Case Report

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MRI Aspects of Cerebral Venous Anomalies about Three Cases and Literature Review

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Abstract

We report three cases of cerebral venous anomalies including two cases in adult patients. The third patient was four years old and had heterotopia of gray matter. Classic appearance of venous anomalies on imaging is that "jellyfish head" or "umbrella". MRI visualizes drainage vein clearly. T1 with gadolinium injection and magnetic susceptibility sequence(venous bold) remain reference for cerebral venous anomalies. FLAIR sequence reveals parenchymal abnormalities (gliosis, demyelination). Diagnosis of associated lesions such as cavernoma guides therapeutic modalities.

Keywords: Venous development anomaly, Cerebral veins, Cavernoma, Angio-MR.

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Introduction

The Venous brain abnormalities are relatively common benign malformations. They are most pften identified near the frontal horn of the lateral or fourth ventricle. They may be associated with a cavernoma with a high risk of bleeding. [1]

The MRI resulted in signifiant increase in diagnosis at 0,48-0,7%. [2] Several studies have shown that brain MRI has altered the conception of the venous abnormality which is something considered an anatomical variant and a pathological form .We report the MRI characteristics of three cases of cerebral venous malformations emphasizing the contribution of MRI in the literature

Case Report

Case 1: Patient of 40 years with a history of headache addressed for progressive assessment of a partial occipital comitality. The balance was normal. The brain MRI performed revealed an abnormality of left cerebellar signal, a type of dilation of the parenchymal venous trunk with a branched appearance of the venules in hypersignal flair, a hyposignal on magnetic susceptibility and with an intense enhancement after the gadolinium injection reflecting a venous abnormal development. The rest of the test was normal.

Case 2: Patient of 4 year referred by the pediatrician for headaches and absenteeism.The balance was normal. The MRI performed showed the presence of dolated vein Cells that converge Towards Galien's vein and take on an ectasic appearance compatible with a venous development abnormality. The venous ectasia appears as an asymetrical serpignal on the magnetic susceptibility sequences with a significant enhancement after gadolinium injection. In addition, the MRI found the presence of grey matter ventricular compatible with heteropia.

Case 3: Patient of 40 years with a history of headache referred by a neurologist to search for vascular processes .The balance was normal .The MRI carried out showed at the right frontal lobe a benous ectasia in a hyposignal magnetic susceptibility draining into the homolateral ependymal vein compensable with a venous developmental abnormality. The MRI did not identify any other assocuated abnormalities.

Discussion

Cerebral veins development anomalies (VDA) are considered as true embryological variant of cerebral venous drainage that deviates from the conventional pathways of cerebral venous returns. They are histologically and functionally normal. [3]

VDA are most often asymptomatic discovered incidentally on MRI. They may however be highlighted during a check-

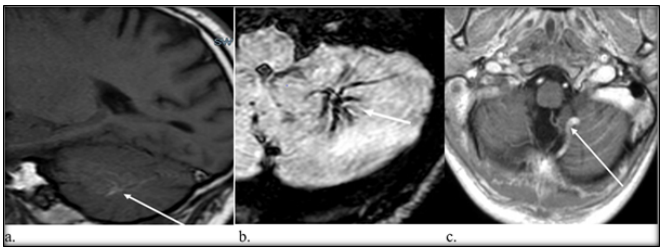

Figure 1: (Patient1) a, Sagittal T1SE MR, dilated cerebellar vein hyperintense with jellyfish head appearance (arrow). b, Axial Venous Bold, dilated left cerebellar veins in hyposignal. c, Axial T1 gadolinium+, dilation of drainage vein.

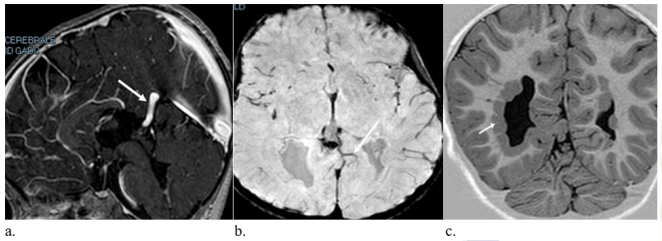

Figure 2: (Patient 2) IRM cérébrale, séquence T1 IR, reconstruction sagittale(a) frontales(b,c). a, Sagittal T1 gadolinium+, dilatation of Galen's vein. b, Axial Venous Bold, Dilation of venules. c, Coronal T1SE MR, Heterotopy of gray matter: periventricular grey matter within the white matter

