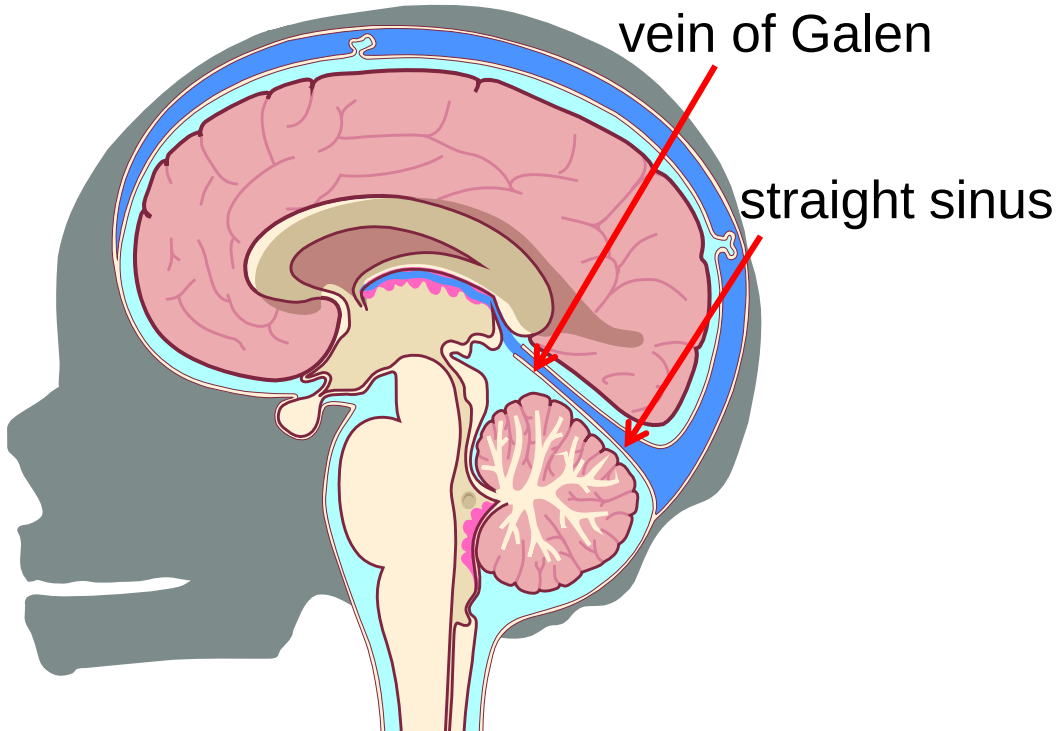
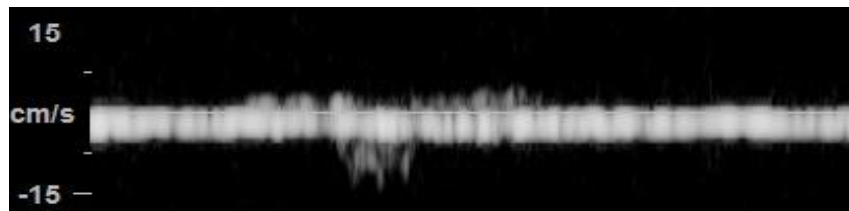
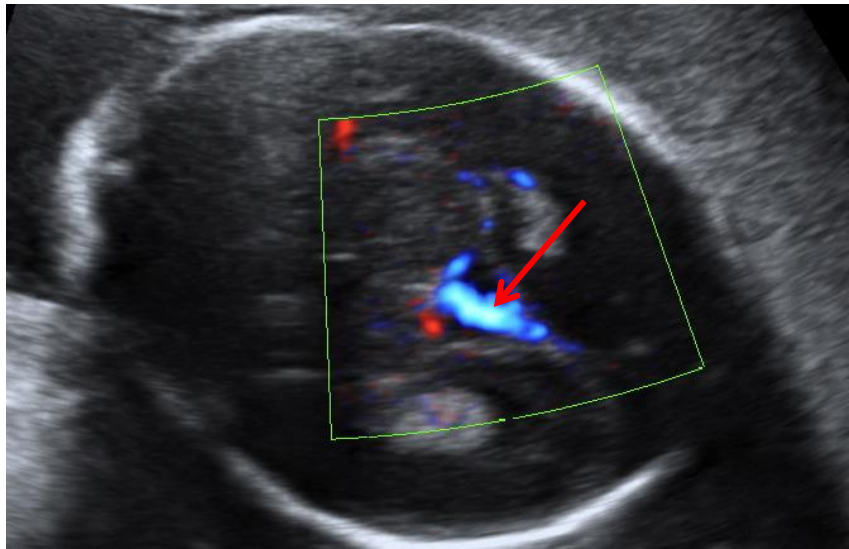
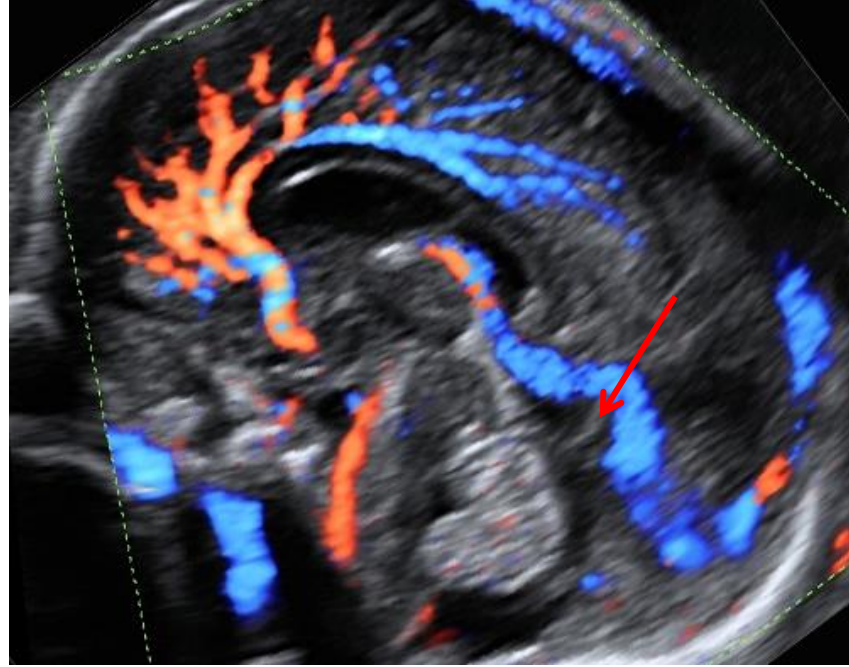




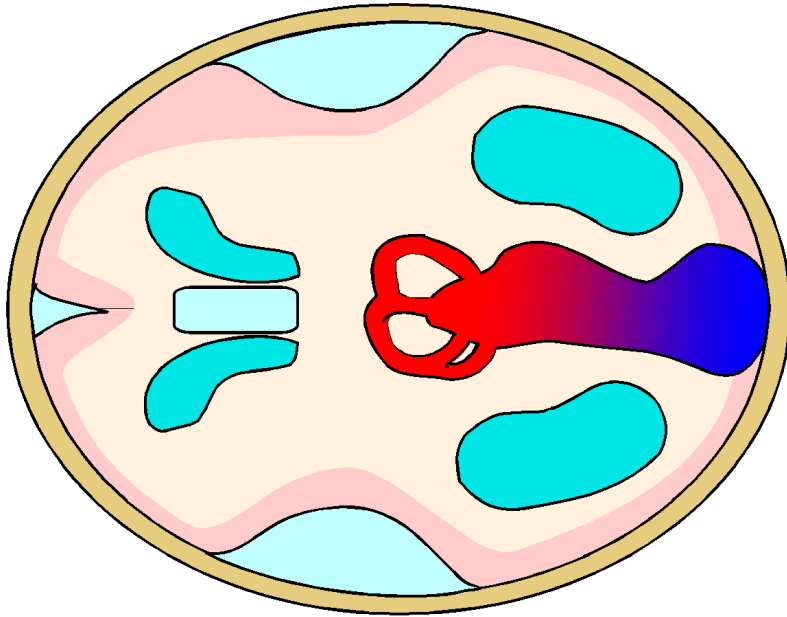
The great vein of Galen



The great vein of Galen runs in the quadrigeminal cistern, posterior to the third ventricle and connects posteriorly to the straight sinus

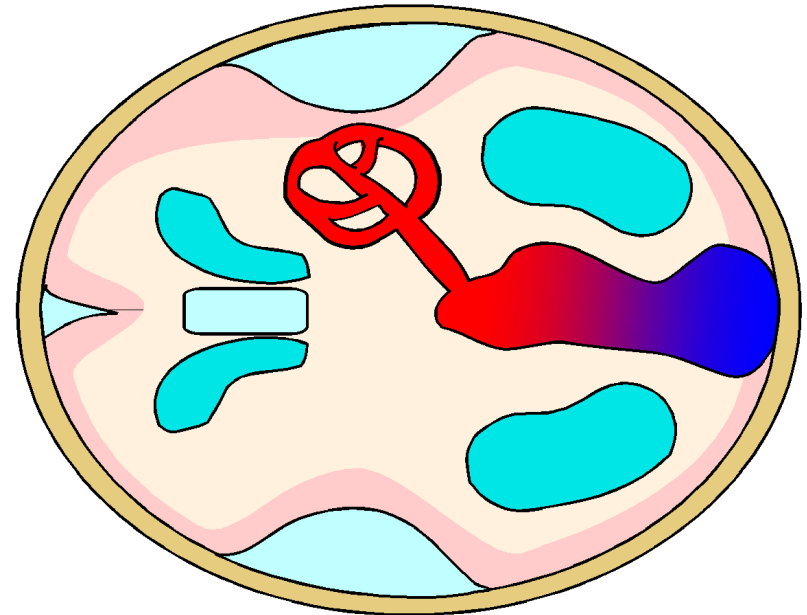


Fetal enlargement of the vein of Galen is usually the consequence of an arteriovenous malformation



Vein of Galen aneurysmal malformation (VGAM)

