Cysts of the pineal gland
A new clinical entity to be distinguished from tumors of the pineal region

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Abstract. Thirty-two cases of pineal cyst diagnosed by magnetic resonance imaging (MRI) were reviewed and are described. The pineal cyst was demonstrated to be an area with slightly less intensity than the surrounding tissue and with slightly greater intensity than the CSF on T1-weighted images. On the T2-weighted images this lesion was identified as a high-intensity area with smooth margins and was homogeneous in nature. In three cases presenting with headache, compression of the vein of Galen was identified, and compression of the quadrigeminal plate was demonstrated in five cases. No patients presented with both pineal and quadrigeminal lesions. Of the cases, 63% were not detected by CT scanning alone. There were two cases in which the cyst ruptured and collapsed spontaneously during follow-up. It is emphasized that the presence of this lesion, which was more frequent than previously expected, should be kept in mind when diagnosing pineal tumors and should not be misdiagnosed. Surgery should not be undertaken unless the lesion produces symptoms due to the compression of the quadrigeminal plate, aqueduct, or the vein of Galen.

Key words: Pineal cyst – Pineal tumor – Pineal lesion – Magnetic resonance imaging.

Pineal tumors have drawn the attention of neurosurgeons because of their anatomical location, diagnostic interest, and the difficulties in surgical treatment. Until recently, surgical treatment of pineal tumors has been associated with high mortality and morbidity. However, recent refinements in diagnostic, anaesthetic, and microsurgical techniques have decreased the mortality and morbidity rates previously associated with direct surgery. More neurosurgeons therefore seem increasingly to advocate direct surgery in preference to conservative treatment, such as irradiation following a cerebrospinal fluid (CSF) drainage procedure. Recently, due to improved diagnostic techniques utilizing magnetic resonance imaging (MRI), it has for the first time become possible to diagnose pineal cysts and distinguish them from pineal tumors. Operative treatment, however, should not be undertaken on this lesion (pineal cyst) except for rare cases presenting particular clinical symptoms and signs.

Our purpose here is to record our observations and to describe the pineal cysts which were found on MRI.

Patients and methods
We reviewed 35 patients (aged 8 – 69 years), with cystic lesions in the pineal region. These patients were evaluated both by MRI and CT scanning.

MRI was performed by a VISTA MR imager (Picker International) using a resistive magnet operating at 0.15 tesla. The patients were studied using the multisection spin-echo technique with a long repetition time (TR) of 2.1 s and an echo time of 80 ms. This long TR sequence is referred to as the “T2-weighted” technique. In most cases, additional spin-echo pulse sequences with a short TR setting of 0.5 s and an echo time of 40 ms, or an inversion recovery (IR) technique was performed to obtain T1 information. These images are referred to as “T1-weighted” images or techniques. Additional sequences were also often performed.

CT studies were performed in all cases. For routine studies, a 10-mm-thick section was scanned without intravenous injection of an iodinated contrast agent. Contrast-enhanced scans were obtained in some of the cases.

Results
There were 32 patients with a pineal cyst. The remaining 3 patients had an arachnoid cyst in the pineal region. The lesions were most easily demonstrated on sagittal T2-weighted images. On T1-weighted images, the pineal cyst had a slightly lower signal intensity than the surrounding tissue and a slightly greater intensity than CSF. The lesions always had smooth margins and often an identifiable cyst wall that was isointense with the surrounding tissue. On T2-weighted images, that was identified as a high intensity area with smooth margins and was homogeneous in nature. The lesions were ovoid, round, or pineal in shape (Fig. 1).

The sizes ranged from normal to greatly enlarged normal. In six patients, the size of the pineal cyst appeared to be normal in size; however, it was abnormally enlarged in 26 patients, judging from the MR images. Pineal cysts in 5 cases
Fig. 1. T1 (left) and T2 (right) weighted images of the pineal cyst. On T2 images, the internal cerebral vein and the vein of Galen were well demonstrated as a black line due to the flow-void phenomenon. Flattening of the upper quadrigeminal plate was seen on T1 images. There was no change in size over the 2 years and 9 months of follow-up.

Fig. 2. Large pineal cyst 1.8 x 1.5 cm in size was demonstrated on T1 (upper) and T2 (lower) images. On T2 images, the vein of Galen appeared to be compressed below the posteroiinferior border of the splenium of the corpus callosum.

Fig. 3. Plain (left) and enhanced (right) CT scans demonstrating the pineal cyst of the same patient. Nodular calcification and small dotted calcifications were seen on the wall of the cyst.

appeared especially enlarged, and 3 of these showed compression of the vein of Galen; these cases presented with headache. All 5 showed compression of the quadrigeminal plate, but presented no corresponding symptoms.

All 32 patients underwent plain CT scanning. On plain CT scans, 12 of 32 patients were evaluated as having a low-density mass consistent with a cyst. Small dotted calcifications were often demonstrated along the cyst walls (Fig. 3). CT scanning alone failed to show a pineal mass in the remaining 20 patients.

There was no difference in incidence between males and females: 16 of each. The pineal cysts were found in both pediatric and adult age groups, ranging from 8 to 69 years old (Table 1). It is, however, interesting to note the fact that there were neither infants nor children less than 8 years old.

A total of 63 MRI studies were performed on these 32 patients during follow-up, which ranged from 3 months to 4 years. In all patients, the cysts were incidental findings. No patients developed the symptoms and signs corresponding to the pineal and quadrigeminal lesions. There was no case presenting with hydrocephalus due to obstruction of the aqueduct or posterior III ventricle, as is common in pineal region tumors. Clinical diagnosis at the time of MRI included 5 cases of migraine, 5 of seizures, 4 of head injury and