



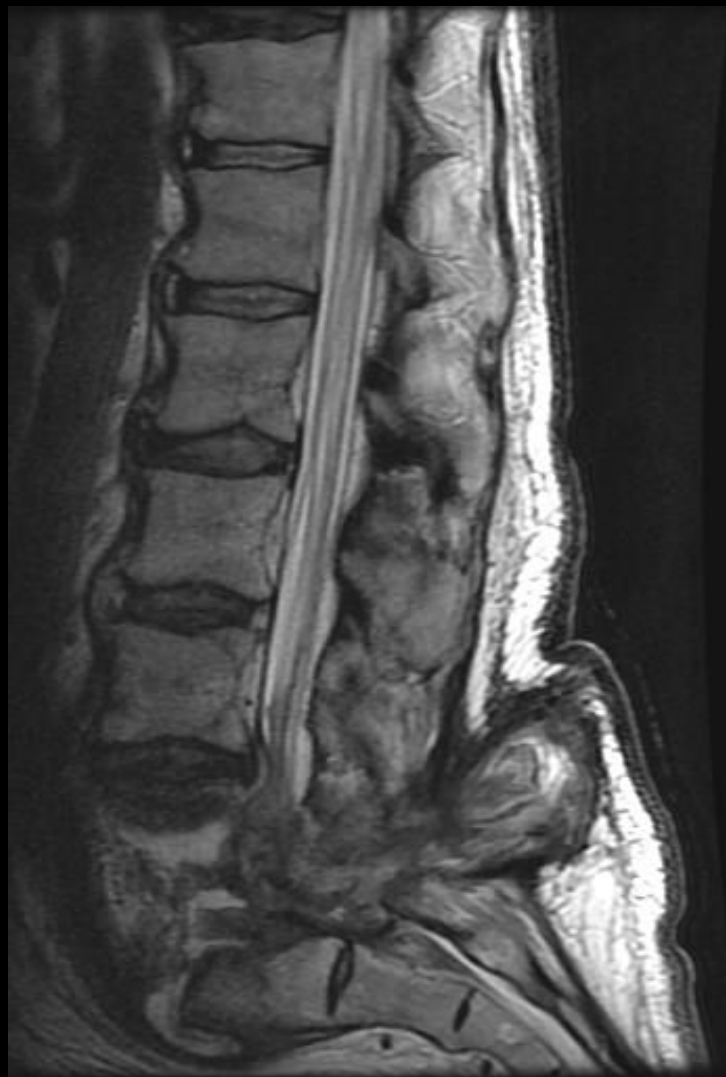
59 year old quadriplegic male with several month history of culture negative lumbar osteomyelitis and chronic draining lumbar spine wound.

CROSS TABLE



BTP





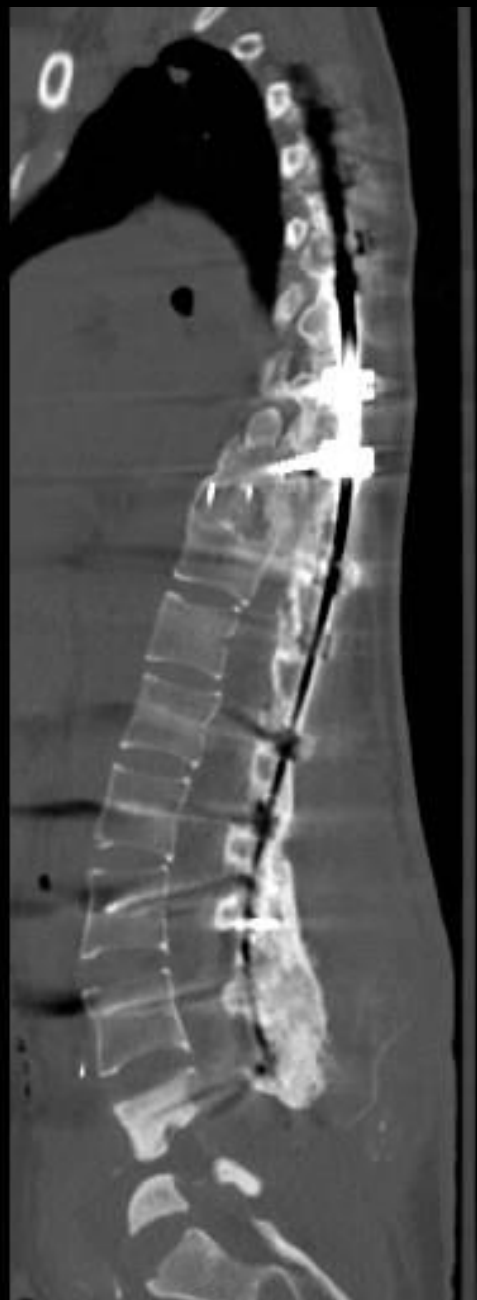


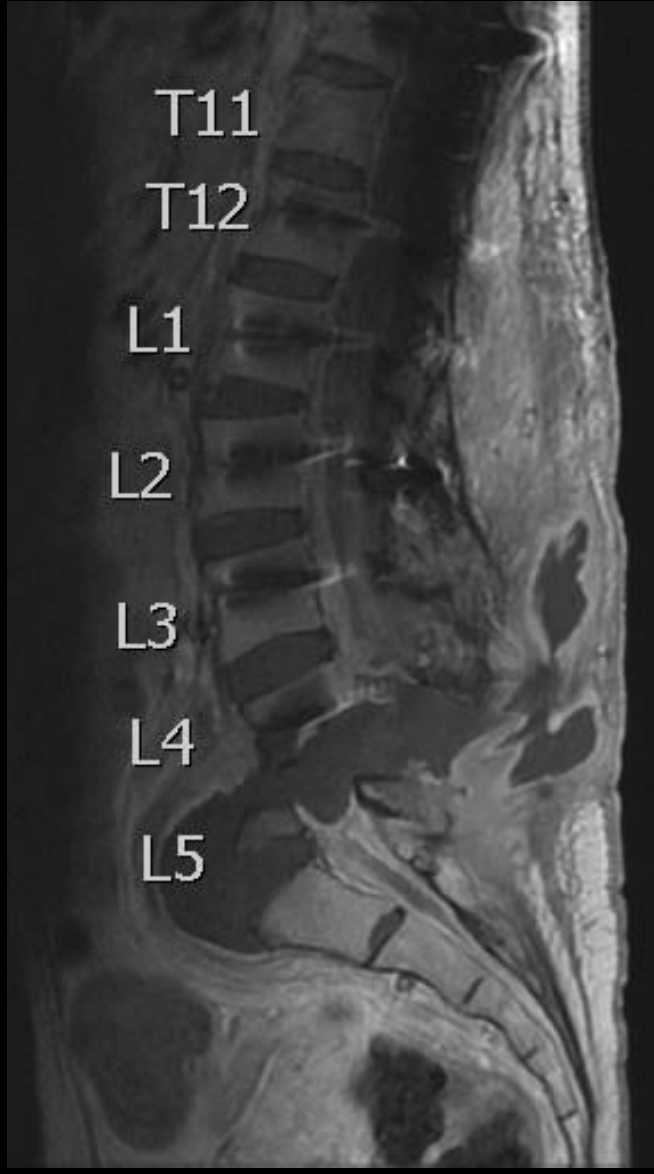
29 year old paraplegic female presents with worsening back pain. History of prior spinal fusion.

