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MR of Intramedullary Spinal Cysticercosis

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Intramedullary spinal cysticercosis (IMSC) is extremely rare [1] and the only radiologic findings previously reported have been those obtained by myelography [1–4]. We describe and analyze the MR features of IMSC and correlate them to the pathologic changes in the cord. This type of analysis can aid in planning the surgical approach to patients with IMSC. We believe this is the first reported case of isolated IMSC imaged by MR.

Case Report

A 46-year-old Chilean man presented with a 1-week history of left lower extremity weakness and right lower extremity pain. A metrizamide myelogram and CT scan done at an outside institution revealed fusiform widening of the cord from C3 to C6, T3 to T5, and at the conus medullaris (Fig. 1). CT of the brain was performed in Chile and was reported as normal, but this scan has been unavailable for review. Two weeks later the patient was referred to our institution. Physical examination showed that the initial symptoms had progressed and the patient was now confined to a wheelchair. In the lower extremities, muscle strength was absent, the reflexes were hypoactive, and the vibratory and position senses were markedly decreased. There was loss of sensation from the perineum to the feet, impotence, urinary retention, and rectal sphincter dysfunction. The remainder of the neurologic and general physical examination, routine laboratory studies, and CSF analysis were normal. T1-weighted images showed well-defined, low-signal-intensity lesions within the cord from C3 to C7, T3 to T5 and at the conus medullaris (Fig. 2). The cord was focally expanded at each of these levels and multiple septations within the thoracic lesion was noted. The T2-weighted images showed the cervical lesion to remain hypointense, suggesting the presence of an intramedullary cyst with flow void phenomenon within it (Fig. 3A). The lesions in the thoracic cord and conus medullaris were hyperintense, suggesting the presence of nonpulsatile cysts (Figs. 3B and 3C). The patient returned to Chile, where surgery was performed. A T12–L1 laminectomy was performed, and after a myelotomy of the conus medullaris a 15-mm × 5-mm globular, fluid-filled, dark gray cystlike lesion was excised. The cavity was flushed and shunted to the peritoneum. CSF complement fixation test was positive for cysticercosis. Microscopic examination confirmed the diagnosis of a *Cysticercus cellulosae* vesicle. The scolex was not found. Because multiple parasitic cysts were probably present cephalad to this lesion and were not resected, the patient was given Praziquantel; his symptoms improved considerably after treatment. Six months later, the patient was able to walk with the aid

of a cane and partial bladder control was regained, but the impotence persisted. No symptoms referable to the upper extremities were present. Follow-up MR revealed satisfactory decompression of the conus medullaris cyst. The cervical and thoracic lesions remained unchanged.

Discussion

IMSC is a rare condition, and during the last 100 years only 19 cases have been reported [1]. Cysticercosis most commonly involves the subarachnoid space and, less often, the cord or epidural space [1]. Subarachnoid involvement is six to eight times more common than intramedullary involvement [2]. In 15 of the 19 cases, the diagnostic evaluation was made via myelography; the remaining four cases were discovered incidentally at autopsy. To our knowledge, CT and MR findings in IMSC have not been described.

It has been hypothesized that IMSC occurs after either hematogenous dissemination or ventriculoependymal spread [1, 5]. Hematogenous dissemination is proportional to blood flow to the cord and, as a result, the thoracic cord, which receives more blood than the other segments, is affected in

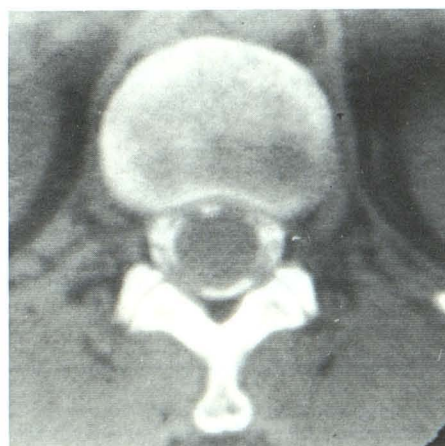


Fig. 1.—Delayed postmetrizamide CT section at T12–L1 level. There is symmetrical enlargement of cord but no intramedullary cyst.

