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CT Myelography of Subarachnoid Leukemic Infiltration of the Lumbar Thecal Sac and Lumbar Nerve Roots

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Spinal nerve root or cauda equina compression in patients with leukemia is often secondary to extradural chloroma [1]. We present the CT myelographic findings of an intradural mass and lumbar nerve root enlargement secondary to leukemic infiltration of the lumbar subarachnoid space and nerve roots. This form of leukemic involvement of the nervous system has not previously been demonstrated with CT myelography.

Case Report

A 27-year-old woman with acute myelogenous leukemia since January 1982, in remission since February 1982, developed right leg weakness and low back pain in December 1984. Leg weakness progressed until, in January 1985, she was unable to walk. Physical examination revealed bilateral proximal and distal leg weakness; deep tendon reflexes were absent. A Babinski response was present on the right and equivocal on the left. Straight leg raise greater than 10° was extremely painful. The lumbar spine was tender to palpation. Initial laboratory data included a normal complete blood count. Several attempts at lumbar myelography returned two drops of turbid fluid, which was sent for culture and sensitivity. The patient experienced significant discomfort during the procedure. A successful C1–C2 puncture returned clear fluid, which was sent for appropriate study. Metrizamide placed within the subarachnoid space flowed freely to the L3–L4 level, where a complete block was encountered (Fig. 1A). Axial CT images from L3 to S1 were obtained immediately (Figs. 1B, 1C, 1D). CSF analysis revealed 1136 white blood cells/mm³, 96% myeloblasts; total protein and glucose measured 86 and 72 mg/100 ml, respectively. All cultures were negative.

Discussion

Metastatic disease within the lumbar subarachnoid space secondary to an extraaxial primary malignancy is unusual [2]. Dissemination of tumor to the lumbar subarachnoid space and associated membranes of the spinal cord takes place by several mechanisms. Primary neuroaxis tumors occasionally seed the spinal cord through the subarachnoid space while a hematogenous route is most likely if no primary neuroaxis tumor is present [2]. Extension of tumor cells to the subarach-

noid space is also possible via perineural lymphatics in the spinal nerves [3]. Leukemia reaches the meninges by penetrating the walls of the veins in the subarachnoid space [4]. Compromise of spine and nerve root in patients with leukemia most often is secondary to adjacent, extradural chloroma, the dura being an effective barrier to direct invasion [2]. At autopsy, Moore et al. [5] found arachnoid infiltration in 30% of 117 cases of leukemia. It occurred twice as often among those with lymphocytic leukemia than among those with myelocytic leukemia, and more frequently in children than adults. Arachnoid infiltration is often diagnosed when the patient is in hematologic remission [6]; the incidence of this complication increases with the duration of the disease [7]. Rarely, nerve deficit is the first manifestation of leukemia [8, 9]. Leptomeningeal leukemia involving the spinal nerves is less common than involvement of the cranial nerves [6]. Myelographic findings in leukemic infiltration of the thecal sac and lumbar nerves are not entirely specific, particularly when flow of metrizamide is obstructed within the thecal sac. The clinical setting narrows the differential diagnosis to metastases, abscess, or hematoma. The CSF cell count and differential provide further discrimination. CSF parameters, particularly the number of immature leukocytes, correlate well with the amount of arachnoid infiltration present in patients with acute leukemia [5]. A collection of leukemic cells within the thecal sac infiltrating the lumbar nerves could create an intradural block by filling the space completely, this appearance has previously been described for metastatic reticulum cell sarcoma [2]. Gravity influences the distribution of metastases within the subarachnoid space around the spinal cord, and, as a result, tumor is more frequently found on the dorsal surface of the cord and cauda equina [10]. Leukemia, lymphoma, and lung, breast, and gastric carcinoma can cause lumbar nerve root thickening [3, 11]. Arachnoiditis, multiple neurofibromas, and hypertrophic interstitial neuropathy of Dejerine and Sottas also result in lumbar nerve thickening [2].

