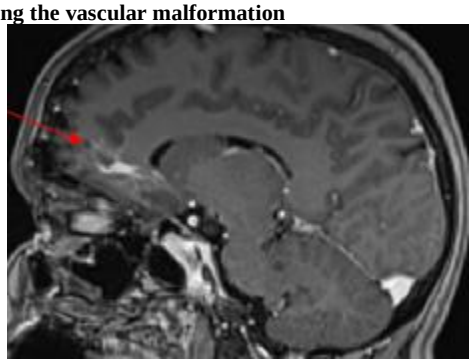


Figure no. 5. Diffusion sequence (axial section) showing the non-restricted lesion

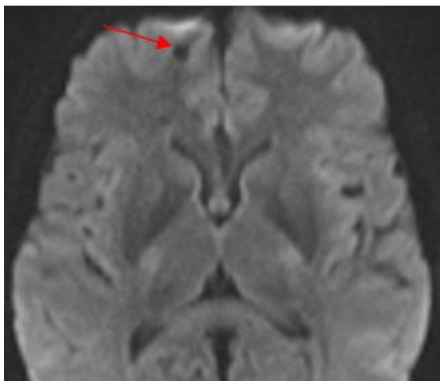
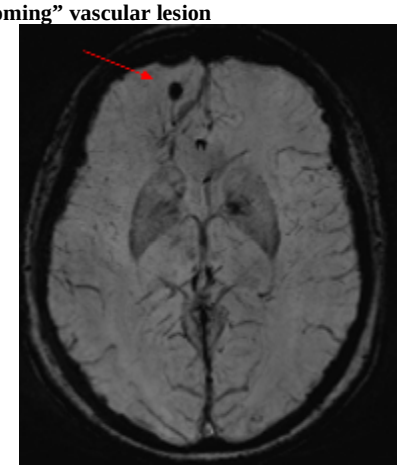
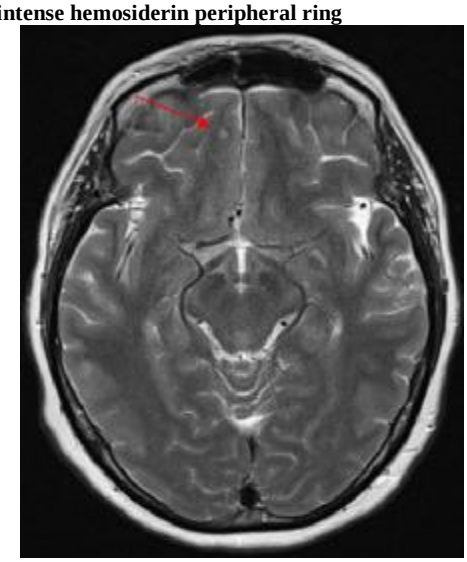


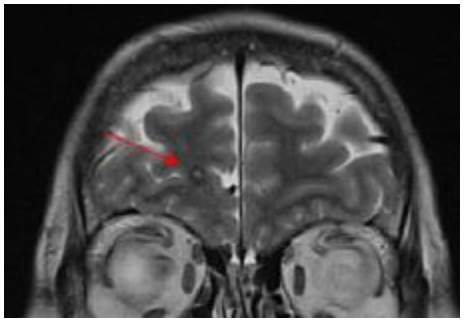
Figure no. 6. Susceptibility sequence (axial section) showing the "blooming" vascular lesion



On the T2 sequences, it reveals high signal in the core lesion with a hypointense hemosiderin peripheral ring localized in the white matter of the right frontal lobe. This "pop-corn like" lesion is in contact with the vascular formation seen in the contrast enhanced sequences.

Figure no. 7. T2 sequences (axial and coronal sections) showing the "popcorn like" lesion surrounded by the hypointense hemosiderin peripheral ring





DISCUSSIONS

Vascular malformations are classified into 5 categories:

1. Arterio-venous angioma;
2. Cavernoma 15 %;
3. Capillary angioma;
4. Developmental venous anomaly 55-63 %;
5. Dural fistula.

There are intracranial and spinal vascular malformations. In this article we will focus on the intracranial malformations which resemble the presented case.(1,2)

The usual clinical picture of the vascular malformations consists of seizures, headache and focal deficits. Some vascular malformations have no symptoms and are discovered incidentally. Complications are bleeding within the brain parenchyma or subarachnoid hemorrhage. MRI (magnetic resonance imaging) has a higher sensitivity than CT (computed tomography) for vascular malformations, especially if not hemorrhagic or calcified. With all vascular malformations, the susceptibility sequences in MRI (magnetic resonance imaging) are the preferred methods of investigation. Contrast enhanced imaging is also useful. Differential diagnoses include other

vascular malformations.(1,2,3,4)

The cavernoma represents approximately 15 % of all vascular malformations with an MRI prevalence estimated at 0,47 %. It is preferentially localized in the white matter supratentorially and the lesion is usually solitary. Microscopically, it is formed of dense vasculature networks without smooth muscle layer and no glial or neurons between the vascular spaces. Usually there is a perilesional hemosiderin ring. The age of onset of symptoms is 40-60 years. Surgical treatment is indicated in: superficially localized symptomatic cavernoma and favourable interventional outcome. Differential diagnosis of cavernoma include:

- other types of vascular malformations;
- amyloid angiopathy;
- metastases;
- primary central nervous system tumours;
- parasitic lesions.(3,5,6,7,8,9,10,11)

The developmental venous anomaly (DVA) is the most frequent vascular malformation and also usually a solitary lesion. It is localized preferentially in the white matter. Microscopically, it is formed from veins with thin walls and no smooth muscle layer. Between the veins, there is normal cerebral tissue. On the contrast enhanced imaging techniques, the lesion is described as having radially converging veins, which drain into a larger collecting vein. The computed tomography can show a linear hyperdense structure. Surgical treatment is indicated only in accessible and hemorrhagic (symptomatic) lesions.(1,2,3,12)

CONCLUSIONS

This case illustrates the importance of thorough imaging examination in symptomatic patients after traumatic brain injury. We want to highlight the increased sensitivity of MRI compared to CT in such small vascular lesions. Furthermore, even in emergency situations it is very important to heighten the imaging technique via contrast.

Our case showed the incidental discovery of a chronic vascular malformation in the situation of an acute traumatic brain injury. At the first CT there was a high suspicion of a small contusion in the frontal lobe secondary to the traumatic brain injury. The persisting hyperdense lesion after 48 hours, raised the suspicion of a vascular malformation which was confirmed by the more sensitive MRI scan. At 48 hours the contusion should have been resolved fully or at least partially. This patient was suspected of two associated vascular lesions: a cavernoma in contact with a developmental venous anomaly.

The question is if we should perform screening examinations for vascular malformations for the general population.

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