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MR imaging of pontine tuberculoma.

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measurements of body temperature and local surface temperature. Our primary concern was acceptance by the patient.

As mentioned in the article, the thermistor probe does behave as an RF receiver and cannot be used during RF exposure. The thermistor was not connected to the electronic circuit until approximately 1 min after each exposure, and the thermistor had a thermal response of T1/2 of approximately 1 sec. We never observed a rapid decrease in temperature during the measurements, and patients never reported that the thermistor felt warm (as they did when the thermistor was connected to the circuitry). We certainly agree that continuous monitoring of surface and core temperature should be performed, but we did not have access to that technology.

The environmental temperature was maintained between 20.0°C and 24.4°C, and air flow was maintained in the scanner by a fan. Humidity was not monitored, but conditions always were considered comfortable. To minimize the impact of changes in environmental temperature on our data, we used the prescan measurements as a baseline.

The head coil was used for the head scans and, as suggested, should not have contributed to axillary surface heating. Even the body scans should not have contributed significantly to axillary surface temperature as the RF pulses were positioned over the lower half of the abdomen.

The purpose of the study was to look for clinically significant changes. We thought that small, transient changes in local surface temperatures were not of clinical significance, and we were interested primarily in sustained increases in "body" temperature. It is unlikely that increases in local surface temperature are important as patients did not report local sensations of heat or burning.

The data from Schaefer and our study are consistent in that neither study shows clinically significant changes in temperature.

The data in Fig. 1 are plotted to three significant figures. Because the experimental accuracy was only 0.1°C, the numerical values in Table 2 were rounded off to the nearest 0.1°C.

We agree with Dr. Shellock that further studies should be performed, especially if more sophisticated monitoring capabilities are available to that group.

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Abbreviated Reports

MR Imaging of Pontine Tuberculoma

Tuberculomas account for up to 30% of all intracranial masses in endemic areas [1]. In more developed nations, however, CNS tuberculoma is rare, occurring mainly among immigrants [2, 3]. Brainstem tuberculomas are particularly unusual; only 8% of all intracranial tuberculomas are located in this region [4]. Imaging techniques are important in defining the extent of these lesions, directing biopsy procedures, and evaluating response to treatment. To our knowledge, this is the first reported case of a brainstem tuberculoma documented by MR imaging.

Case Report

A 63-year-old woman presented on August 15, 1985, with a 3-month history of progressive hemiparesis, dysarthria, and dysphagia. Neurologic examination revealed mild dysarthria, left-sided motor trigeminal and peripheral facial palsy, an immobile left soft palate, deviation of the tongue to the left on protrusion, and a mild left-sided hemiparesis without sensory deficit. Mild left-sided dysdiadochokinesia was found on cerebellar testing. CT with IV contrast showed a 1-cm lesion in the pons with marked enhancement (Fig. 1A).

MR was performed with a 0.35-T unit and showed a mass of decreased intensity on T2-weighted images that was 15 mm in diameter (Fig. 1B). This lesion was surrounded by a large zone of increased intensity on T2-weighted images, indicating edema, which extended through much of the pons into the cerebellar and cerebral peduncles (Fig. 1C). The fourth ventricle was slightly compressed and posteriorly displaced. The findings were thought to be due to an infectious process, most likely tuberculosis.

Five days after admission, the patient underwent stereotactic biopsy of the pontine lesion under CT guidance. Two 2-mm fragments of tissue were obtained and showed noncaseating granulomas composed of histiocytes, lymphocytes, and giant cells. Special stains showed rare acid-fast bacilli. The diagnosis of tuberculoma was subsequently confirmed by cultures, and antituberculous therapy was

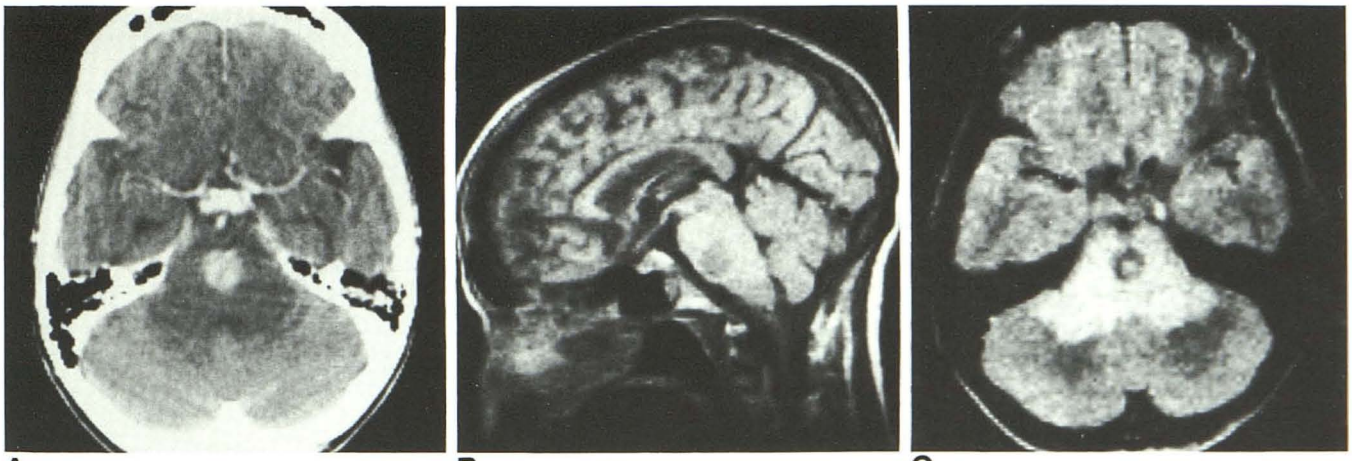

Fig. 1.—63-year-old woman with pontine tuberculoma.
***A*, CT scan after infusion of contrast shows 1-cm lesion in pons.**
***B*, Sagittal MR image (TR = 1.0 sec; TE = 28 msec) shows a focal mass of decreased signal intensity.**
***C*, Axial MR images (TR = 2.0 sec; TE = 56 msec) show extension of edema in cerebellum.**

started. Postoperatively the patient had no progression of her neurologic deficits and responded well to antituberculous therapy. A CT scan obtained on the 10th postoperative day showed slight prominence of the pons without hemorrhage or mass effect.