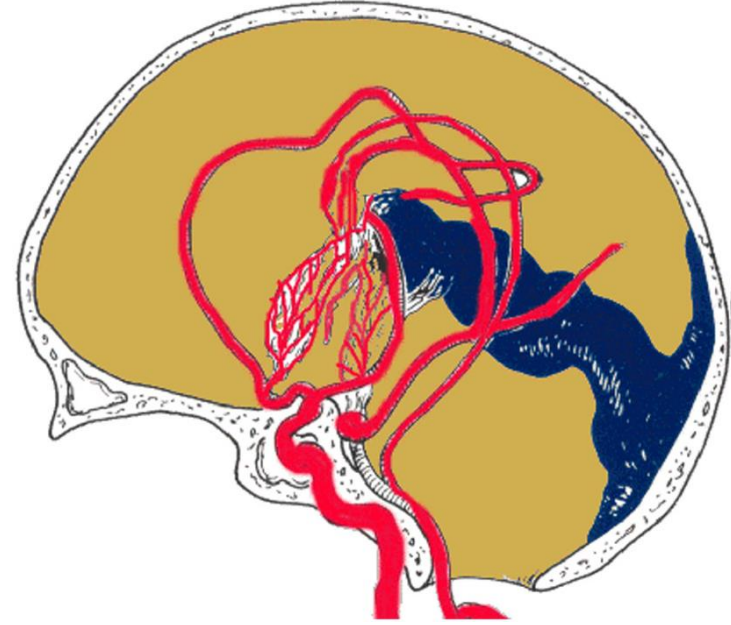
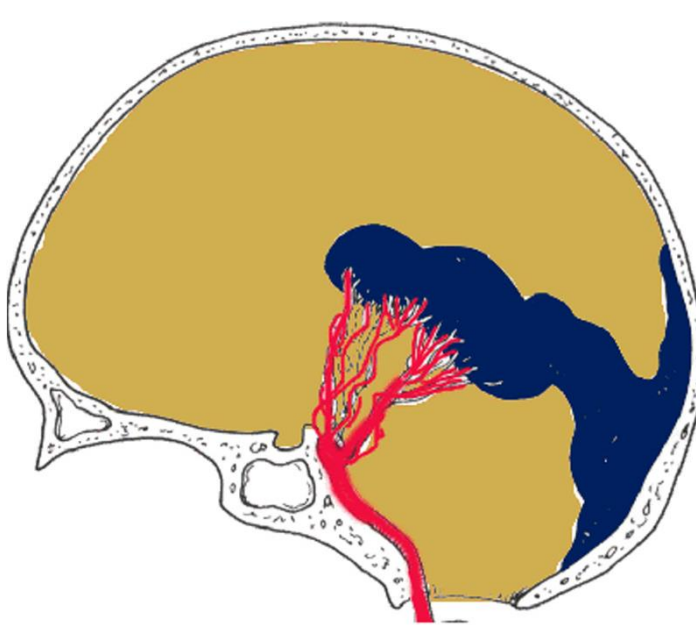
Most frequent form, due to aberrant vessels arising from the circle at the base of the skull connect directly to the vein of Galen



Pial arteriovenous malformation (pial AVM)

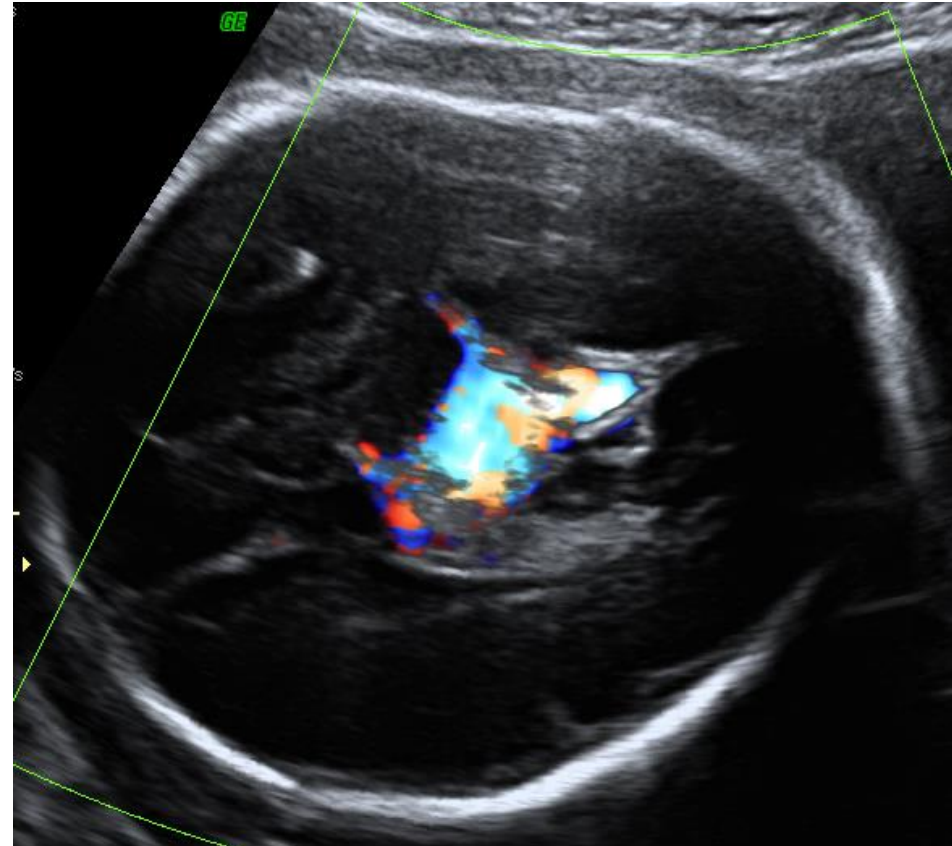
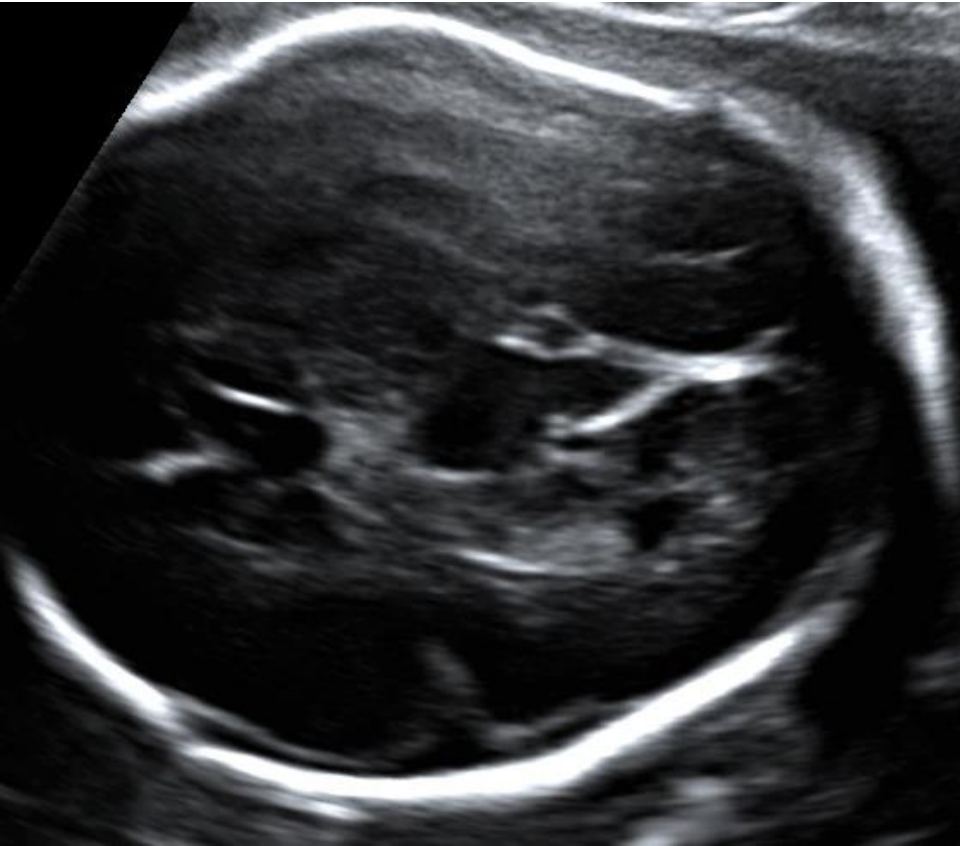
Less frequent, due to an AV malformation within the brain, fed by pial (cortical) arteries and connected to the vein of Galen through a venous channel

The spectrum of VGAM



VGAMs are very variable; the effects depend upon number and size of the aberrant arterial vessels connected to the vein of Galen; when the network is small isolated enlargement of the vein may be the only consequence; multiple large feeding arteries lead to bypass of the cerebral circulation with ischemic brain damage, hemorrhages and hyperdynamic circulation that may lead to high-output cardiac failure

Sonography of enlargement of the vein of Galen



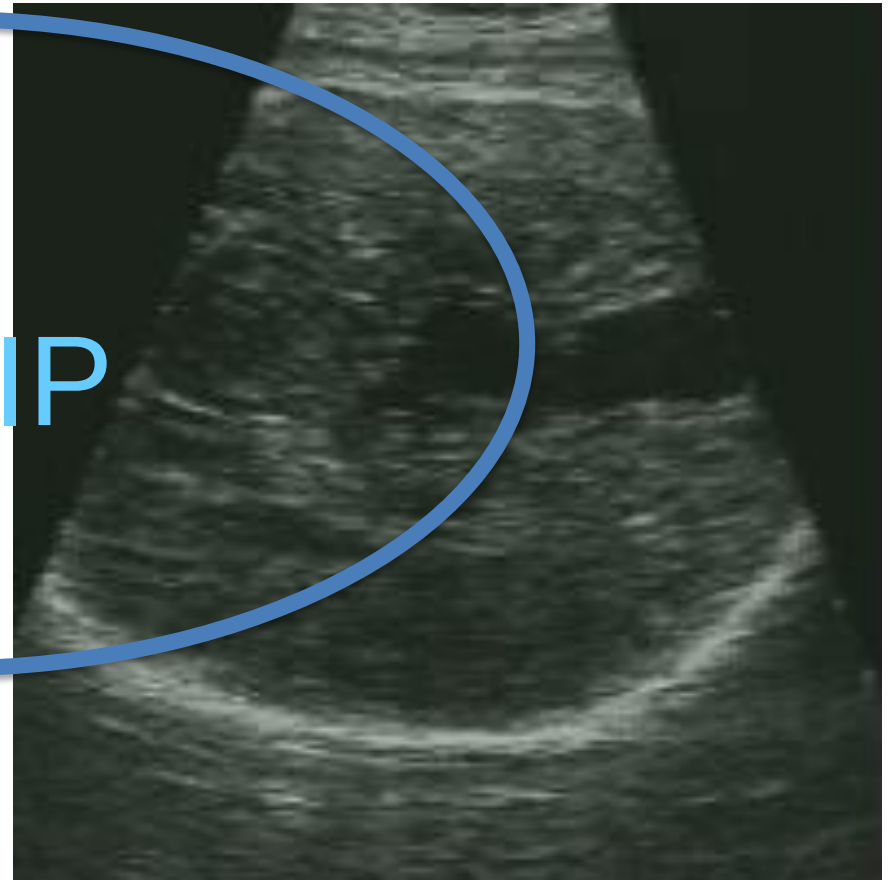
On 2D sonograms enlargement of the vein Galen appears as a fluid-filled area in the posterior third of the brain, indistinguishable from an intracranial cyst; a specific diagnosis is easily made with Color Doppler