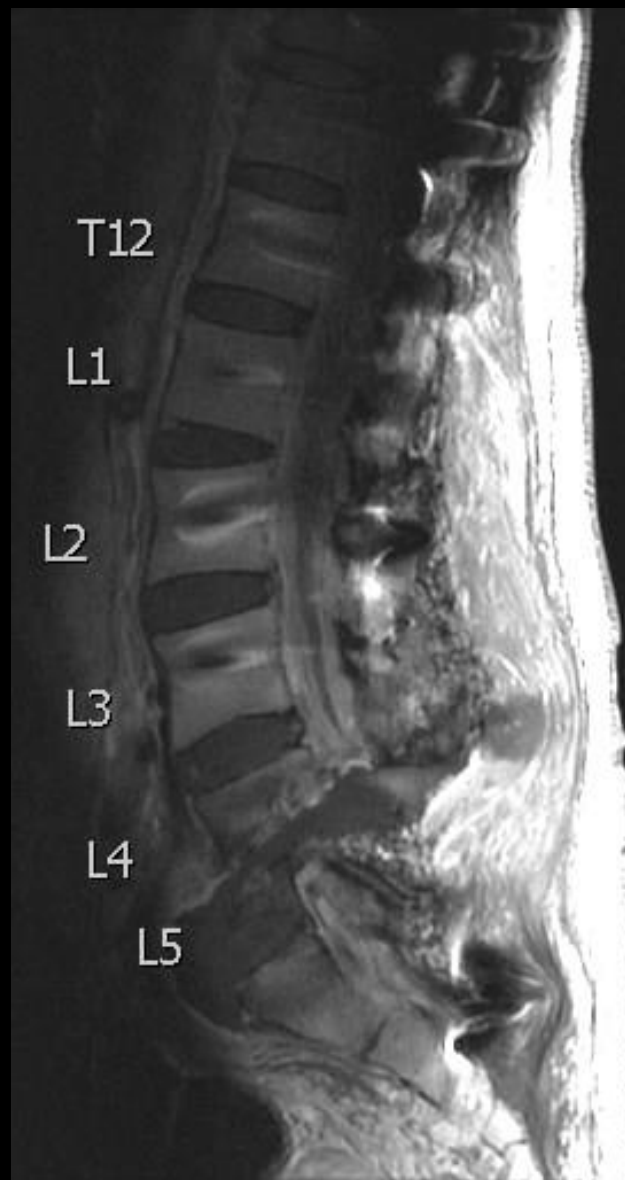


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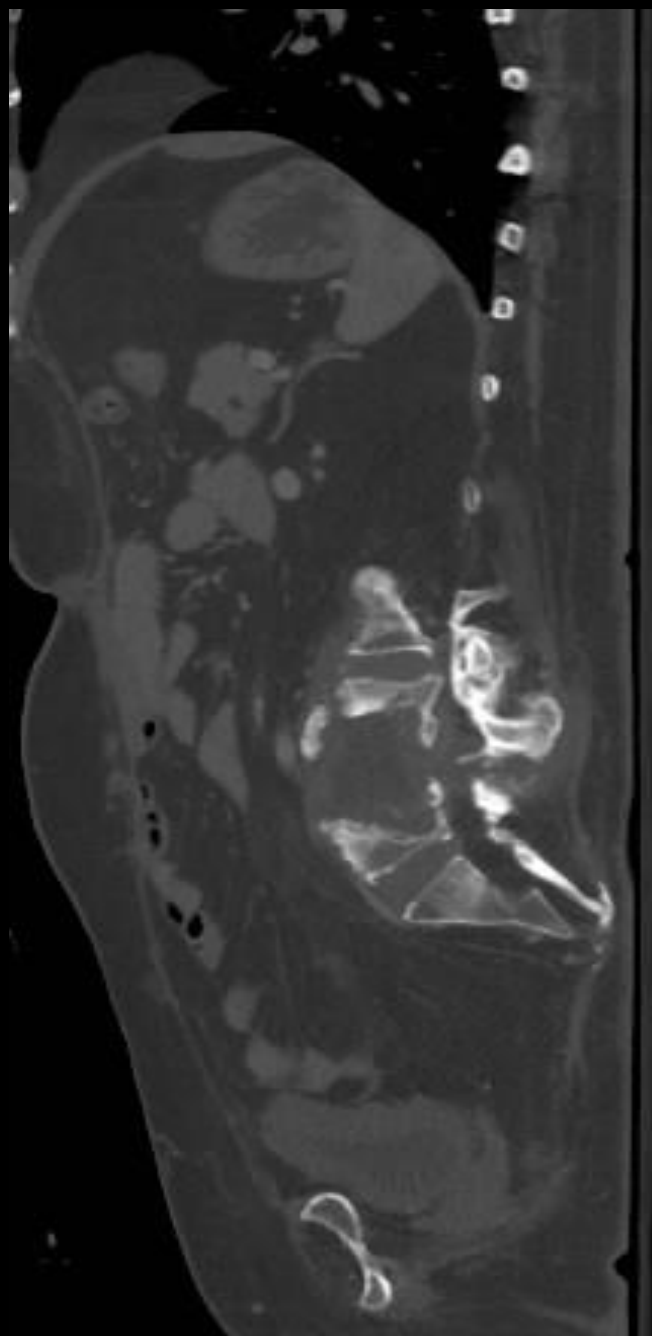