Discussion

Before the advent of antituberculous agents, complete surgical excision of intracerebral tuberculoma offered the only chance for survival, generally with poor results [1]. Currently, however, these agents are the treatment of choice for CNS tuberculoma, with surgery reserved for cases of uncontrolled intracranial pressure of failure of medical therapy [2]. Symptomatically, neoplastic and vascular lesions of the brainstem and infection can have similar presentations [1, 3, 5]. Unless a primary focus of infection is identified, histologic confirmation of an intracranial lesion is mandatory before any therapy is started.

Because of its contrast resolution and multiple projections, MR has been shown to be superior to CT for imaging brainstem lesions [6, 7]. As documented by the present case, the true extent of the tuberculoma and its precise relationship to adjacent structures could not be fully appreciated by CT. Use of MR in areas edemic for tuberculosis will allow further characterization of this granulomatous process.

Despite their sensitive locations, biopsy of brainstem lesions can be accomplished with minimal disruption of normal tissue [8]. Further application of MR and MR-directed stereotaxis will provide precise three-dimensional localization of brainstem lesions, increasing the likelihood of successful biopsy with diminished risks.

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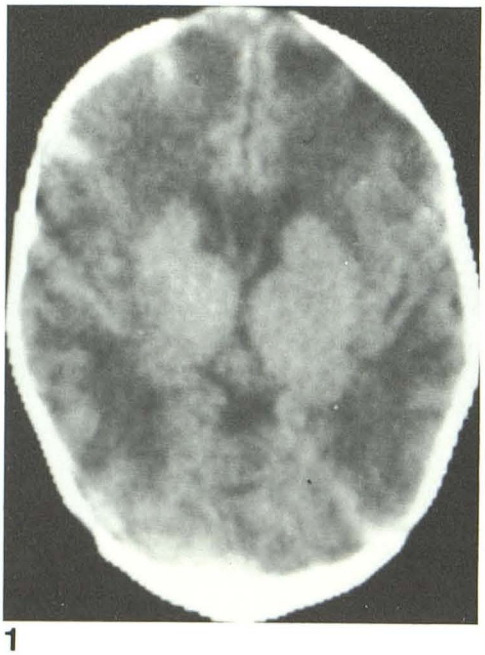
Cranial CT in Galactosemia

Galactosemia is an autosomal recessive disorder occurring in one in 40,000 live births. Cranial CT changes in galactosemia before and after treatment have been reported only recently in the literature [1]. This case is the second. In both cases, CT findings were strikingly similar, and their resolution corresponded to clinical improvement.

Case Report

A 5-week-old boy was admitted to the hospital for evaluation of ascites; the presumptive diagnosis was phenylketonuria. The direct bilirubin was moderately elevated. Head circumference was at the 35th percentile, and the weight was at the 5th percentile. The neurologic examination was unremarkable except for a mild developmental delay. Galactosemia was suspected after a urine glucose test was performed, and the diagnosis was confirmed by enzyme assay that showed no activity of galactose-1-phosphate uridyl transferase. The infant also was found to have cataracts. Head CT revealed symmetric low attenuation in the white matter, with sparing of the basal ganglia and a moderate degree of ventricular dilatation (Fig. 1). After 20 months of milk restriction, follow-up CT was performed. It showed significant recovery of normal white-matter attenuation, with only a minimal degree of ventricular dilatation (Fig. 2). Follow-up physical examination revealed normal liver and spleen size, normal neurologic development, and resolution of cataracts.



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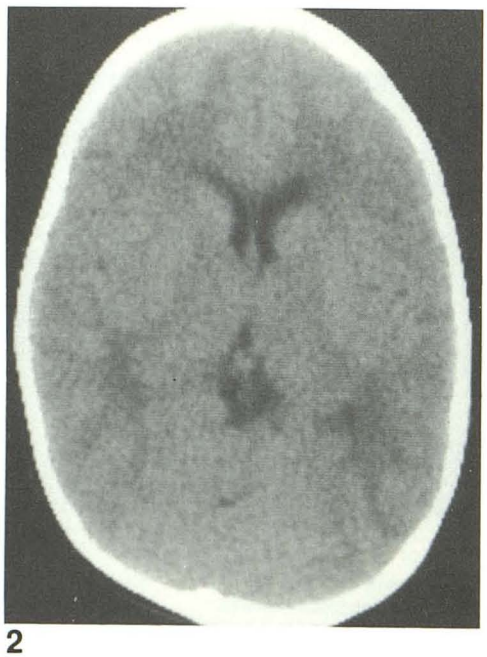

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Fig. 1.—Unenhanced CT scan of head at 5 weeks of age shows decreased attenuation diffusely throughout white matter, with relative sparing of basal ganglia. Mild ventricular dilatation is also present.

Fig. 2.—Follow-up unenhanced CT scan of head 19 months later, after dietary restriction of lactose, shows return to normal appearance of white matter; ventricles are still somewhat prominent for age.