2D and color Doppler of enlarged vein of Galen

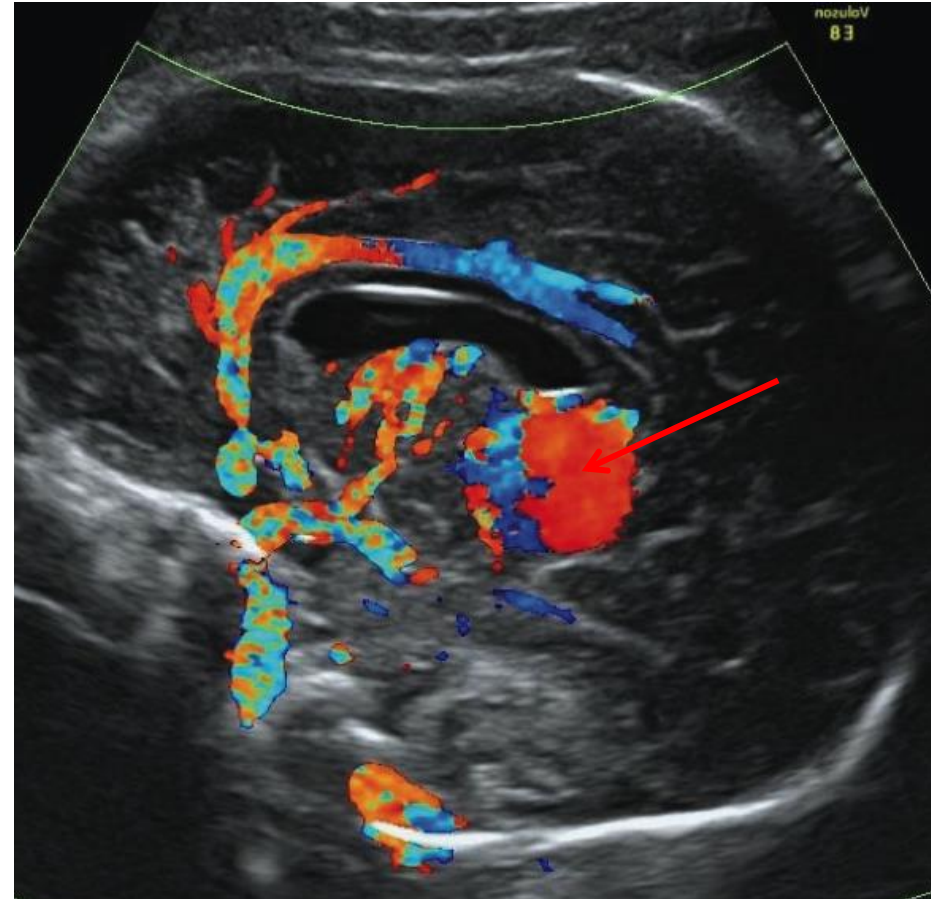
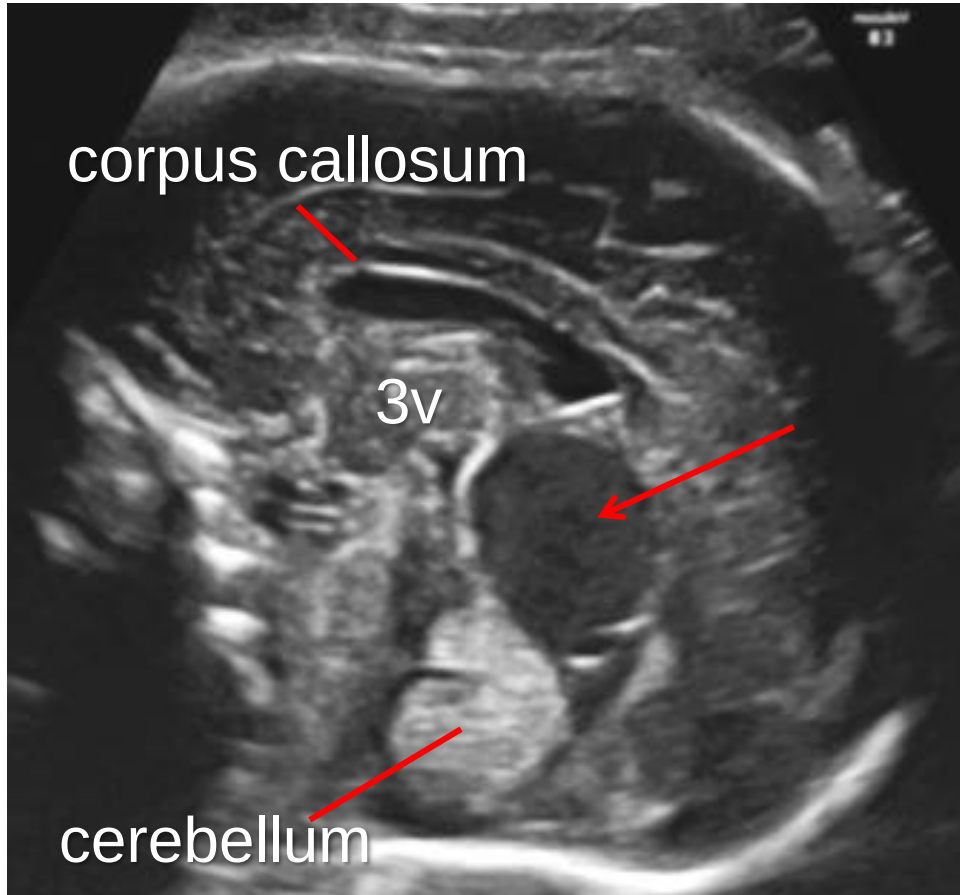
The position and elongated tortuous shape of this intracranial cystic structure, in association with the unusual echogenicity of the brain, are strongly suggestive of a cerebral AV malformation associated with enlarged vein of Galen; the use of Color Doppler allows a specific diagnosis

CLIP

VGAM 2D cfm.avi



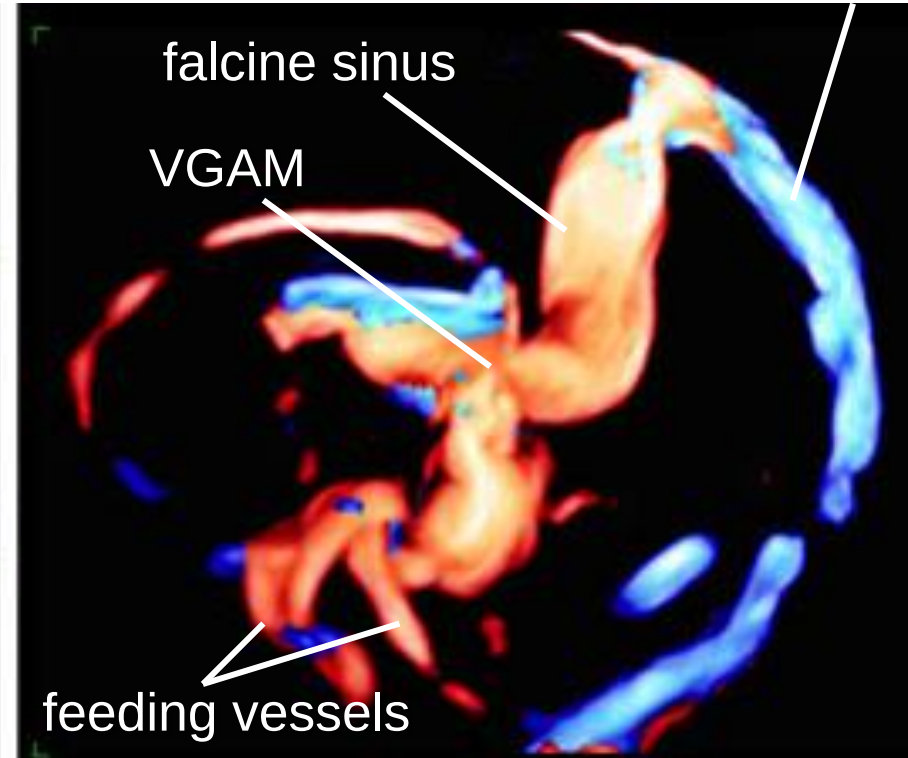
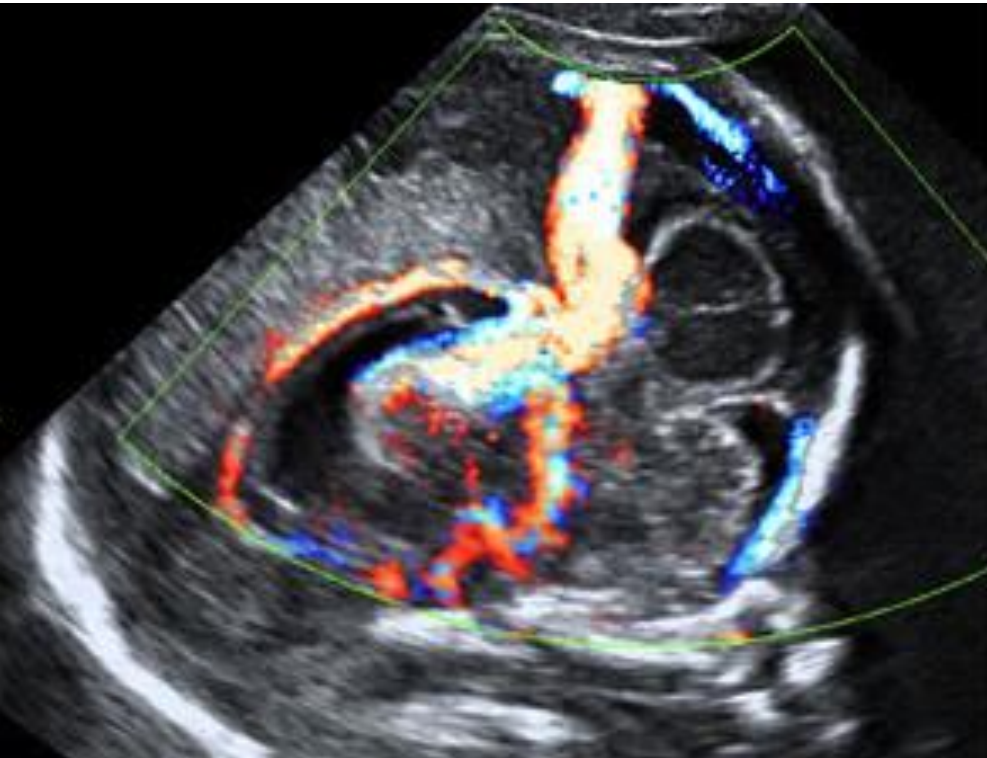
Sonography of enlargement of the vein of Galen



Multiplanar sonograms are useful to better identify the typical anatomic location of the vein of Galen: the angle between the corpus callosum, third ventricle and cerebellum

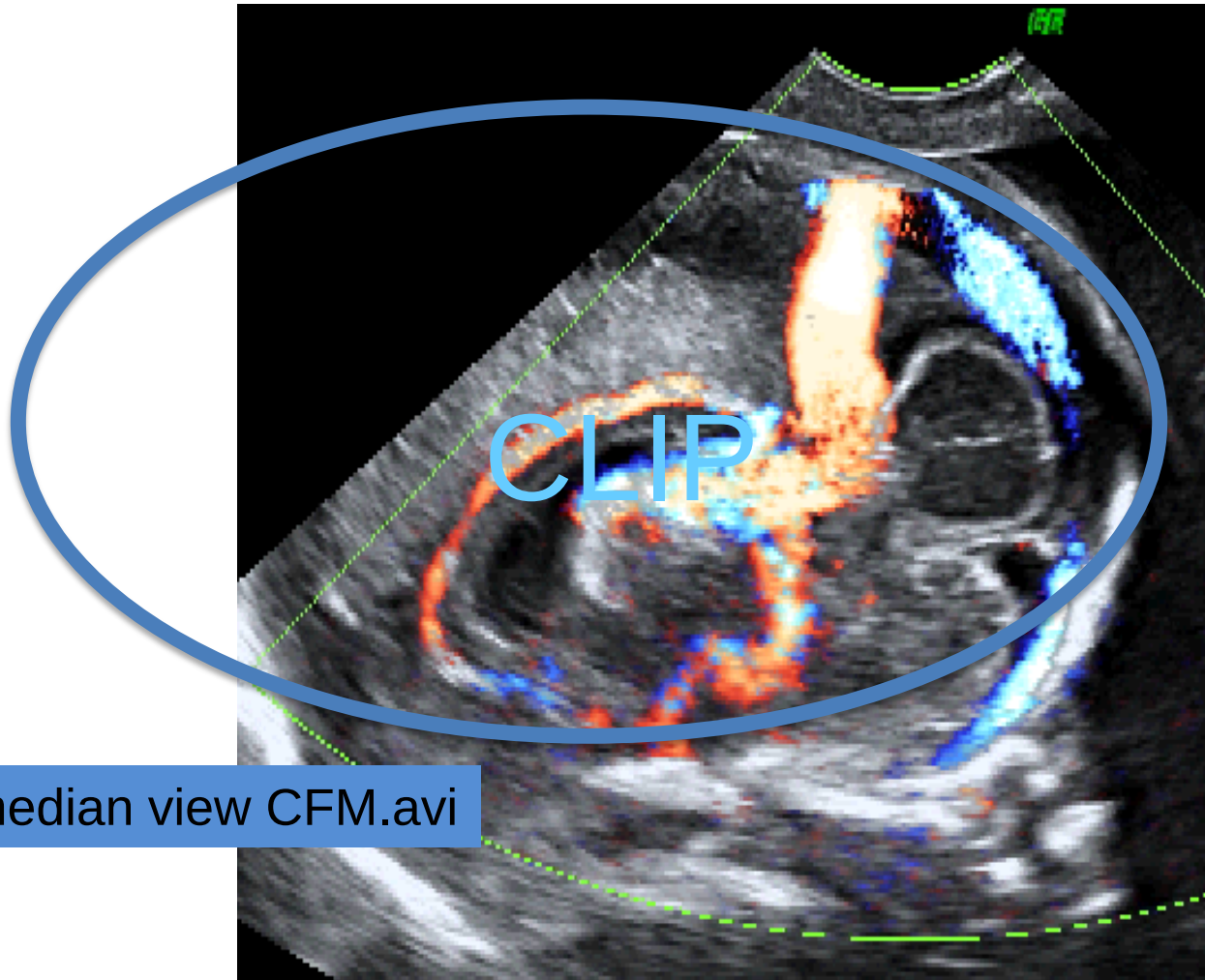
2D and 3D color Doppler of vein of Galen aneurysmal malformation (VGAM)

superior sagittal sinus



Multiplanar sonography with Color Doppler and 3D ultrasound is particularly useful for depicting the abnormal vascular anatomy of VGAM; in this case large arterial feeding vessel arising from the base of the skull are found suggesting a guarded prognosis; a frequent variant is also noted: the presence of the falcine sinus connecting the vein of Galen with the superior sagittal sinus

Median view with transvaginal sonography and color Doppler of VGAM



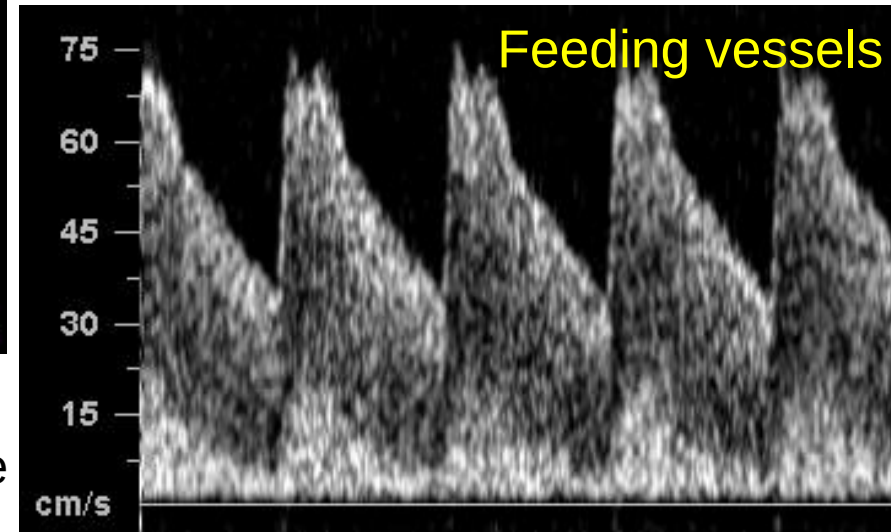
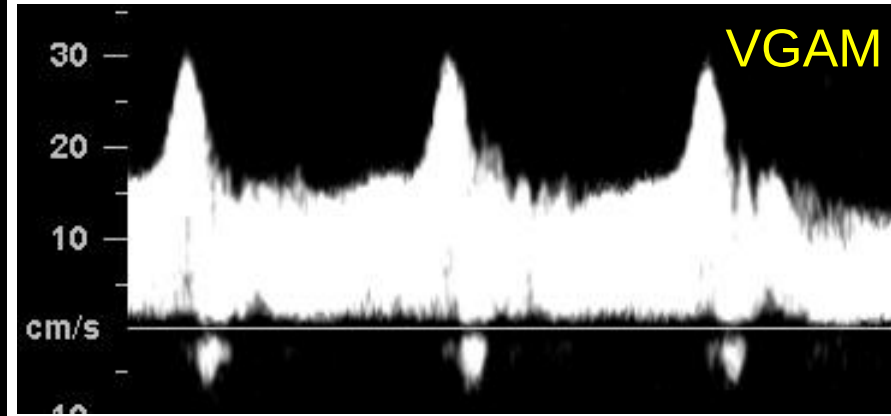
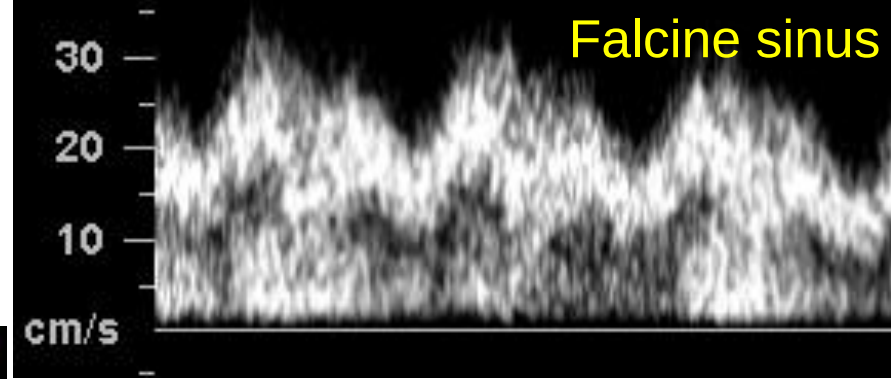
VGAM median view CFM.avi

