Gout in the cervical spine: MR pattern mimicking diskovertebral infection.

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Gout in the Cervical Spine: MR Pattern Mimicking Diskovertebral Infection

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Summary: We report the MR features of a surgically proved cervical spine involved with gouty tophi in a patient with a long history of hyperuricemia. Tophi appeared as sharply delineated areas of low signal intensity on T1 and T2 MR images and showed intense and homogeneous signal enhancement on postcontrast images.

Index terms: Metabolic disorders; Spine, magnetic resonance

Gout is a common metabolic disorder with well-defined clinical, biochemical, and radiologic features (1, 2). Gouty arthritis typically affects the distal joints of the appendicular skeleton (1–4). Involvement of the axial skeleton is uncommon, and urate deposition in the spine is rare (1, 2); however, the prevalence of spinal gout involvement remains controversial (5). Histologically proved cases of gouty involvement of the spine have been reported in the literature (6–25). Most of them presented with symptomatic cord or root compression (12–25). Radiologic findings are not specific and include disk space narrowing and spondylodiscal erosive changes (6, 10). The odontoid process of C2 may be involved (10), as may the lumbar posterior joints (9, 11).

Case Report

A 59-year-old man with long-standing gout presented with progressive impairment of walking. The symptoms had appeared 1 year previously and finally resulted in a tetraparetic state. Both clinical examination, revealing bilateral pyramidal signs, and electrophysiological studies including evoked potentials and electromyography, were consistent with spinal cord compression.

Retrospective inquiry revealed insufficient compliance with the hypouricemic treatment (combining allopurinol 300 mg daily and dietary restrictions) and persistent serum levels of uric acid as high as 590 μmol/L (normal values, 180 to 360 μmol/L).

Plain films of the hands and feet (not shown) demonstrated multifocal joint lesions with features typical of gouty arthritis. Plain films of the cervical spine (Fig 1A) demonstrated severe destructive and proliferative discovertebral changes from C3-4 to C5-6. Magnetic resonance (MR) examination at 0.5 T included precontrast and postcontrast sagittal T1-weighted spin-echo images (450/20/4 [repetition time/echo time/excitations]) and sagittal T2-weighted fast spin-echo images (3200/120/6, echo train 16). Multiple areas of low signal intensity on both T1 and T2 images showed an intense and homogeneous enhancement after administration of contrast (Fig 1B–D).

Surgical treatment consisted of corporectomies of C-4 and C-5 followed by bilateral foraminotomies of C3-4, C4-5, and C5-6. Interposition of an autogeneous bone graft (fibula) between C-3 and C-6 completed the procedure. During surgery, disk spaces C4-5 and C5-6 were indistinguishable from the adjacent vertebral bodies, and the resected posterior longitudinal ligament was thickened with patchy white deposits consistent with gouty tophi.

Pathologic examination of the specimens demonstrated amorphous urate deposits and reactive bone fragments embedded within a chronic inflammatory stroma (Fig 1E). However, variable degrees of fibrous change were observed in the reactive stroma, and numerous vascular channels were seen at all places. No features of tumoral or infectious process were seen. Bacteriologic examinations of multiple specimens were negative. These included the special procedures for detecting mycobacteria. A mild clinical improvement with partial neurologic recovery occurred after surgery.

Discussion

Involvement of the spine in patients with gout has been reported (1, 2). The proved cases underwent either biopsy to rule out other processes (6–11) or decompressive surgery in the presence of root or cord compression (12–25). Considering these 14 reports on this topic and including our case, neurologic compression may occur in all segments of the spine: 6 cases in the cervical

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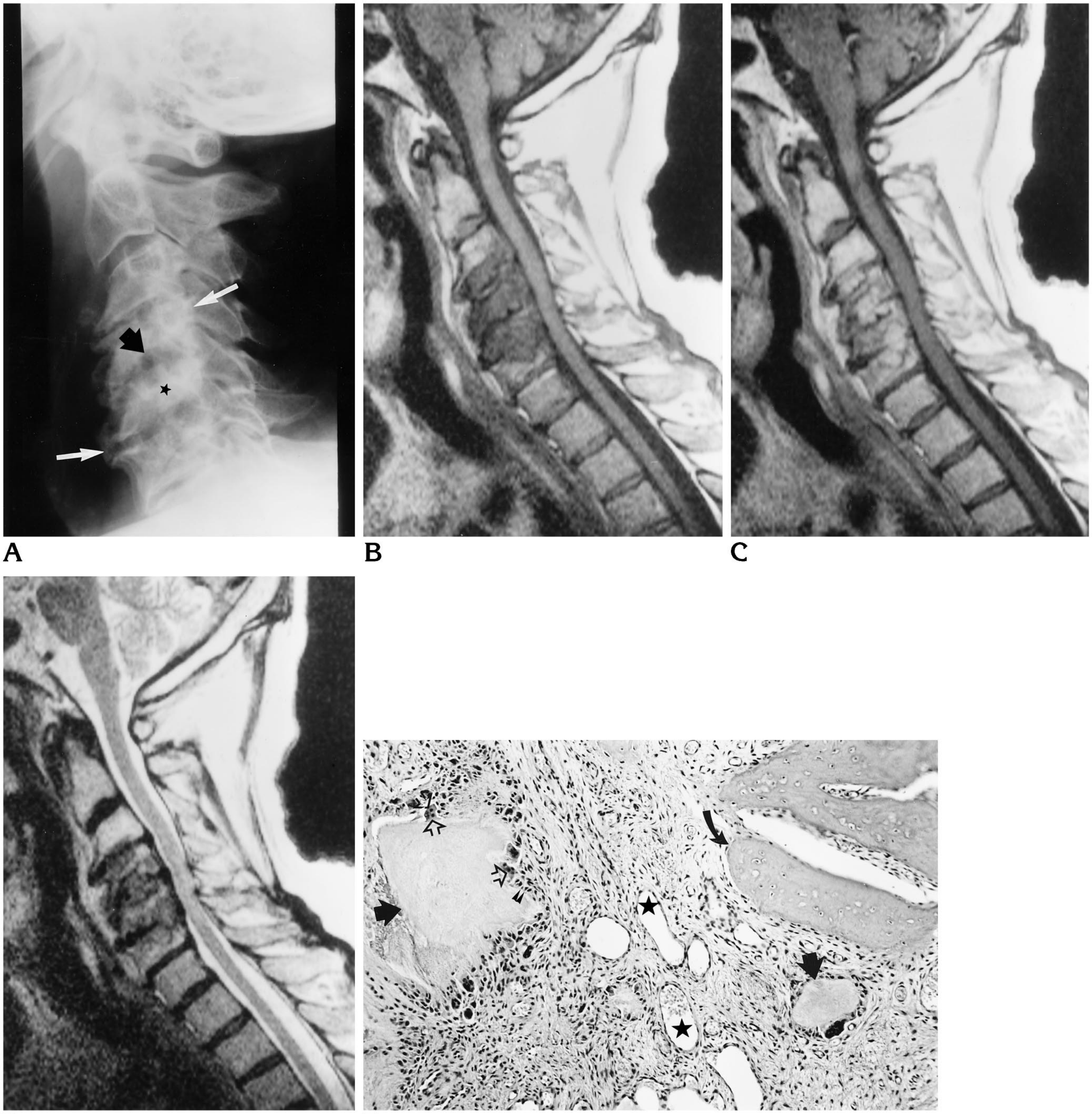

Fig 1. *A*, Lateral-view radiograph of the cervical spine shows atypical diskovertebral changes from C-3 to C-6. Deep erosions of several end plates (*black arrow*) are associated with hyperostosis (*star*) and prominent marginal osteophytosis (*white arrows*).

B, Unenhanced sagittal T1-weighted spin-echo MR image (450/20) shows large hypointense areas within the vertebral bodies of C-4, C-5, and C-6 without changes in the adjacent epidural and prevertebral spaces.

C, Postcontrast T1-weighted MR image in the same plane. Enhanced foci involve both the C-4 to C-6 disk spaces and the contiguous vertebral erosions. The ventral segment of C5-6 is spared despite dorsal involvement. Note the continuum between the diskal and vertebral lesions.

D, T2-weighted fast spin-echo MR image (3200/120, echo train length 16) in the same plane. The enhanced foci in *C* appear as low-signal-intensity areas. Cord compression is obvious at the C5-6 level.

E, Histologic section of a surgically resected specimen. Two tophaceous deposits (*thick black arrows*) surrounded by histiocytes and multinucleated giant cells (*open arrows*) are embedded in a chronic inflammatory stroma. Vascular channels (*stars*) and cancellous bone fragments (*curved arrow*) without lamellar organization are present. Note pseudopalissadic disposition of histiocytes surrounding tophi (*small double arrowhead*).

segment (16, 18, 20–22), 4 cases in the thoracic segment (12, 15, 17, 25), and 5 cases in the lumbar spine (13, 14, 19, 23, 24).

Bone erosions by the urate crystal deposits and secondary proliferative bone changes are the prominent but nonspecific feature of spinal gout on plain films. Computed tomography may help in delineating bone and soft-tissue changes and in disclosing tophi as low-density areas.

In the case reported here, deep erosions of multiple end plates (Fig 1A and B) and tissue enhancement both within the disks and adjacent vertebral bodies (Fig 1C) initially suggested the diagnosis of diskovertebral infection. However, some MR features of the lesions were different from the usual presentation of a diskovertebral infection. These lesions were sharply delineated without surrounding infiltrative changes; normal disk tissue persisted immediately adjacent to the destroyed diskal areas, and no significant bone marrow edema was seen in the trabecular bone adjacent to the lesions. On T2-weighted images, the diskal and intravertebral lesions disclosed an unexpected low signal intensity, and the adjacent soft tissues were normal.

The MR signal and vascularization characteristics of the gouty tophi observed in this case (ie, low signal intensity both on T1 and T2 images and homogeneous enhancement on postcontrast images) are remarkable. They possibly reflect the dual histologic component of the lesions (Fig 1E). The low signal intensity seen on T2-weighted images may result from the presence of fibrous tissue and crystalline structures. We similarly observed hypointense gouty tophi on T2-weighted images in peripheral joints in other patients. In turn, the enhancement seen on postcontrast images may reflect the presence of vascularized reactive tissue within lesions.

