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## Enhancement of pineal cysts on MR images.

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## Enhancement of Pineal Cysts on MR Images

Pineal cysts have been reported as an incidental finding at autopsy and on MR images of asymptomatic patients [1–3]. With the introduction of gadopentetate dimeglumine, we have noticed that these pineal cysts may enhance and resemble solid tumors on delayed images obtained after administration of the contrast medium. We report six such cases.

### Subjects and Methods

The six patients were imaged on either a 1.0- or a 1.5-T MR unit. When pineal cysts >7 mm were detected on sagittal images, 500/20/2 (TR/TE/excitations), of patients in the course of daily imaging procedures and contrast medium was administered, additional sagittal images (500/20) were obtained immediately and then 60–90 min later. The size of the cysts was 7–15 mm. All six patients were studied as part of examinations done because of signs and symptoms not referable to the pineal region. CT correlation was available in one case. Pathologic confirmation was not available in any of the cases.

### Results

In all six cases, the pineal cysts were sharply margined, had low intensity on the T1-weighted images, and were hyperintense on the T2-weighted images. On images obtained immediately after injection of contrast material, a rim of enhancement was seen at the margin of the cyst. In two cases, small areas of focal enhancement were seen within the cyst. On the images obtained 60–90 min after injection, the entire cyst enhanced in all cases. In four cases, the cysts were hyperintense compared with the adjacent splenium of the corpus callosum (Fig. 1). In the two other cases, the cysts were isointense (Fig. 2). These were not the same two that showed focal enhancement on the images obtained immediately after injection of contrast material. In the case with CT correlation, a densely calcified partial rim was seen around the cyst on the CT scan.

### Discussion

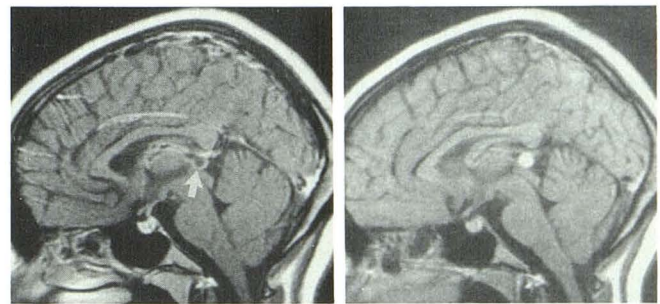
Benign pineal cysts may arise from incomplete fusion of the third ventricular diverticulation that gives rise to the pineal gland [1, 3]. These cysts usually have a glial lining, but cysts with an ependymal lining have been described. Although long recognized in the pathologic literature, pineal cysts have been rediscovered in the imaging literature because of their often quite striking MR appearance. Their intensity is lower than that of brain parenchyma but higher than that of CSF on T1-weighted images. On T2-weighted images, they are hyperintense relative to brain and often to CSF [2, 4]. Although most commonly pineal cysts are an incidental finding, they may become symptomatic when they are large enough to compress the aqueduct, quadrigeminal plate, or vein of Galen [1, 5, 6].

Pineal cysts have a high-signal rim of enhancement immediately after injection of contrast material. This is a reflection of the surrounding pineal tissue, which does not have a blood-brain barrier. On delayed images (60–90 min after injection), the central portion of the cyst fills in and may appear hyperintense. This enhancement may be inhomogeneous at first, but it becomes homogeneous on later scans. The mechanism of the enhancement is probably passive diffusion of contrast material from the surrounding pineal tissue. It is not known

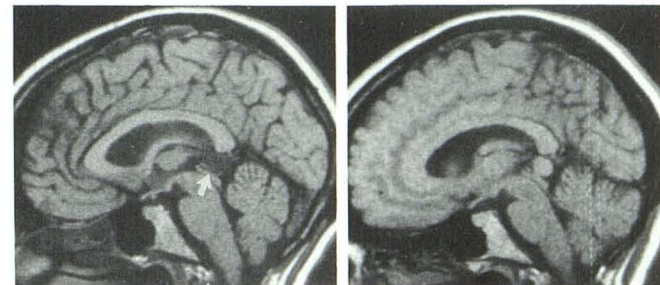
if active secretion of contrast material occurs, but the idea is intriguing in light of the occasional occurrence of giant pineal cysts. Such cysts are thought to have an ependymal lining, thus behaving like ependymal cysts elsewhere in the brain [3].

It is important to recognize benign pineal cysts as such. This characterization is not always straightforward, as investigators [7, 8] have reported hemorrhage into a cyst and a pineocytoma that resembled a cyst. In most cases, the cyst's appearance on unenhanced MR images is quite typical, however. In all the cases reported here, the patients were asymptomatic, so pathologic confirmation was not available. In an investigation of 32 cases of pineal cysts by Tamaki et al. [4], the cysts did not enlarge on follow-up studies over 3 months to 4 years. None of the patients became symptomatic, and in two cases, the cyst spontaneously collapsed. One of the cases was surgically proved, and other reports [5, 6] have confirmed the histologically benign nature of these lesions.

Confusion may arise when images obtained after the administration of contrast material are interpreted as showing a solid enhancing lesion. In such cases, it is important to consider the time elapsed since the injection of contrast material. Although delayed images are not obtained intentionally at most sites, considerable time may elapse if the postcontrast images are obtained in multiple imaging planes. In



**Fig. 1.**—A, MR image obtained immediately after injection of contrast material shows the typical rim enhancement of pineal cyst (arrow). B, On image obtained 1 hr after A, cyst appears uniformly hyperintense.



**Fig. 2.**—A, Unenhanced MR image shows a sharply margined pineal cyst (arrow) with low signal intensity. B, On delayed image obtained after administration of contrast material, cyst enhances but appears isointense with corpus callosum.

such cases, it may be prudent to obtain the sagittal images first, which will show the more typical rim enhancement.

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