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Noninvasive imaging is playing a greater role in evaluating the intracranial venous system in both healthy and diseased states. An overview of the current methods and their applications and limitations is provided. Intracranial venous anatomy is then described, and depicted using a novel auto-triggered elliptical centric-ordered 3D gadolinium-enhanced MR angiographic technique.

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Patricia E. Burrows, Orhan Konez, and Annouk Bisdorff	

Variations in the anatomic distribution of cerebral venous drainage, developmental venous anomalies (DVAs), are familiar to neuroradiologists and are usually asymptomatic, incidental findings. These anomalies may be associated with hemorrhage, presumably because of functional venous obstruction, or when combined with cavernous malformations. DVAs are frequently seen in patients with extensive cervicofacial or orbital venous and lymphatic malformations. Dural and osteodural malformations (eg, sinus pericranii) also coexist with cervicofacial and cerebral vascular malformations. Recognition of these associated malformations and their impact on cerebral blood flow as well as flow through the facial malformation is important in treatment planning.

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Cavernous malformations (CMs) are commonly recognized on CT and MR imaging in both asymptomatic and symptomatic patients. The diagnosis of CMs can often be made on MR imaging based on the characteristic morphology of the subacute and chronic blood products. Edema, mass effect, and peri-lesional hemorrhage may obscure the typical findings of a CM. This article reviews the literature on CMs with emphasis on imaging, natural history, de novo formation, familial occurrence, classification, and management.

Wendy Taylor

High-flow arteriovenous fistulas are a challenging problem in the pediatric age group. Venous occlusive changes develop as part of the dynamic response to these fistulas. The development of adequate venous collateral flow circumvents the destructive sequelae of longstanding venous hypertension. Without adequate collaterals, venous hypertension develops. Venous hypertension interferes with cerebrospinal fluid resorption, resulting in increased brain water. Ventriculomegaly and tonsillar prolapse commonly develop and are reversible if therapeutic intervention is done in a timely fashion.

Venous Congestive Encephalopathy Related to Cranial Dural Arteriovenous Fistulas**55**

J. Marc C. van Dijk and Robert A. Willinsky

Cranial dural arteriovenous fistulas (DAVFs) present with a wide spectrum of clinical findings from pulsatile tinnitus alone to intracranial hemorrhage and nonhemorrhagic neurologic deficits. The neurologic sequelae are a result of a venous congestive encephalopathy secondary to venous hypertension and cortical venous reflux. Venous congestion is evident on MR imaging as a diffuse T2 hyperintensity in the deep white matter with peripheral enhancement and prominent pial vessels. DAVFs with cortical venous reflux require prompt endovascular treatment, or a combination of endovascular treatment and surgery.

Venous Manifestations of Spinal Arteriovenous Fistulas**73**

Tommy Andersson, J. Marc C. van Dijk, and Robert A. Willinsky

Impairment of the spinal cord venous outflow may create symptoms caused by venous hypertension and congestion. This has been referred to as venous congestive myelopathy. Spinal dural arteriovenous fistulas, as well as some of the epidural arteriovenous fistulas and perimedullary spinal cord arteriovenous malformations, commonly present with venous-related symptomatology. The typical MR imaging findings include peripheral T2 hypointensity outlining a T2 hyperintensity within a swollen spinal cord and dilated, tortuous perimedullary vessels. Contrast-enhanced MR angiography has been instrumental in the localization of spinal dural arteriovenous fistulas before conventional angiography. Selective catheter angiography is still the gold standard to characterize the angioarchitecture of these vascular malformations. Treatment planning is multidisciplinary and requires knowledge of the natural history of these complex lesions.

Radiologic Findings and Clinical Significance of Venous Compartment of Brain Arteriovenous Shunts**95**

Seon-Kyu Lee and Karel G. terBrugge

The venous compartment of brain arteriovenous shunts (AVSs) is closely related to the development of various clinical consequences, including hemorrhage, seizure, and neurologic deficit. Therefore, understanding the venous etiology of the clinical symptoms and the imaging characteristics of partial or complete venous outlet thrombosis is critical for the proper management of patients with brain AVSs.

Sinovenous Thrombosis in Children
Manohar Shroff and Gabrielle deVeber

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Among disorders in the cerebral venous system in neonates and children, sinovenous thrombosis is emerging as one of the most important. The incidence in neonates and children likely exceeds that in adults, and, with the current development of improved neuroimaging techniques, the frequency of diagnosis for this condition will continue to rise. We are at an early stage in research of childhood sinovenous thrombosis; however, the epidemiology including risk factors, outcomes, and to some extent treatments is now largely defined. This article summarizes current knowledge about neonatal and childhood sinovenous thrombosis, with an emphasis on the mechanisms, practical diagnosis, and management of children with this condition.

Cerebral Venous Thrombosis in Adults: The Role of Imaging Evaluation and Management

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Seon-Kyu Lee and Karel G. terBrugge

Cerebral venous thrombosis has extremely variable clinical presentations, including headaches alone, seizures, and stroke. Direct and indirect signs may be evident on CT and MR imaging. Specific patterns of edema and hemorrhage should direct radiologists to look for direct evidence of venous thrombosis. Heparin is believed to be a first-line treatment, and endovascular treatment is usually reserved for selected cases.

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