Pulsed Doppler of VGAM

falcine sinus

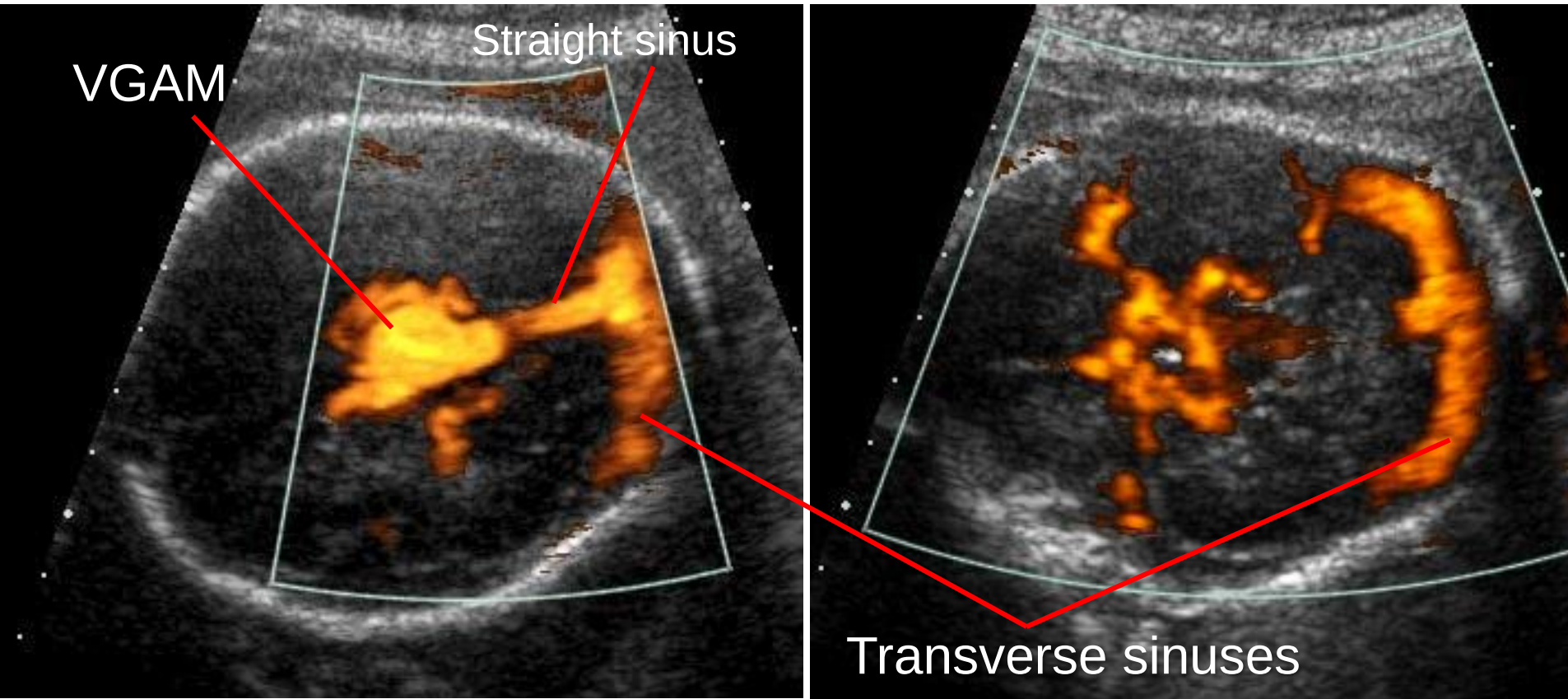
VGAM

feeding vessels



Pulsed Doppler typically demonstrates arterial waveforms with a low impedance pattern in the feeding vessels, and a pulsatile venous pattern in the venous site of the malformation

Enlargement of venous system in VGAM



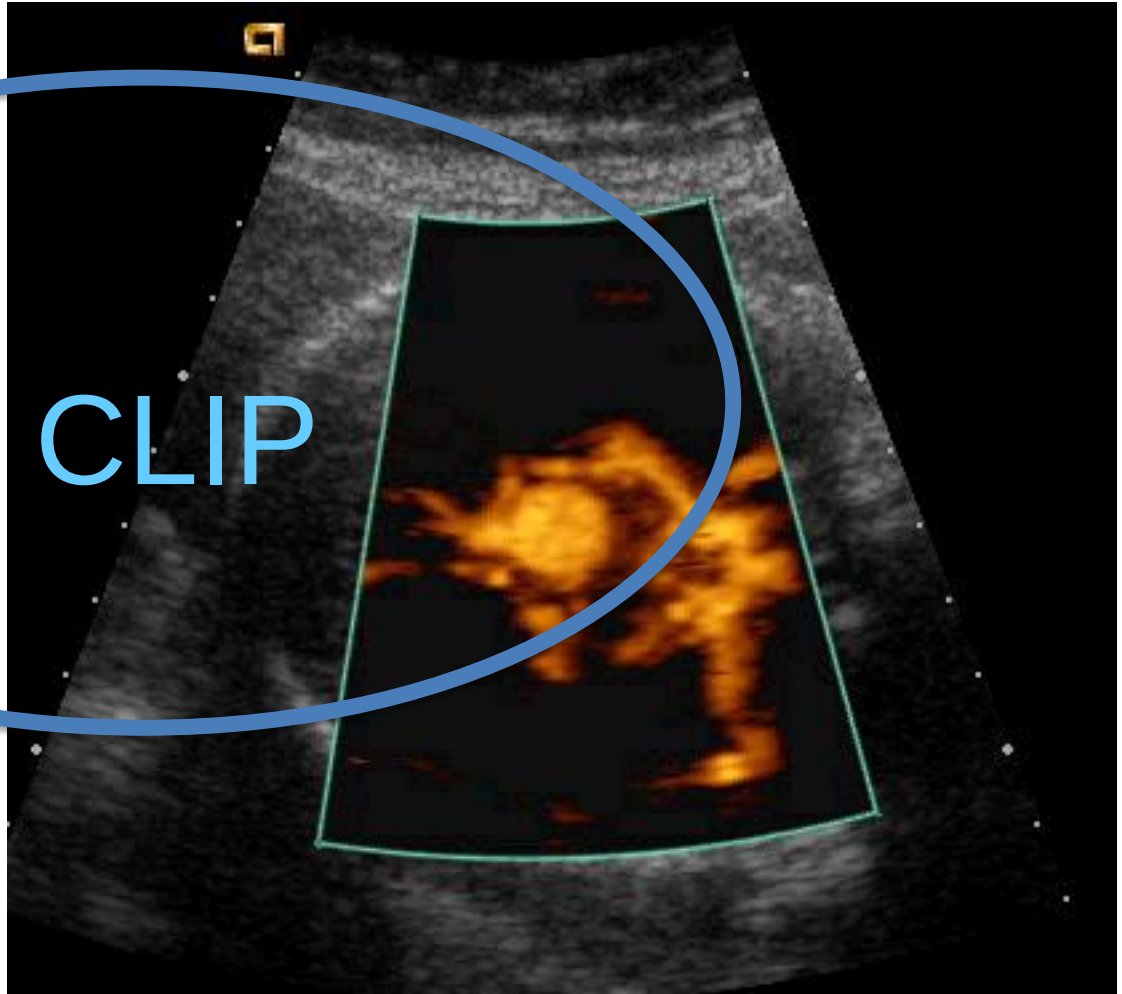
VGAM is typically associated with increased blood flow leading to enlargement of the entire cranial venous network distal to the vein of Galen

Power Doppler of VGAM

The large vein of Galen and the complex network of feeding arteries are seen with power Doppler

