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Section: Neuroradiology

History: 32-year-old female with a headache.

MR Brain with and without contrast

**Review the images below. What is the most likely diagnosis?**

a. Arachnoid cyst.
b. Epidermoid cyst.
c. Pineal cyst.
d. Germ cell tumor.

**Answers:**
a. Sorry, arachnoid cysts will follow CSF signal on all sequences. Please pay particular attention to the FLAIR sequence.
b. Good try; an epidermoid cyst should be listed in the differential but typically has a more cauliflower/lobulated shape.
c. Correct! See discussion.
d. Sorry, correct location but wrong appearance.

Figure 1 (page 1). T1WI, non-contrast.
Figure 2 (page 1). TIWI, with contrast.

Figure 3 (page 1). FLAIR.
Figure 4 (page 1). T2WI.

**Questions:**
1. T or F; A pineal cyst can be distinguished from a pinecytoma with imaging?
2. T or F; Pineal cysts are more common in females than males?
3. T or F; A normal pineal gland may be cystic?
4. T or F; Compression of the tectal plate may result in Parinaud syndrome?

**Answers:**
1. False; a pineal cyst cannot be distinguished from a pinecytoma with imaging. Histologic correlation and/or follow-up imaging are recommended when one suspects a pineal cyst.
2. True; female: male ratio is 3:1
3. True; a normal pineal gland may be cystic.
4. True; compression of the tectal plate may result in Parinaud syndrome (paralysis of upward gaze).

**Findings:**
A cystic lesion (2.0 x 1.8 x 1.2 cm) with thin and well-defined enhancing walls (blue arrow) places mild mass-effect on the tectum. No hydrocephalus is present. The cystic lesion (yellow arrows) is homogeneously isointense to CSF on TIWI, uniformly hyperintense on FLAIR sequences, and isointense to CSF on T2WI. No diffusion restriction is seen on DWI. These findings are most compatible with a pineal cyst. Less likely, this may represent a pinecytoma.
Figure 1 (page 2). T1WI, non-contrast.

Figure 2 (page 2). T1WI, with contrast.
Figure 3 (page 2). FLAIR.

Figure 4 (page 2). T2WI.
**Diagnosis:**
Pineal cyst

**Case points:**
- A pineal cyst can only be distinguished from a pinecytoma histologically
- Pineal cysts are a common incidental finding but can be symptomatic
- Follow-up imaging and/or biopsy should be obtained

**Differential Diagnosis:**
Normal pineal
Pineocytoma
Epidermoid cyst
Arachnoid cyst
Germ cell neoplasm

**Discussion:**

Pineal cysts are usually asymptomatic and are often discovered incidentally. They have been discovered in up to 40% of patients on autopsy studies. Patients with large pineal cysts may have headaches secondary to obstructive hydrocephalus. Rarely, pineal cysts can produce Parinaud syndrome (paralysis of upward gaze, lid retraction, and abnormal pupillary movements). If the cyst is hemorrhagic, acute hydrocephalus can develop. Young (21-30 year-old) females are affected more than males (3:1, Female: Male). The cysts commonly enlarge with puberty and then regress with age.

On CT the pineal cyst contents are usually isodense relative to CSF. The wall may be calcified. The cyst wall (nodular or thin) may enhance with contrast. Pineal cysts have a variable appearance with MR. Cystic contents are most often hyperintense relative to CSF but may be isointense on T1WI. On T2-weighted sequences, the cystic contents are either isointense or hypointense to CSF. On FLAIR sequences the cystic contents are hyperintense. No restriction is seen with diffusion-weighted imaging. The cyst walls may enhance (60%). On delayed images, the cystic contents may enhance.

The key management issue regarding a pineal cyst is the fact that they can be indistinguishable from a pinecytoma. Therefore, a histological diagnosis may be needed to make the distinction. If biopsy or surgery is not performed, long follow-up imaging should be obtained. Some suggest that clinical follow-up without imaging is an acceptable alternative. In one follow-up series, the cysts did not change in size in 75% of patients.
References:

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