The segmental pattern of disk involvement observed in our patient is unusual in diskovertebral infection, which generally involves the entire disk surface. A few cases of pyogenic infection have shown a subtle and limited contrast enhancement of the disk (26). In addition, infectious vertebral erosions are usually not as sharply marginated as in this case.

References

1. Resnick D, Niwayama G. Monosodium urate crystal deposition disease (gout). In: Resnick D, ed. *Bone and Joint Imaging*. Philadelphia: WB Saunders Co, 1989;461–476
2. Edeiken J, Dalinka M, Karasick D, Arthritides. In: Grayson T, ed. *Edeiken's Roentgen Diagnosis of Diseases of Bone*. Baltimore: Williams & Wilkins, 1990:756–773
3. Barthelemy CR, Nakayama DA, Carrera GF, Lightfoot RW, Wortmann RL. Gouty arthritis: a prospective radiographic evaluation of sixty patients. *Skeletal Radiol* 1984;11:1–8
4. Rubinstein J, Pritzker KP. Crystal-associated arthropathies: a review article. *AJR Am J Roentgenol* 1989;152:685–695
5. Jajic I. Gout in the spine and sacroiliac joints: radiological manifestations. *Skeletal Radiol* 1982;8:209–221
6. Lagier R, MacGee W. Spondylodiscal erosions due to gout—a case-report. *Ann Rheum Dis* 1983;42:350–353
7. Kersley GD, Mandel L, Jeffrey MR. Gout, an unusual case with softening and subluxation of the first cervical vertebra and splenomegaly: result of ACTH administration and eventual post mortem findings. *Ann Rheum Dis* 1950;9:282–304
8. Lichtenstein L, Scott HW, Levin MH. Pathologic changes in gout: survey of eleven necropsied cases. *Am J Pathol* 1956;32:871–895
9. Hall M, Selin G. Spinal involvement in gout. *J Bone Joint Surg [Am]* 1960;42-A:341–343
10. Vinstein AL, Cockerill EM. Involvement of the spine in gout: a case report. *Radiology* 1972;103:311–312
11. Das De S. Intervertebral disc involvement in gout: brief report. *J Bone Joint Surg [Br]* 1988;70-B:671
12. Koskoff YD, Morris LE, Lubic LG. Paraplegia as a complication of gout. *JAMA* 1953;152:37–38
13. Litvak J, Briney W. Extradural spinal deposition of urates producing paraplegia: a case report. *J Neurosurg* 1973;39:656–658
14. Reynolds AF, Wyler AR, Norris HT. Paraparesis secondary to sodium urate deposits into the ligamentum flavum. *Arch Neurol* 1976;33:795
15. Magid SK, Gray GF, Anand A. Spinal cord compression by tophi in a patient with chronic polyarthritis: case report and literature review. *Arthritis Rheum* 1981;24:1431–1434
16. Sequeira W, Bouffard A, Salgia K, Skosey J. Quadriparesis in tophaceous gout. *Arthritis Rheum* 1981;24:1428–1430
17. Leaney LJ, Calvert JM. Tophaceous gout producing spinal cord compression. *J Neurosurg* 1983;58:580–582
18. Miller JD, Percy JS. Tophaceous gout in the cervical spine. *J Rheumatol* 1984;11:862–865
19. Varga J, Giampaolo C, Goldenberg D. Tophaceous gout of the spine in a patient with no peripheral tophi: case report and review of the literature. *Arthritis Rheum* 1985;28:1312–1315
20. Jacobs SR, Edeiken J, Rubin B, Dehoratius RJ. Medically reversible quadriparesis in tophaceous gout. *Arch Phys Med Rehabil* 1985;66:188–190
21. Van De Laar MA, Van Soesbergen RM, Matricali B. Tophaceous gout of the cervical spine without peripheral tophi. *Arthritis Rheum* 1987;30:237–238
22. Downey PR, Brophy BP, Sage MR. Four unusual cases of spinal cord compression. *Australas Radiol* 1987;31:136–141
23. Ferreira A, Silva-Junior BA, Braga FM, Gargiulo NM, Stavale JN. Paraparesia por gota. *Arq Neuropsiquiatr* 1989;47:479–483
24. Vervaeck M, De Keyser J, Frecourt N, D'Haens J, Ebinger G. Sudden hypotonic paraparesis caused by tophaceous gout of the lumbar spine. *Clin Neurol Neurosurg* 1991;93:233–236
25. Yasuhara K, Tomita Y, Takayama A, Fujikawa H, Otake Y, Takahashi K. Thoracic myelopthy due to compression by the epidural tophus: a case report. *J Spinal Disord* 1994;7:82–85
26. Post MJ, Sze G, Quencer RM, Eismont FJ, Green BA, Gahbauer H. Gadolinium-enhanced MR in spinal infection. *J Comput Assist Tomogr* 1990;14:721–729