

MR in the Diagnosis of Colloid Cysts of the Third Ventricle

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Colloid cysts of the third ventricle are rare, benign lesions that originate in the primitive neuroepithelium, which forms the roof plate of the tela choroidea [1-4].

Clinical presentation varies, symptoms being related to acute or chronic hydrocephalus. Intermittent headaches, gait disturbances, ataxia, fainting spells, mental disorders, and personality changes are encountered, alone or in combination.

Radiologic diagnosis—previously based on the typical pneumoencephalographic appearance of dilated lateral ventricles due to a smooth, round mass projecting in the region of the foramina of Monro—has become easier with CT. In all reported series, the characteristic finding is the high density of almost all the cysts, which appear as well defined, homogeneously hyperdense, nonenhancing lesions in the region of the foramina of Monro. Nonetheless, a few cases of isodense or ring-enhancing lesions have been described [5-9].

Atomic emission spectrometry of the mucinous content of a third-ventricular colloid cyst [10] detected principally sodium, calcium, and magnesium with the mucin; trace amounts

of silicon, copper, iron, and phosphorus; and a slight trace of aluminum. Calcifications have also been found [11], but calcium does not seem to be responsible for the high Hounsfield numbers [12].

MR provides images based on proton density and T1 and T2 relaxation times of tissues, and it has proven to be a valuable imaging technique in diagnosing CNS diseases.

Among the first 1200 patients examined since October 1983 for CNS studies, we encountered a colloid cyst of the third ventricle. The partially unexpected MR behavior of this lesion is reported.

Case Report

A 41-year-old man was referred for an MR study to better investigate a third-ventricular lesion with CT features of a colloid cyst of the third ventricle.

The first symptoms, consisting of progressive weakness of both legs appeared about 1 year before the investigation. On neurologic

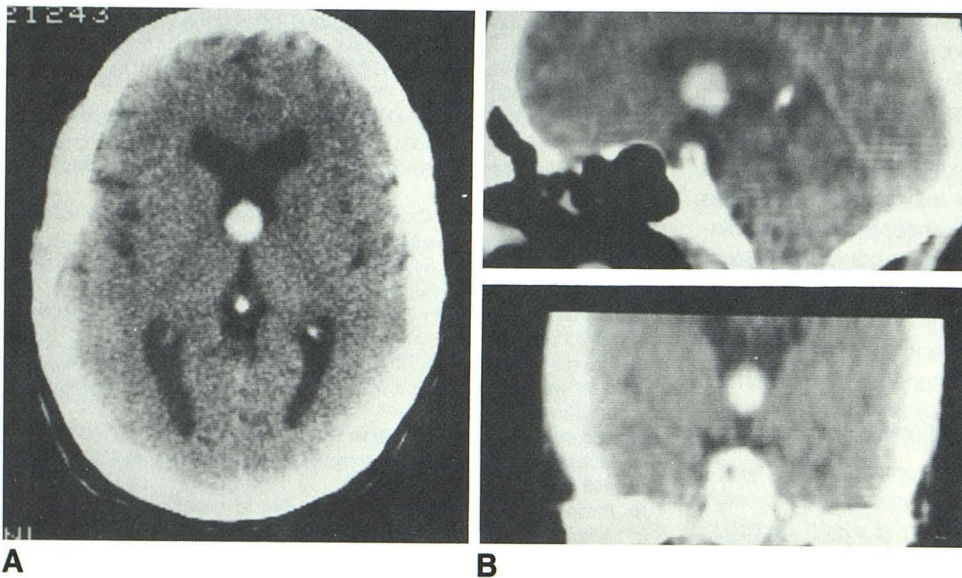


Fig. 1.—CT: axial slice (A) and reformatted sagittal (B, top) and coronal (B, bottom) images. A round, homogeneously hyperdense, nonenhancing lesion is seen in region of foramina of Monro, projecting within frontal horns of both lateral ventricles and in cranial anterior part of third ventricle. Lateral ventricles are slightly dilated.

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examination he had a mild spastic paraparesis, fasciculations, and complained of paresthesia.

CT showed a round, nonenhancing, homogeneously hyperdense mass in the region of the foramina of Monro, with mild dilatation of

the lateral ventricles (Fig. 1). At surgery, a colloid cyst of the third ventricle was aspirated by a transventricular approach. No evidence of hemorrhage was found.