In the case we describe, the patient's symptoms and physical findings indicate spinal cord compromise. The complete blood count and the CSF findings make abscess or hematoma unlikely reasons for the patient's complaints. We

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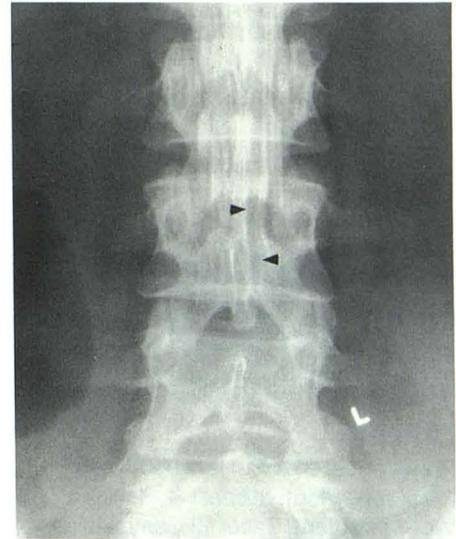
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Fig. 1.—A, Metrizamide myelography shows complete block at L3–L4 interspace and highlights enlarged nerve root within cauda equina (arrowheads).

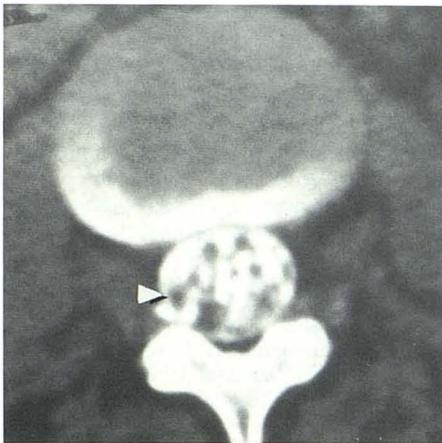
B, Axial CT image through L2–L3 disk space. Metrizamide outlines thickened, irregular nerve roots in thecal sac (arrowhead).

C, Axial CT image through pedicles of L3 show soft-tissue mass within dorsal aspect of thecal sac. Metrizamide is present anteriorly.

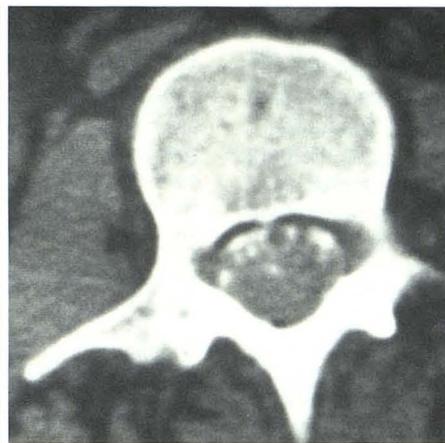
D, Axial CT image 5 mm caudal to image in part C shows minimal metrizamide in anterior aspect of distended thecal sac. Normal epidural fat outlines enlarged L3 roots (arrowheads) and thecal sac. Metrizamide does not enter nerve root sleeves. Similar findings were present at L4 and L5.



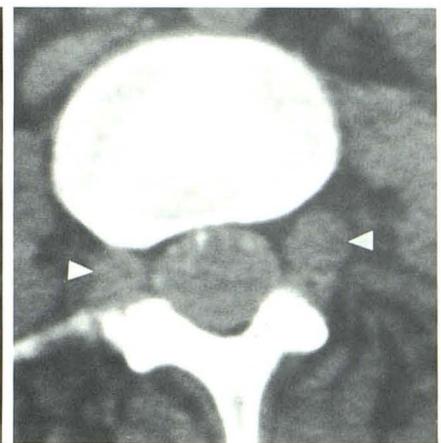
A



B



C



D

believe myeloblasts have infiltrated and enlarged the lumbar nerve root sleeves and displaced CSF from the subarachnoid space around the cauda equina below L3. We did not demonstrate the cause of the right Babinski response. Although we do not have biopsy proof of these findings, the CSF myeloblast count of 1093 cells/mm^3 and the patient's positive response to 2400 rad of radiation therapy to the lumbar spine strongly support our contention.

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