CLIP

VGAM power 1.avi

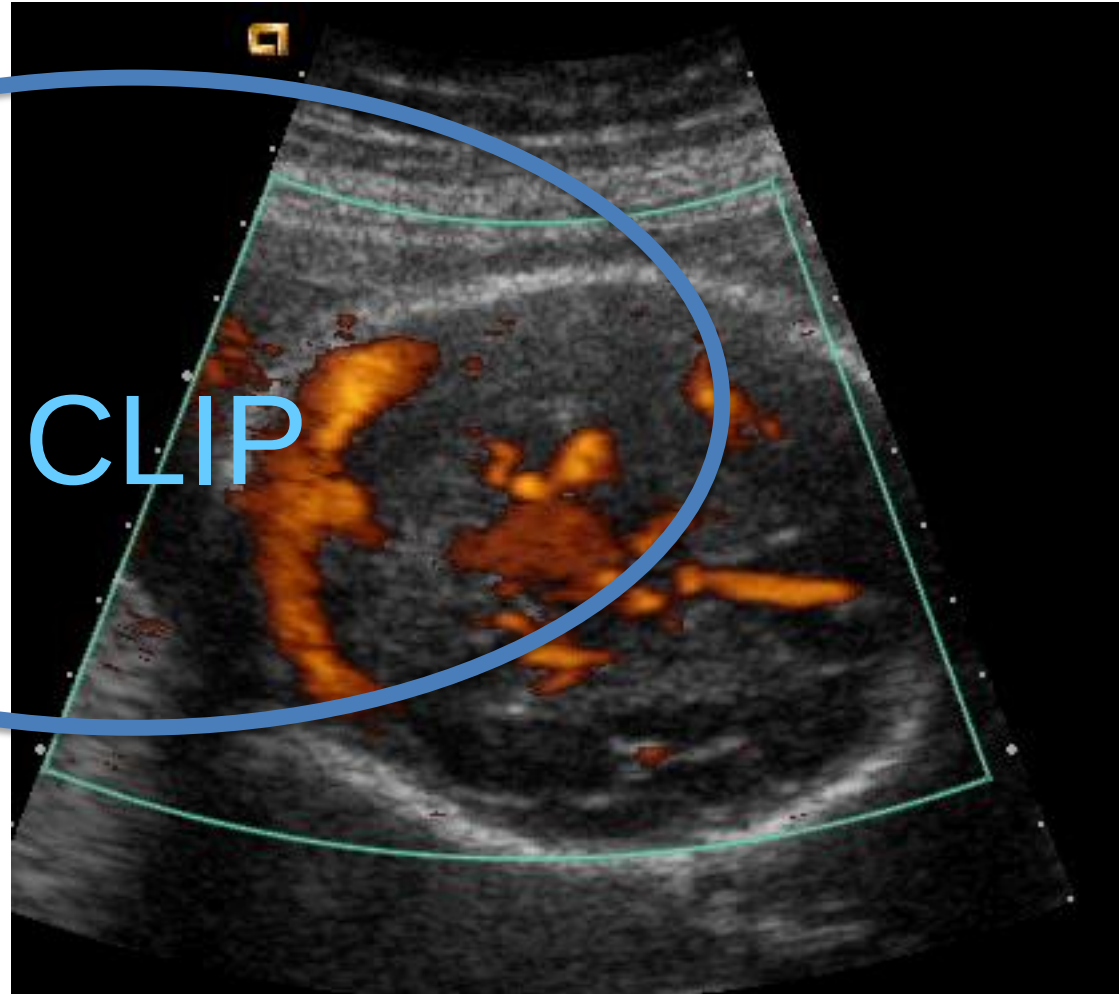


Power Doppler of cranial venous sinuses in VGAM

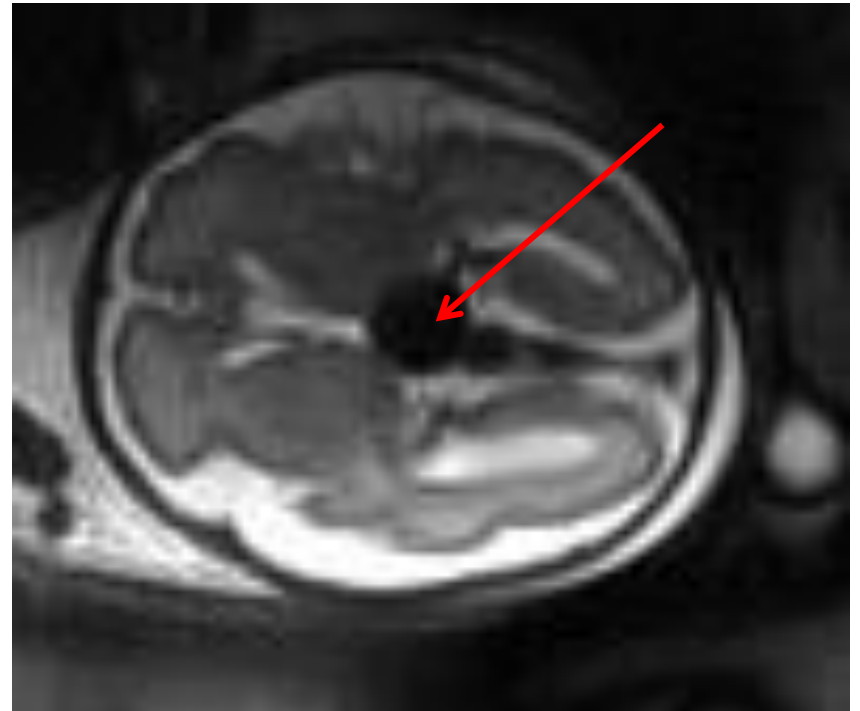
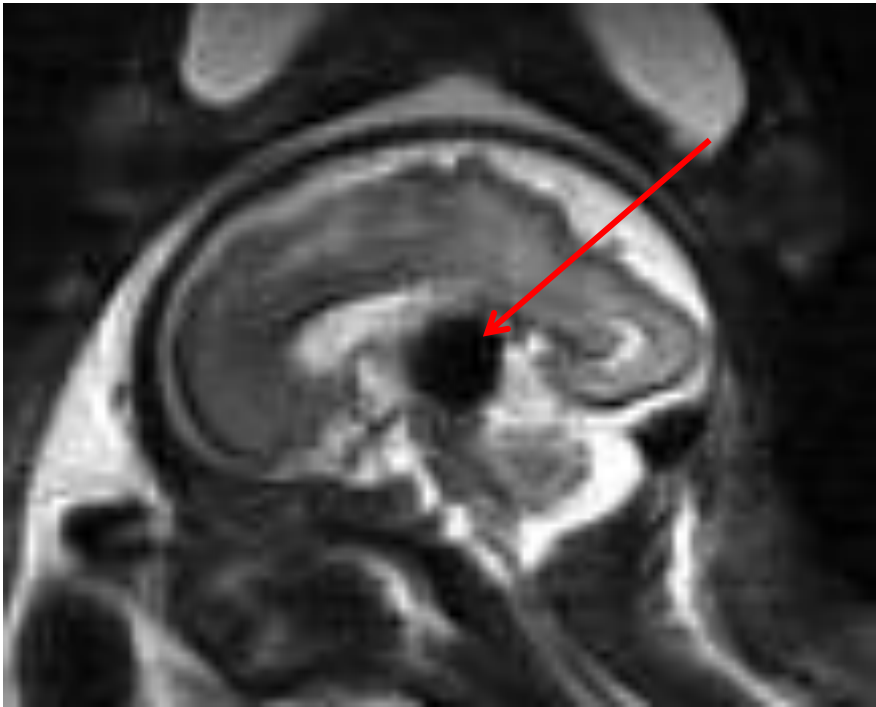
Power Doppler demonstrate the enlargement of the vein of Galen, straight sinus and transverse sinuses

CLIP

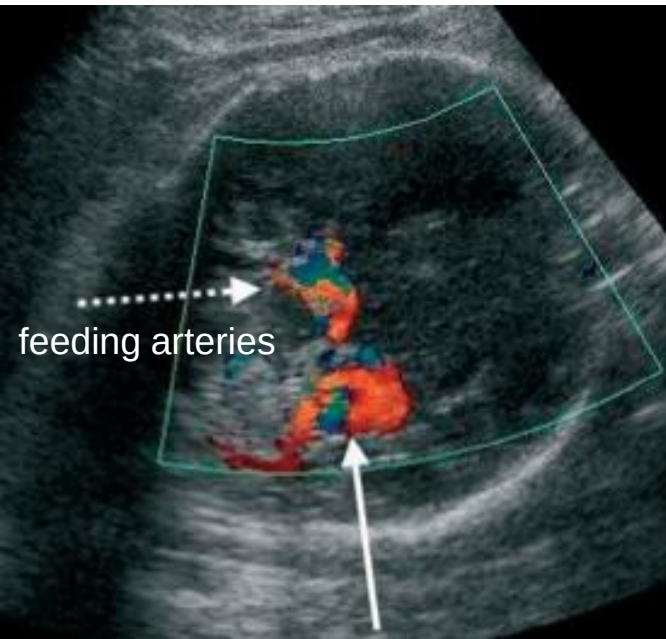
VGAM power 2.avi



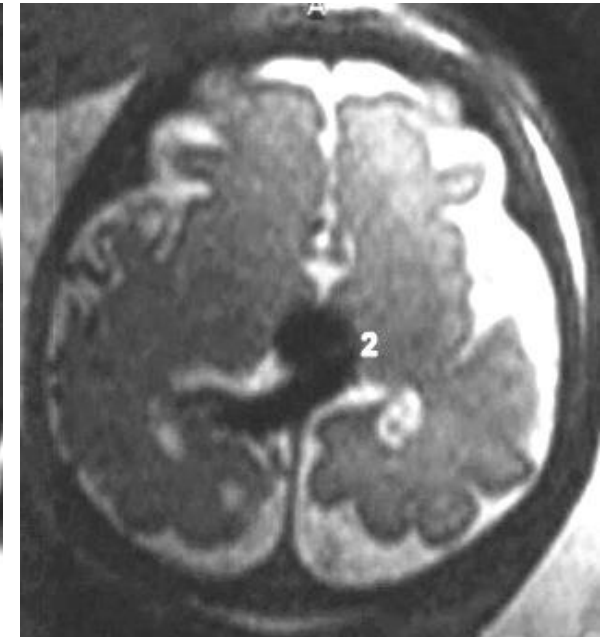
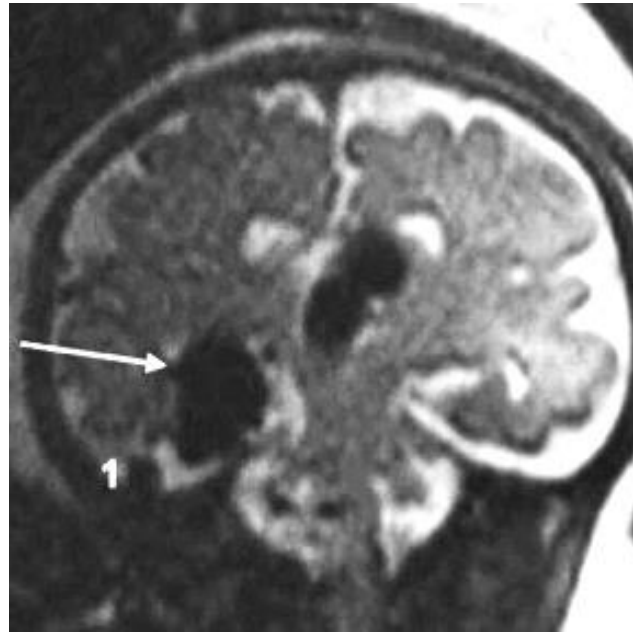
Magnetic resonance imaging of VGAM



Pial arteriovenous malformation

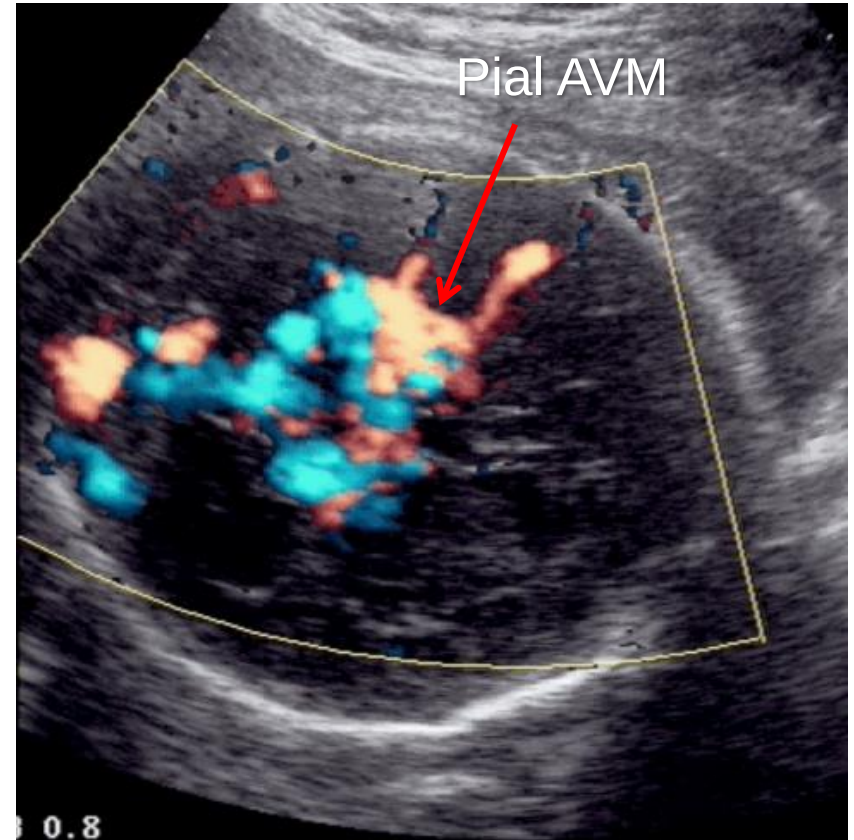
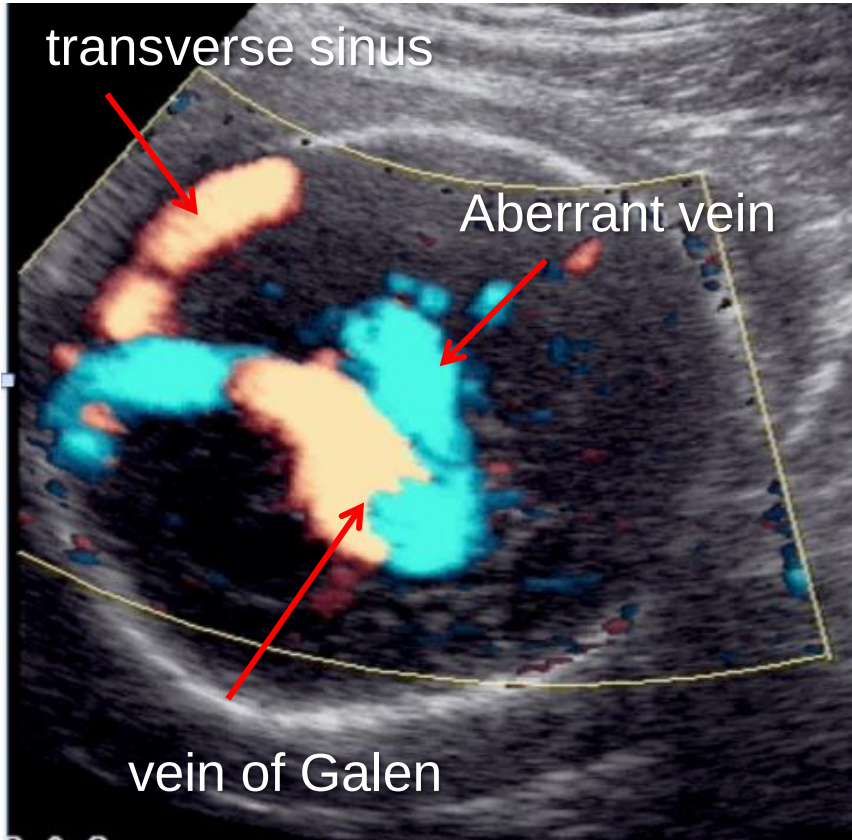


pial AVM



In this fetus the vein of Galen is enlarged and sonography reveals a pial AVM in the hippocampal fissure. More medially, enlarged feeding arteries are also seen. MR confirms the presence of the pial AVM in the hippocampal fissure (arrow) as well as the dilatation of the petrous vein (1) and vein of Galen (2)