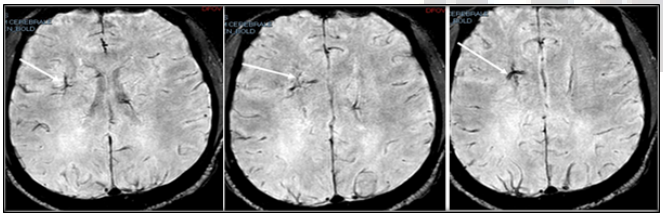

Figure 3: (Patient 3) a,b,c: Axials Venous Bold MR, right frontal venous ectasia in hyposignal draining into homolateral ependymal vein.

up for headache, neurological defiency or epileptic seizures that may reflect an evolutionary complication associated with cavernoma. Classic appearance on imaging is like a jellyfish head or an umbrella.

VDA topography is mainly sus tentorial with a predilection for frontal lobe 50%. Cerebellum is the second location. Brain stem and medullar locations are rares.[4]

Other vascular malformations may be associated with VDA such as pericanii sinus and cervico-facial vascular malformations.[5] Apart from cavernoma and telangiectasia, other abnormalities are commonly found in VDA drainage area such as cerebral atrophies and dystrophic calcifications.[6] None of the three patients had an associated cavernoma.

On MRI, the most descriptive sequences are magnetic susceptibility sequence (SWI in Siemens, SWAN in GE and Venous Bold in Philips) and gadolinium injection.

In our study, Venous Bold sequence was used. This sequence exploits the difference in magnetic susceptibility in relation to the degree of oxygen saturation of haemoglobin in arterial blood (about 100%) and venous blood (about 70%).

This sequence has multiple advantages

-Good anatomical resolution with better visualisation of cortical and deep veins, including inframillimetric veins diameter up to 100 or 200 microns, without gadolinium using.

Venous Bold sequence is particularly sensitive to venous abnormalities such as venous developmental abnormalities, cavernomas, telangiectases and thromphlebitis.

This sequence is very sensitive to microbleeds, it detects diffuse axonal white matter traumatic lesions and tumour neoangiogenesis.

Our first patient had left cerebellar VDA. Cerebellar localisation is second after frontal localisation.The most common modes of manifestations of VDA are headaches, convulsions and intra-parenchymal or subarachnoid haemorrhages.[4]

Several authors have described cases of epileptic attacks with non-haemorrhagic venous infarction related to VDA. This non-haemorrhagic infarction can be explained by impeded venous drainage from the AVD (stenosis) because there is no venous thrombosis.[7] This lesion was demonstrated by dilatation of the venous collector in the form of linear T2 hyposignal and Venous BOLD, T1 hypersignal and FLAIR with significant enhancement after injection of Gadolinium. In front of the collector, several venules can be seen, describing the typical medusa head or umbrella appearance.[8] The brain parenchyma adjacent to the VDA was normal. The parenchyma adjacent to the VDA may be abnormal. Venous infarction appears as T2 hypersignal.

Gadolinium injection enhances the signal of the vessels and the injured area in the event of a venous infarction.[9] The injection also allows the elimination of a possible associated cavernoma that may be responsible for visible haemorrhage in hypersignal T1.[10]

In the second patient, there were several dilated venules draining into an ectatic Galen vein. VDA was associated with grey matter heterotopia. This association is not usual. We did not find it in literature. Grey matter heterotopias are congenital

malformations due to genetic mutations (FLNA++ gene).[11] He had periventricular nodular heterotopia. These cortical dysplasias are very epileptogenic, especially during the first decade, which corresponds to the age of our patient (four years). MRI better characterizes the cavernoma; it presents a heterogeneous central zone associating an intense T1 and T2 hypersignal related to the presence of methemoglobin and a hyposignal due to the calcium-hemosiderin mixture with a peripheral zone in T2 hyposignal.

The third patient had a right frontal VDA. The frontal lobe is the preferred site for VDA in 50% of cases.[4] It is an VDA with subependymal drainage. VDA was visible as an ectasia of several venules draining into the homolateral subependymal vein. There were no associated parenchymal abnormalities. Pereirra VM.[12] explained that the symptomatology would be related to the drainage flow of the malformation

Conclusion

MRI is the technique of choice for the diagnosis of developmental venous anomalies considered as extreme anatomical variants of venous drainage. It detects associated anomalies and in particular the cavernoma responsible for the clinical symptomatology. This study shows the interest for the assessment of associated vascular and parenchymal malformations allowing a good therapeutic orientation.

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