Sagittal, axial, and coronal spin-echo (SE) and inversion recovery

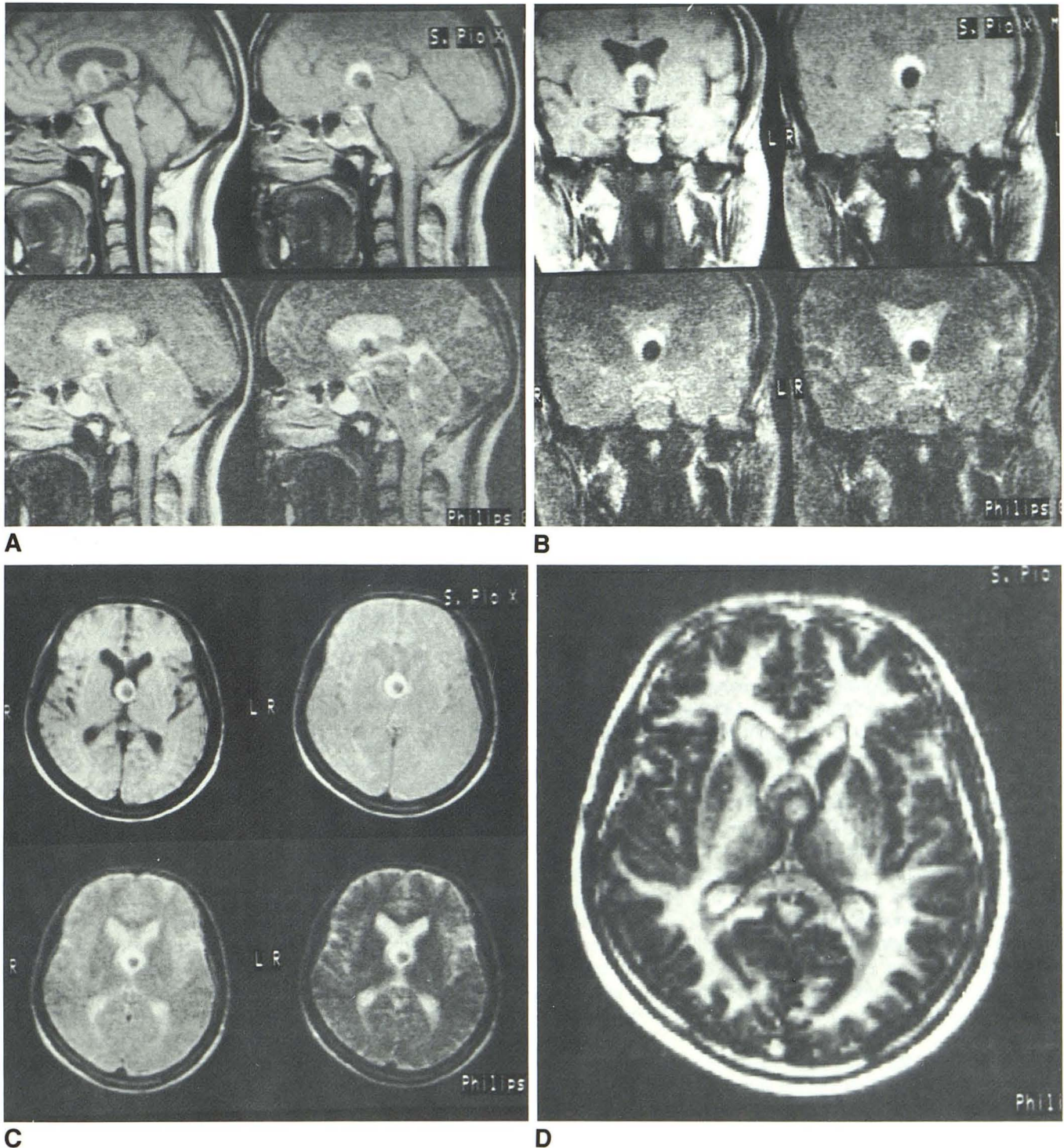


Fig. 2—MR: sagittal (A), coronal (B), and axial (C) spin-echo images; multiple-echo sequence (TR 700 msec; TE 50, 100, 150, 200 msec). Signal of the cyst's capsule is very high (long T2) while content has almost no

signal (short T2), probably because high concentrations of magnesium, calcium, copper, and iron ions have a paramagnetic effect. In IR (D), high signal of fluid content probably reflects short T1 of mucin.

(IR) scans were obtained with a superconductive 0.5-T unit (Philips Gyroscan S). SE images were obtained with a multiple-echo technique using a TR of 700 msec and TE of 50, 100, 150, and 200 msec. IR scans were obtained only in the axial plane using the following parameters: TD of 400 msec and TR of 1000 msec. Slice thickness was 10 mm, and images were acquired with two averages on a 128×128 matrix and displayed on a 256×256 matrix. Acquisition time was about 4 min for a multiecho slice with four echoes, and 6 min for an inversion recovery slice. The receiver coil used was the standard head coil with an inner diameter of 30 cm.

MR images allow easy detection of the lesion that can be precisely localized thanks to the slices obtained in the three orthogonal planes. The round mass projects through the foramina of Monro superolaterally within both frontal horns and inferomedially within the third ventricle (Fig. 2).

In SE images, the signal from the cyst has two components: (1) in the outer ring there is a strong signal, increasing in the more heavily T2-weighted images, which represents a structure with a long T2, and (2) in the center of the lesion there is a very low signal in all SE sequences, suggesting either a very short T2 or a low proton density.

In IR images, the signal is high from the center of the lesion and low from the periphery, suggesting inhomogeneity of the material in the center of the cyst, which should also contain substances with a short T1.

Discussion

MR, as already well proven and documented, is a very useful imaging technique for diagnosing any type of lesion of the central nervous system.

MR is superior to CT not only for its easy acquisition of images in the three orthogonal planes, but also for its ability to provide more information on the physicochemical properties of the tissues.

The colloid cyst that we examined, homogeneously hyperdense at CT, appears to have at least two different components with different properties at MR. The very high signal of the capsule, reflecting long T2, is most likely due to the pathologic epithelial secreting tissue. More interesting is the signal detected from the fluid content of the cyst by SE and IR. Since there is no circulating fluid, the low signal in all the echoes of the multiple-echo sequence most likely represents the high concentration of those ions of sodium, calcium,

magnesium, copper, and iron with paramagnetic properties. This is probably an indirect confirmation of previous studies that detected high concentrations of these ions in the mucinous fluid within the cyst. The fact that a high signal is detected from the same fluid in IR is probably due to the mucoid substrate.

Despite the fact that this single observation does not have a biochemical or spectrographic correlation, it is nonetheless an interesting confirmation that MR is a technique capable of providing a better understanding of the structure and nature of the lesions of the central nervous system.

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