Differentiating VGAM from Pial AVM

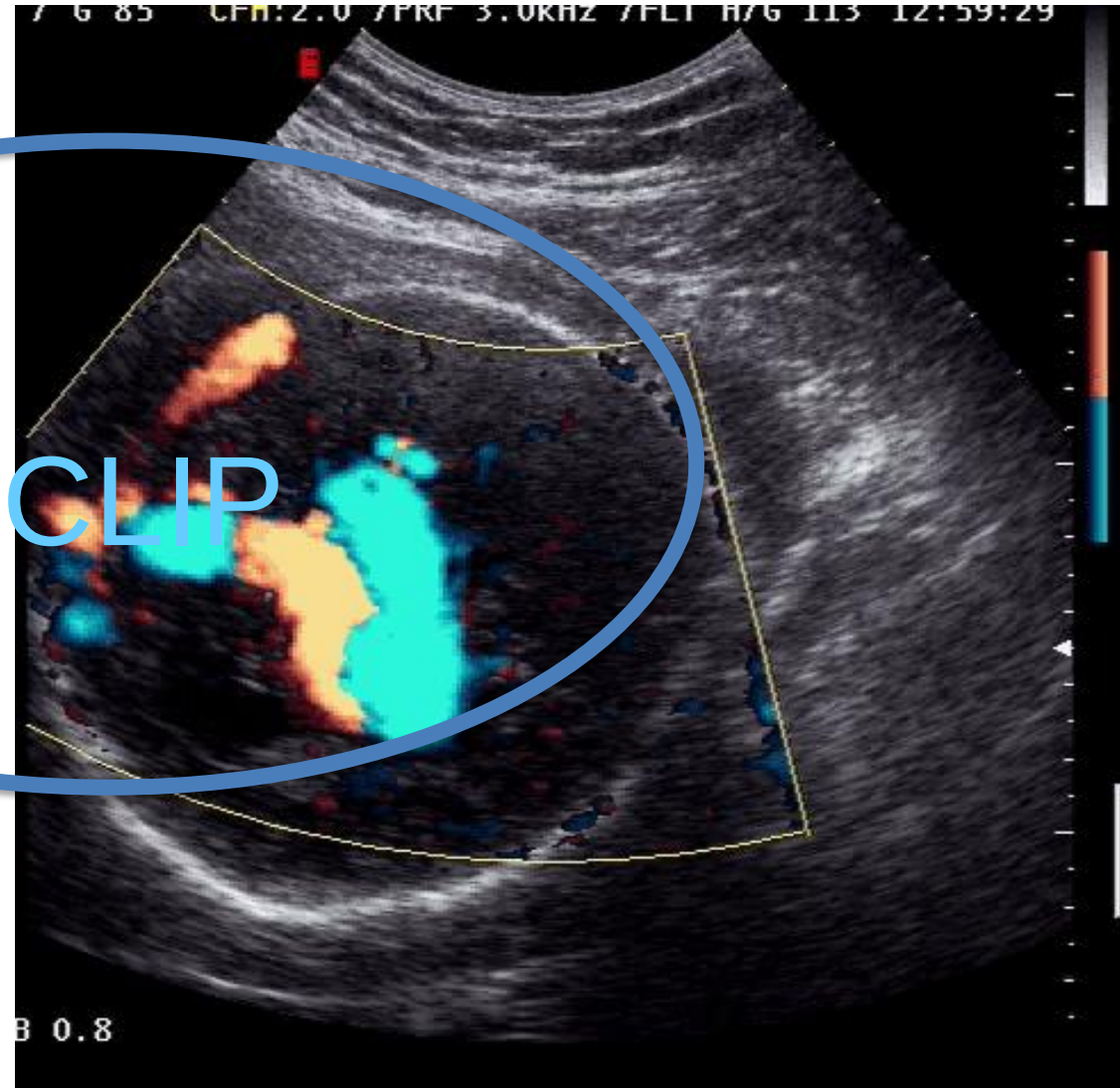


This patient was originally referred with a presumptive diagnosis of VGAM; sonography confirmed severe dilatation of vein of Galen and dural sinuses but also revealed an AV malformation in the temporal lobe that was connected with a large aberrant venous channel to the vein of Galen

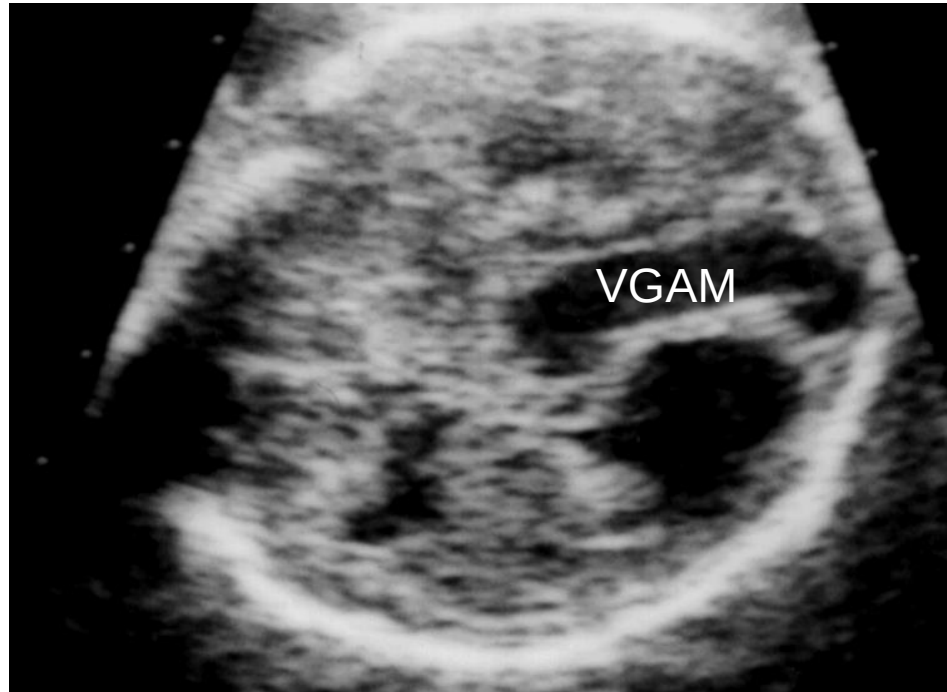
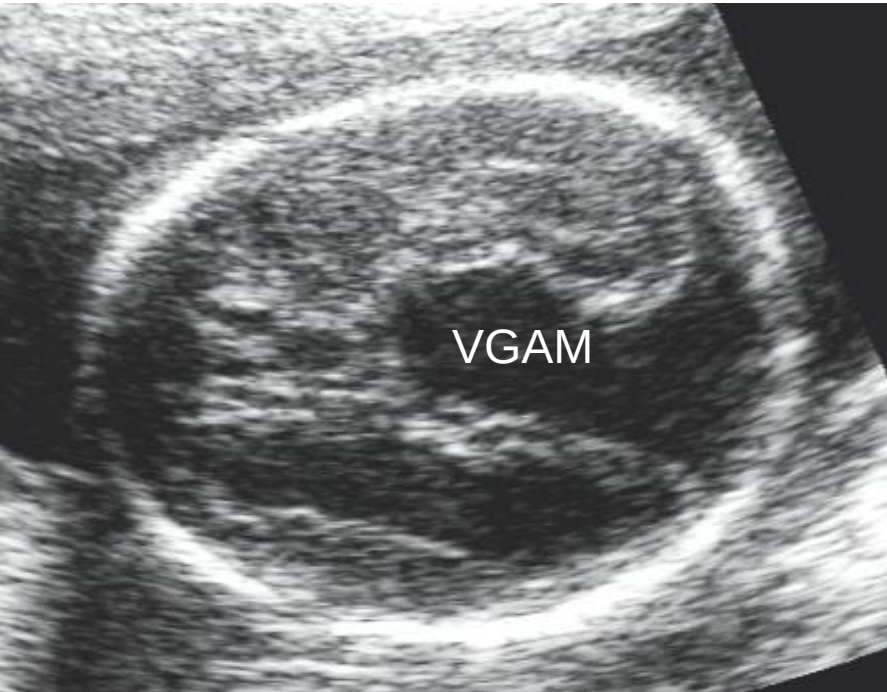
Differentiating VGAM from Pial AVM

This video was obtained from the previous patient and demonstrates the connection between the large vein of Galen and the pial AVM in the temporal lobe of the brain

