Neuroepithelial cyst
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Patient: 52 years, female

Clinical History:
A 52-year-old woman presented with a long-standing history of headache and a recent history of head injury.

Imaging Findings:
A 52-year-old woman was referred to our radiology department for evaluation of a long-standing history of headaches. The only remarkable information in her medical history was her involvement in a car accident three months ago, which had resulted in a mild head injury. A direct post-traumatic clinical and radiological evaluation was not performed at that time.

A non-enhanced CT of the brain and a pre- and post-contrast enhanced MRI of the brain were performed. CT examination was negative for intracranial blood accumulations. However, it revealed a round, well circumscribed, homogeneously hypodense lesion, extending in the right cerebral peduncle and the right thalamic region.

MRI examination of the brain confirmed the presence of the lesion, which appeared with homogeneously low signal intensity on T1WI, homogeneously high signal intensity on T2WI and low signal intensity (similar to CSF) on FLAIR images. Diffusion weighted images demonstrated low signal intensity of the lesion, with increased ADC values; restriction of diffusion was not observed. The lesion did not cause any mass effect. It also showed no enhancement, following the intravenous administration of paramagnetic substance.

Radiological findings were mostly compatible with a neuroepithelial cyst. In the differential diagnosis, an atypical, enlarged Virchow-Robin space should also be considered. A definite diagnosis though, could only be made by pathologic study.

Discussion:
Neuroepithelial cysts represent a heterogeneous group of lesions. These lesions have been called ependymal cysts, choroid plexus cysts, choroid-epithelial cysts, noncolloid cysts and subarachnoid-ependymal cysts among other terms. The proposed unifying term "neuroepithelial cyst" reflects their histologic origin.

Neuroepithelial cysts are benign lesions, mostly asymptomatic. They are uncommon, representing only 1% of all intracranial cysts. Their origin remains controversial. According to the most probable theory though, intraparenchymal neuroepithelial cysts are congenital lesions, arising from embryonic neural tube elements that become sequestered within the developing white matter.

Neuroepithelial cysts can be found anywhere in the neuraxis. They may be intraventricular, intraparenchymal, intraspinal or extra-axial lesions. The most common type is the small, usually asymptomatic cyst of the choroid plexus. Less common are large cysts that occur at the trigone of the left lateral ventricle. Intraparenchymal, intraspinal or extra-axial lesions are the least common.

Patients with neuroepithelial cysts are usually asymptomatic. Symptoms, when present, vary according to the site of the lesion and include hydrocephalus, gait disturbances, tingling and numbness of extremities, focal neurologic
deficits, headaches and seizures.
Lesions are usually unilocular, spherical or ovoid, measure up to several centimeters in size and may have mass effect. They are lined by thin columnar or low cuboidal epithelium, with or without a basement membrane, and have a CSF-like content. CT and MR imaging confirm the cystic nature of the lesion. CT scans usually show a homogeneous mass, with attenuation similar to that of CSF. MR signal intensity characteristics follow CSF signal intensity on all pulse sequences. Edema is typically absent or minimal and calcifications are rarely seen. MRI also allows exclusion of gliosis around the cyst. A chronic lacunar infarct for example, which has to be differentiated from a neuroepithelial cyst, typically shows a hypointense center on FLAIR images, with a surrounding hyperintense rim; an appearance that reflects gliosis.
A common entity that resembles to our lesion and should be the first to encounter in the differential diagnosis is an enlarged Virchow-Robin space. There are three categories of enlarged perivascular spaces: type I (which appear in the basal ganglia), type II (which appear at the high convexities) and type III (which appear in the midbrain, as the lesion in our example). Virchow-Robin spaces are structures, with an MR signal similar to that of CSF. They are most commonly bilateral lesions and measure less than 5mm. Less commonly, Virchow-Robin spaces have atypical characteristics, presenting as markedly enlarged lesions, with bizarre cystic configurations and accompanying mass effect. In one-half of cases, giant VR spaces may have surrounding signal intensity abnormality on T2 and FLAIR images. According to bibliographic references, the only way to differentiate with certainty between a neuroepithelial cyst and an enlarged Virchow-Robin space is by pathologic study of the lesion.
Other lesions that may be mistaken for a neuroepithelial cyst include an infectious cyst, porencephalic cyst and arachnoid cyst. Infectious cysts are typically smaller than 1 cm and may partially enhance. Porencephalic cysts communicate with the lateral ventricle and show peripheral gliosis. Arachnoid cysts are typically extra-axial.

**Differential Diagnosis List:** Neuroepithelial cyst

**Final Diagnosis:** Neuroepithelial cyst

**References:**

Description: Axial non-enhanced T1WI, showing a lesion with homogeneously low signal intensity in the right cerebral peduncle. Origin:
Description: The lesion extends to the right thalamic region and is well circumscribed. Origin:
Figure 2

Description: The lesion shows homogeneously high signal intensity in T2WI. Origin:
**Description:** Axial T2WI at the level of the third ventricle. The lesion extends to the right thalamic region and appears with homogeneously high signal intensity. **Origin:**
Description: The lesion presents with low signal intensity on FLAIR images, similar to that of CSF.
Origin:
Description: The signal intensity of the lesion follows the signal intensity of CSF. Origin:
Figure 4

Description: On DWI, the lesion shows low signal intensity, a finding that is compatible with no restriction of diffusion. Origin:

Description: DWI at a higher level. The lesion shows low signal intensity. Origin:
Description: On corresponding ADC map, the lesion presents with high signal intensity. Origin:

Description: Corresponding ADC map at the level of the third ventricle. The lesion appears with high signal intensity. Origin:
Description: Axial contrast-enhanced T1WI. The lesion shows no enhancement. Origin:
**Description:** Axial contrast-enhanced T1WI at the level of the third ventricle. The lesion shows no enhancement. **Origin:**
Description: Coronal contrast-enhanced T1WI. Origin:
Description: Saggital contrast-enhanced T1WI. Origin:
Description: Axial non-enhanced CT examination. A hypodense lesion appears at the right cerebral peduncle. Origin:
Description: The lesion extends up to the right thalamic region. There is no evidence of mass effect.
Origin: