

Cerebral developmental venous anomalies associated with loco-regional parenchymal abnormalities

F. B. Pizzini¹, D. San Millán Ruíz², E. Piovan¹, A. Beltramello¹, D. Rüfenacht³

¹Neuroradiology, University Hospital Verona, Verona, Italy, Italy, ²Department of Radiology and Medical Informatics, Geneva University Hospital, Geneva, Switzerland, Switzerland, ³Department of Radiology and Medical Informatics, Geneva University Hospital, Geneva, Switzerland, Switzerland

Background and Purpose:

The aim of the study is to report a series of 99 consecutive patients harboring 102 cerebral developmental venous anomalies (DVA) and discuss the physiopathological mechanisms. In particular to evaluate the possible correlation with atrophy or parenchymal abnormalities found within the drainage territory of the DVA.

Method:

The DVA were explored with MRI (1, 1.5 or 3 Tesla), CT, or both, depending on the underlying pathology.

Results:

33.3% showed cerebral parenchymal abnormalities within the drainage territory of the DVA, in the form of a focal cortical or subcortical atrophy (26.5%), or signal anomalies on MRI (parenchymal hyperintensity on T2 weighted images and FLAIR) or dystrophic calcification on CT (6.8%). None of these parenchymal abnormalities could explain the patient's symptomatology.

Conclusions:

DVA are the most frequent vascular malformations of the central nervous system and they develop in prenatal life

DVA thus occur both in the pediatric and adult population.

As seen in the current series, most of DVA cases were fortuitous findings during routine neuroimaging workup.

It's not clear yet if they have a pathologic meaning or they are extreme normal variants: actually they are considered normal anatomic variants of the cerebral medullary venous system and, even if they are associated to pathologic findings (e.i.: cavernous angiomas or cortical migrations abnormalities) and the risk of bleeding, the therapeutic approach is usually not aggressive.

This study demonstrates the association between DVA and loco-regional cerebral parenchymal abnormalities in about 30% of cases.

These parenchymal abnormalities are found within the drainage territory of a DVA which suggests a pathogenic correlation to the DVA. We postulate that impaired regional venous drainage and venous hypertension within the DVA system may be involved in the development of these parenchymal lesions. DVA represent a zone of venous confluence, and may demonstrate thickened walls on histological examination. These two factors combined could predispose a DVA to develop venous hypertension and subsequent loco-regional parenchymal alterations.

Furthermore, length, diameters, volume and stenosis of the collecting vein of a DVA could have prognostic value for the risk of bleeding.