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Celebrating 35 Years of the AJNR

September 1982 edition

Clinical NMR Imaging of the Brain: 140 Cases

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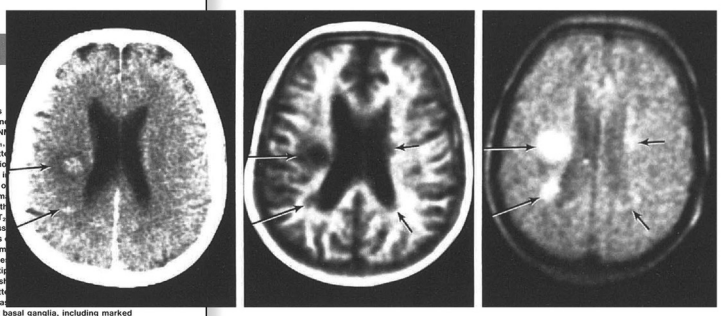

Cranial nuclear magnetic resonance (NMR) scans
volunteers and 140 patients with a broad spectrum of ne
with x-ray computed tomography (CT) scans. The NM
sequences reflecting proton density, blood flow, T_1,
sagittal, and coronal images. White matter, gray matte
clearly distinguished in the normal brain with inversio
normal progressive myelination was demonstrated in i

Acute hemorrhages displayed short T_1 values, but o
as infarction, infection, demyelination, edema, and m
long T_1 values. Cysts had very long T_1 values (about th
echo (SE) sequences showed increased values of T_2
highlighted lesions against the relatively featureless
brain. With inversion-recovery scans, different stages
the hemispheres. NMR was more useful than CT in dem

The white matter lesions in demyelinating disease
NMR scans. Many more lesions were observed in multip
CT. Benign tumors were well seen and usually had sh
tumors. Mass effects from tumors were generally bett
with CT, including more subtle mass effects such a
capsule. Abnormalities were seen in diseases of the basal ganglia, including marked atrophy of the head of the caudate nucleus in Huntington chorea.

Advantages of NMR imaging include the high level of gray–white matter contrast, lack of bone artifact, variety of possible sequences, transverse, sagittal, and coronal imaging, sensitivity to pathologic change, and lack of known hazard. Disadvantages include lack of bone detail, limited spatial resolution, lack of contrast agents, and cost. Promising directions for future clinical research include developmental neurology, tissue characterization with T_1 and T_2, assessment of blood flow, and the development of contrast agents. Much more detailed evaluation will be required, but NMR seems to be a potentially important addition to existing techniques of neurologic diagnosis.

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Although NMR imaging was initially proposed in the United States [1, 2], much of the early development was carried out by small groups of physicists and engineers in Britain based at the Department of Bio-medical Physics in Aberdeen [3], the Department of Physics in Nottingham [4], and the Central Research Laboratories of Thorn-EMI Ltd. The hitherto published results of NMR imaging of the brain largely reflect the activities of these groups, although major contributions are expected from other centers in the near future. Head images were produced by the Thorn-EMI group in 1978 [5], and a series of brain scans was published by the Nottingham group during 1980 [6–10]. The Aberdeen group produced normal head images in 1980 [11] and have described abnormal cases during 1981 [12]. Nevertheless the total volume of published cerebral cases remains small. Fewer than 40 cases have been described with the largest series a group of 10 patients with multiple sclerosis [13].

In previous studies we have emphasized the high level of gray–matter contrast

Computed Tomography of the Sacrum: 2. Pathology

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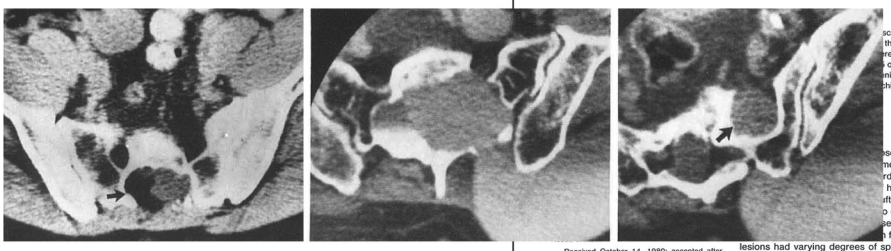

Fifteen cases of primary sacral pathology were analyzed. High-resolution computed tomography was found to be the most accurate means of studying these cases. Certain anatomic changes involving the central canal and sacral foramina were found to be helpful in determining the type of pathology. Although conventional plain films, radionuclide bone scans, and myelography were useful in certain cases, computed tomography was found to be the procedure of choice in the workup of sacral problems

scans of 15 patients with sacral abnormalities were
the supine position with no angulation of the table or
re examined using the Pfizer model 450 scanner with
or 10 sec, and a slice thickness of 2–10 mm. Of the
nital lesions (three adults, six children) and six had
hildren).

sed as meningocele (case 1), lipoma (cases 2–
meningocele (case 6), low conus, tethered cord
rd (case 8). All but one of the six children in this
having a congenital lesion either because of a
ft, hemangioma) or associated anomalies such
o of the three had histories strongly suggestive
es 2 and 3), while one patient (case 1) was
first examined. All the patients with congenital lesions had varying degrees of spinal dysraphism on plain films. In two cases, the defect was minimal and not appreciated on the initial films, while in one case of adult meningocele the sacral deformity was believed to represent neoplasm. Bone scanning was not performed in any of the patients with congenital lesions. Myelography was performed in six patients, two with metrizamide and four with Pantopaque. A low conus with tethered cord was demonstrated in five patients; an associated lipoma was present in four and a dermoid in one. However, the most informative study of the sacrum in all these patients was the high-resolution CT scan.

All the congenital lesions demonstrated dorsal dysraphism with widening of the central sacral canal and sparing of the sacral foramina. The four lipomas clearly displayed fat density (fig. 1) while the dermoids showed calcium, fat, and soft-tissue density. In the patient with meningocele (case 1), CT demonstrated the widening of the central canal as well as extrusion of the meningocele into the buttock via a dorsal defect in the sacrum (fig. 2A). In addition, CT was able to

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