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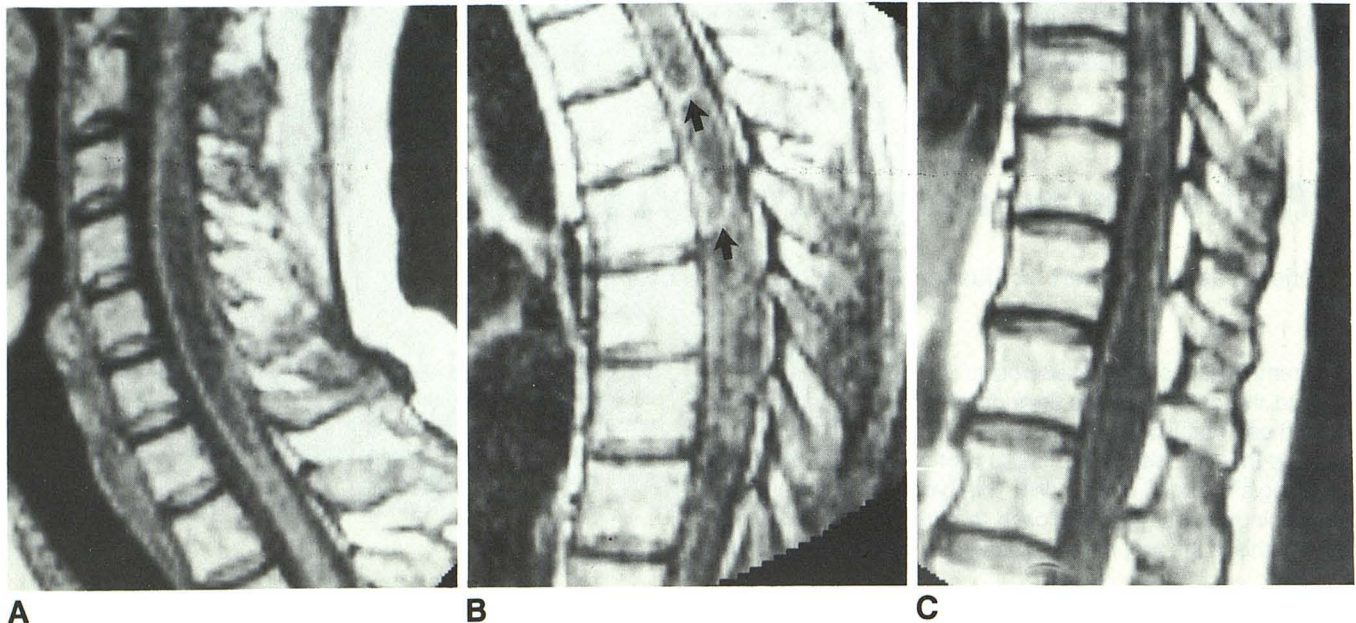


Fig. 2.—A, Sagittal T1-weighted (700/26) MR image at cervical spine level. A syrinx of low signal intensity is seen extending from C3 to C7. Borders of lesion are smooth, there are no septations, and there is mild enlargement of cord.
 B, Sagittal T1-weighted (700/26) MR image shows multiseptated cyst (arrows) of low signal intensity extending from T3 to T5 with cord enlargement.
 C, Sagittal T1-weighted (700/26) MR image of conus medullaris shows a low-signal-intensity cystic lesion.