Pial AVM.avi

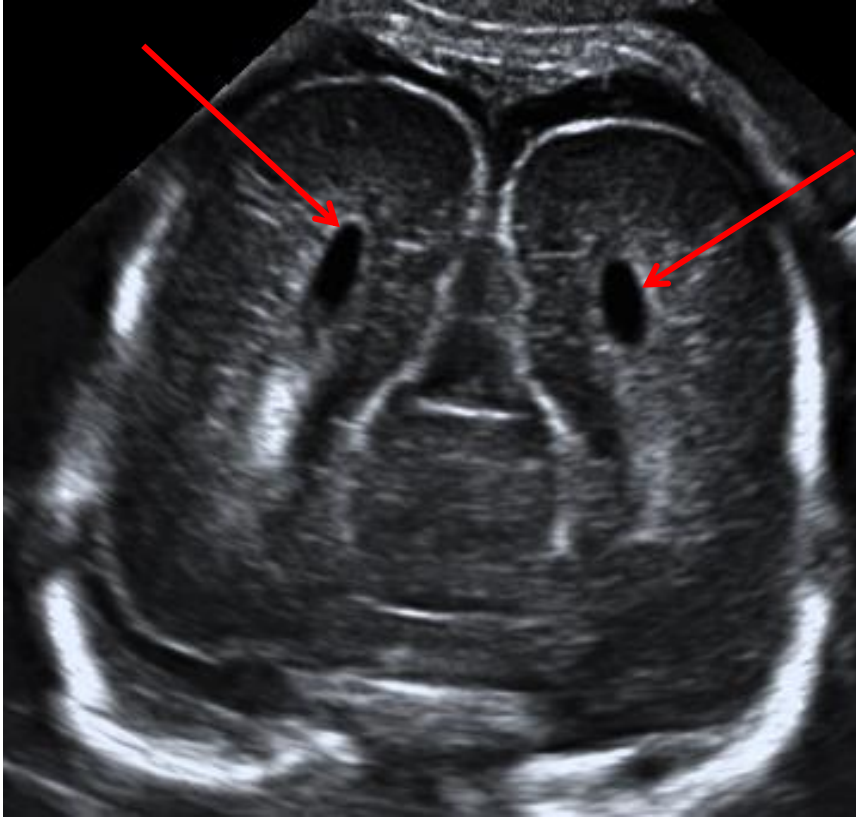


Prognostic factors of fetal VGAM: abnormal cerebral anatomy



One of the most important prognostic factors with fetal vein of Galen aneurysmal malformation is the presence of signs of cerebral injury: in both of these cases the lateral ventricles are enlarged and have an irregular contour, and the brain is unusually echogenic suggesting severe edema

Abnormal cerebral anatomy with VGAM



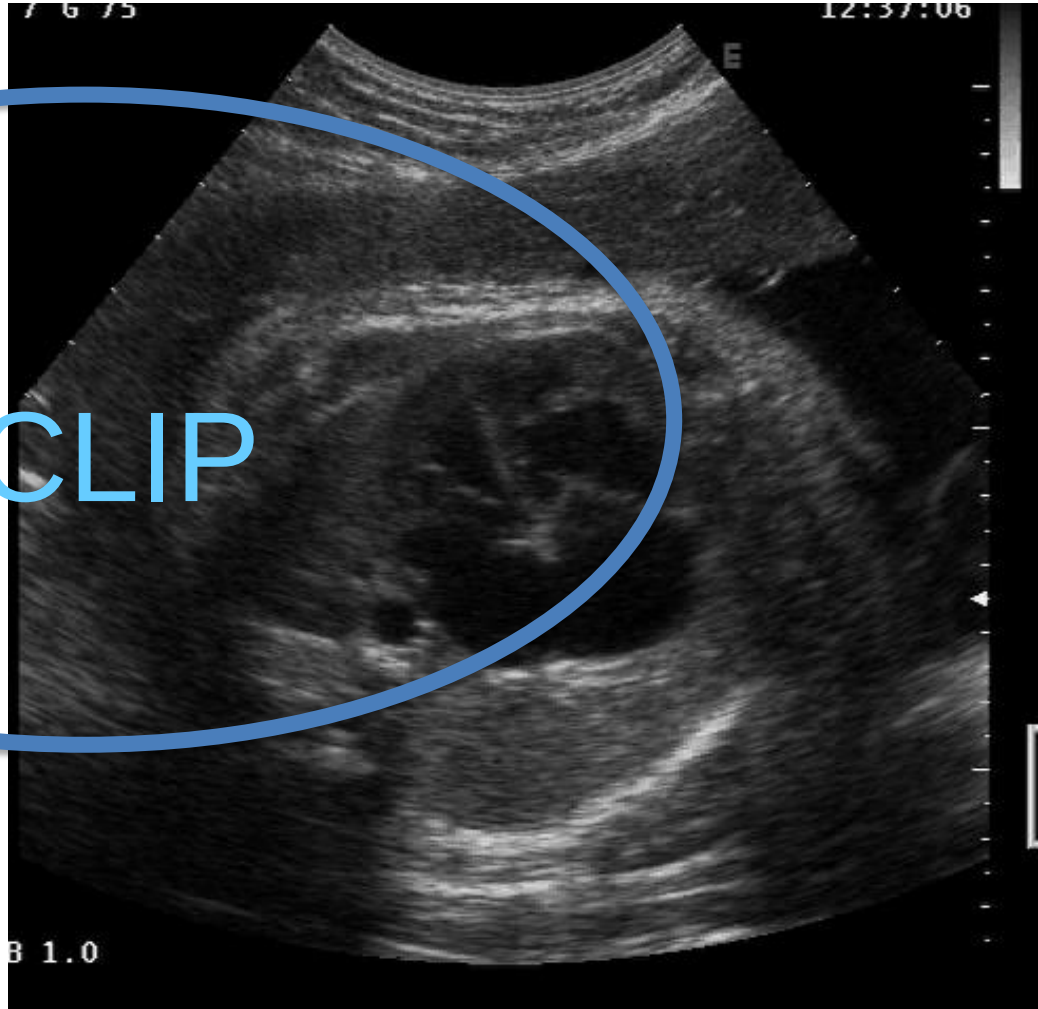
Although in this fetus with seemingly isolated VGAM a good prognosis had been predicted at midgestation, follow-up scans demonstrated slit-like lateral ventricles suggesting brain edema; after birth severe cerebral injuries were documented; the infant was considered inoperable and died in the first week

Cardiovascular compromise with fetal cerebral arteriovenous malformation

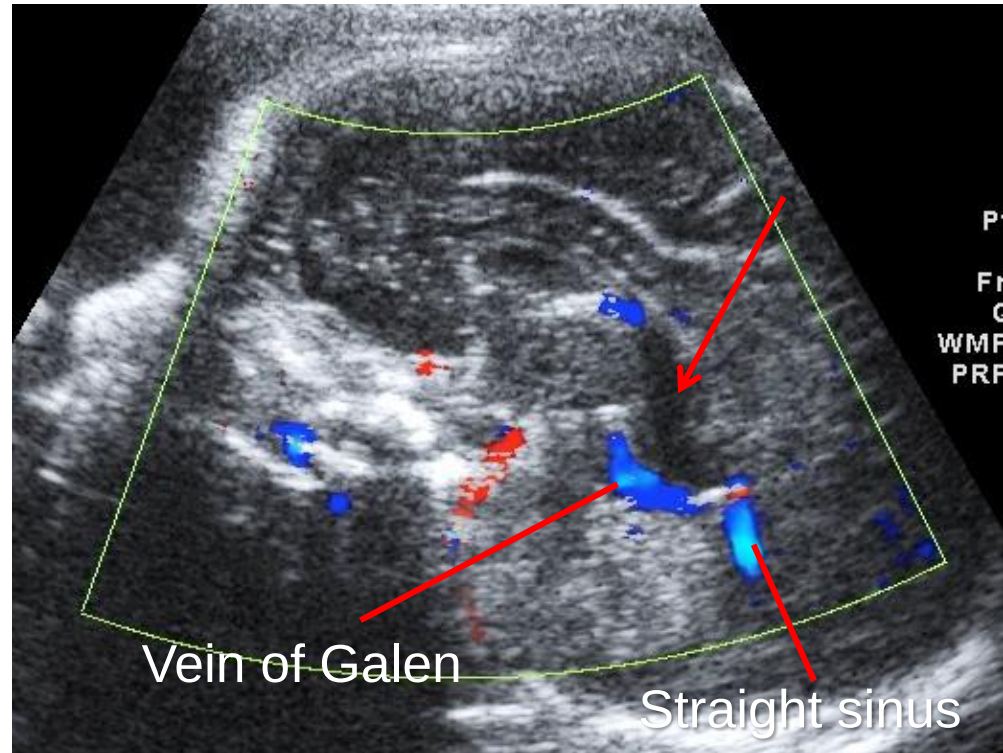
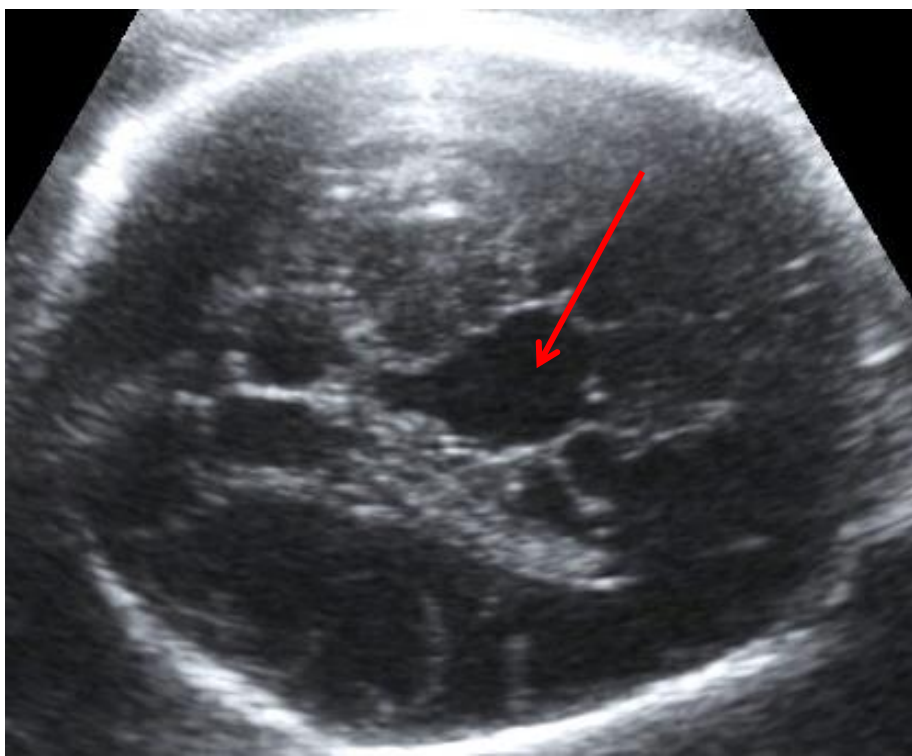
In this third trimester fetus with severe pial AVM there is obvious cardiomegaly suggesting increased cardiac work; this may evolve in time in hydrops

Pial AVM echo.avi

CLIP



Differential diagnosis of vein of Galen enlargement: midline cyst (cavum veli interpositi)



Differential diagnosis of vein of Galen enlargement mainly include intracranial cysts of the midline, particularly a large cavum veli interpositi which is usually a benign condition; a specific diagnosis is easy using color Doppler