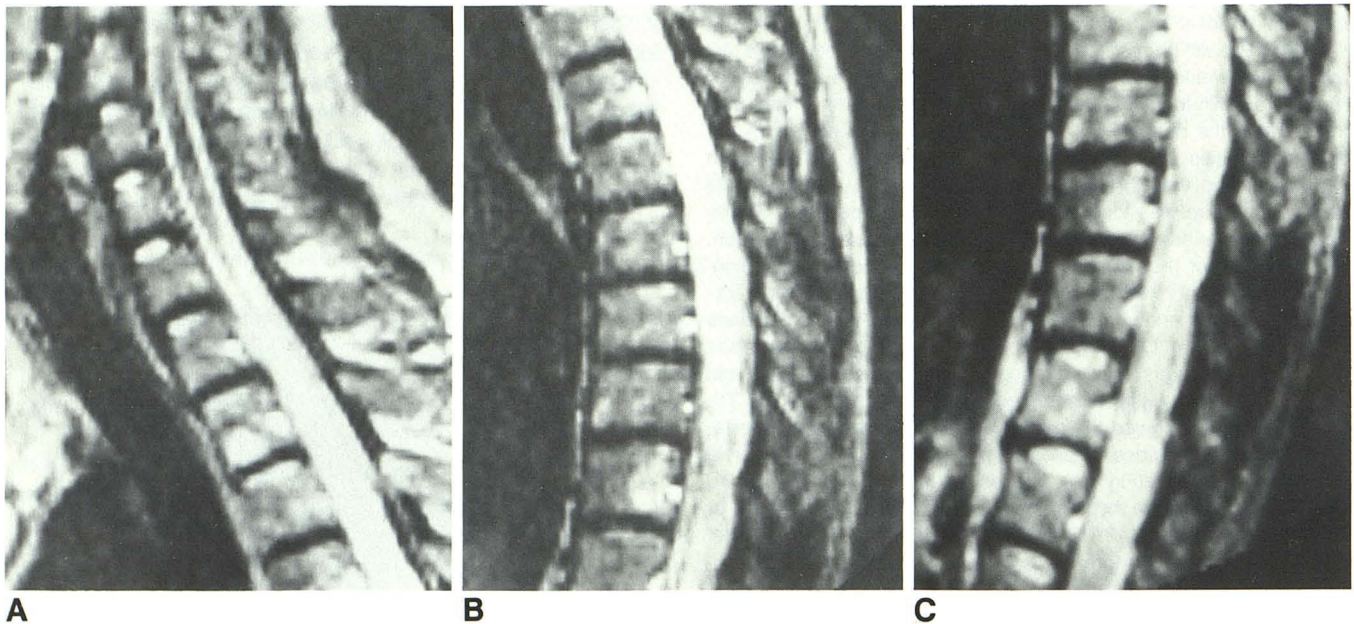


Fig. 3.—A, Sagittal T2-weighted (2000/80) MR image at cervical level shows that lesion remains of low signal intensity, probably secondary to intracystic fluid motion.
 B, Sagittal T2-weighted (2000/80) MR image at thoracic spine (same level as Fig. 2B) shows that lesion is of increased signal intensity similar to adjacent CSF. This finding is most likely due to a lack of intracystic fluid motion within parasitic cyst.
 C, Sagittal T2-weighted (2000/80) MR image demonstrates that cyst at conus medullaris is of increased signal intensity. Surgery confirmed presence of intramedullary cysticercosis at this level. Note that lesions in thoracic region have identical characteristics.

the majority (64%) of cases [1, 6]. The hypothesis stating that in ventriculoependymal spread cysticerci could migrate to the cord via a patent central canal is unsubstantiated [6]. Despite the probability that hematogenous dissemination is

more likely, IMSC usually occurs as a single lesion; no explanation exists for this phenomenon. Once the parasite has become lodged in the cord, neurologic symptoms may be produced by one or more of the following mechanisms: (1)

inflammation secondary to metabolites from the parasite or the remains of the degenerated larvae, (2) mass effect, and/or (3) cord degeneration that may be due to meningitis and/or vascular insufficiency [5].

Clinically, the majority of patients present with progressive spastic paraplegia, but other common symptoms include urinary and rectal sphincter dysfunction, radiating pain, sensory and motor deficits, and sexual impotence [3, 4, 7]. Approximately 50% of the cases reported were found to harbor the parasite in other sites, primarily the brain (30%) and muscular tissue (25%) [1]. The duration of symptoms can vary from 3 months to 3 years. Clinical diagnosis is extremely difficult and of all the reported cases the correct preoperative diagnosis was made in just one patient. Routine laboratory examination reveals peripheral eosinophilia in half the patients, while CSF examination is usually normal [1]. The most precise laboratory test is the CSF complement fixation test [1].

The only diagnostic imaging procedure previously used has been conventional myelography, which may show areas of focal widening of the cord, with or without partial or complete block at the level of involvement [1, 5]. Because IMSC can be treated by surgical excision and therefore may be curable, the correct preoperative diagnosis is important [6]. In our patient a cystic intramedullary neoplasm was considered the most likely possibility. In the cervical cord the lesion was of low signal intensity in the T1- and T2-weighted images (Fig. 2A), indicating the presence of a syrinx cavity with a flow void phenomenon. The cyst in the cervical region was quite different in its MR appearance from the intramedullary cyst in the thoracic cord. Specifically, in the thoracic cord and conus there was low signal intensity on the T1-weighted images but increased signal intensity on the T2-weighted images (Figs. 3B and 3C). We believe that the fluid within the parasitic cysts of the thoracic cord and the conus medullaris was relatively immobile and therefore resulted in high intensity signal on the

T2-weighted images. Although we have no surgical proof, it is possible that the low signal on T2-weighted images of the cystic dilatation of the cervical cord (Fig. 3A) was due to the development of a noninfected hydromyelic cavity above an obstructed central canal. From a clinical standpoint this situation is most likely because the patient had no upper extremity symptoms or tonsillar ectopia to suggest the presence of a preexisting hydromyelic cavity. Had this been an infected cyst of the cervical cord, neurologic symptoms would be expected. Because of the similarity of the mid-thoracic and conus lesions on MR, we believe that cysticercosis affected the cord from T3 to the conus.

Although clinical diagnosis is usually not possible in isolated IMSC, we suggest that when a patient from an endemic region presents with single or multiple cord cysts that contain nonmobile fluid as indicated by MR, IMSC be considered in the differential diagnosis. By analyzing the signal intensities from various portions of the cystic lesion, one may be able to direct the surgeon to that area of the spinal cord that is most likely to contain the loculated inflammatory fluid.

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