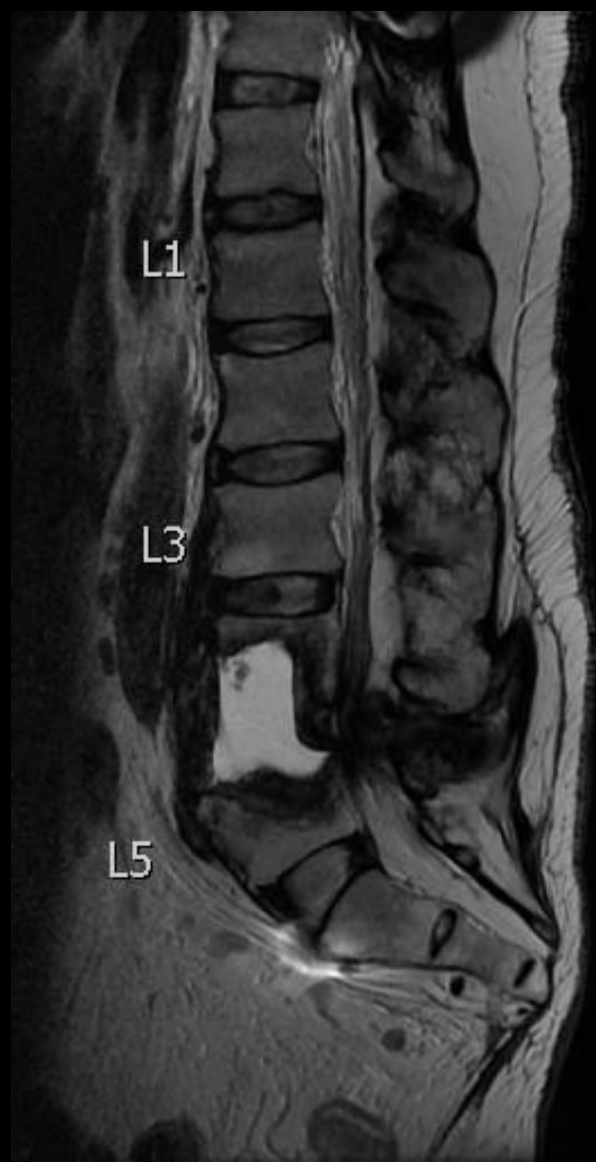






40 year old paraplegic male involved in MVA.





Disk Space Infection vs Neuroarthropathy

Musculoskeletal Imaging

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Can Imaging Findings Help Differentiate Spinal Neuropathic Arthropathy from Disk Space Infection? Initial Experience¹

PURPOSE: To determine if radiographic, computed tomographic (CT), and magnetic resonance (MR) imaging findings can help differentiate spinal neuropathic arthropathy from disk space infection.

MATERIALS AND METHODS: Imaging studies in 33 patients were evaluated, including 14 patients with spinal neuropathic arthropathy (12 radiographic, seven CT, and six MR studies) and 19 with disk space infection (13 radiographic, nine CT, and 12 MR studies). Potential imaging discriminators, including endplate sclerosis or erosions, osteophytes, spondylolisthesis, facet involvement (narrowing or erosions), vacuum disk, paraspinal soft-tissue mass, joint disorganization, and osseous joint debris, were recorded, as were MR imaging signal intensity and gadolinium-enhancement characteristics.

RESULTS: The most helpful findings for diagnosis of spinal neuropathic arthropathy were vacuum disk on radiographs and CT images, debris on radiographs and CT and MR images, disorganization on radiographs and CT and MR images, facet involvement on radiographs and CT and MR images, spondylolisthesis on CT and MR images, diffuse signal intensity patterns in vertebral bodies on MR images, and rim enhancement of disks on gadolinium-enhanced MR images. Findings that were not helpful included endplate sclerosis and erosions, osteophytes, paraspinal soft-tissue mass, and decreased disk height.

CONCLUSION: Vacuum disk, facet involvement, vertebral body spondylolisthesis, joint disorganization and debris, and gadolinium-enhancement patterns of vertebral bodies and disks may help differentiate spinal neuropathic arthropathy from infection.

- retrospective study between 1993-1998
- used radiographs, CT, and MRI
- 33 total patients; 14 with neuropathic arthropathy (12 CR, 7 CT, 6 MR) and 19 with disk space infection (13 CR, 9 CT, and 12 MR)

TABLE 1
Summary of Conventional Radiographic Findings

Finding	Neuropathic Spine (n = 12)		Disk Space Infection (n = 13)		Sensitivity (%)		Specificity (%)	
	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2
Endplate sclerosis	10	10	7	4	83	83	46	69
Endplate erosions	8	5	3	3	67	42	77	77
Loss of disk height	11	9	11	12	92	75	15	8
Facet involvement	7	5	3	1	58	42	77	92
Osteophytes	11	10	12	10	92	83	8	23
Spondylolisthesis	8	6	6	5	67	50	54	62
Vacuum phenomenon	6	8	1	2	50	67	92	85
Disorganization	2	4	1	1	17	33	92	92
Debris	4	5	1	1	33	42	92	92
Paraspinal soft-tissue mass	2	2	3	3	17	17	77	77

TABLE 2
Summary of CT Findings

Finding	Neuropathic Spine (n = 7)		Disk Space Infection (n = 9)		Sensitivity (%)		Specificity (%)	
	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2
Endplate sclerosis	6	6	9	6	86	86	0	33
Endplate erosions	6	4	7	6	86	57	22	33
Osteophytes	7	4	7	4	100	57	22	56
Spondylolisthesis	5	5	0	0	71	71	100	100
Vacuum phenomenon	5	3	0	0	71	43	100	100
Disk bulge	4	6	2	0	57	86	78	100
Facet involvement	4	1	1	0	57	14	89	100
Paraspinal soft-tissue mass	2	3	2	1	29	43	78	89
Debris	3	2	1	1	43	29	89	89
Disorganization	4	3	1	1	57	43	89	89

TABLE 3
Summary of MR Imaging Findings

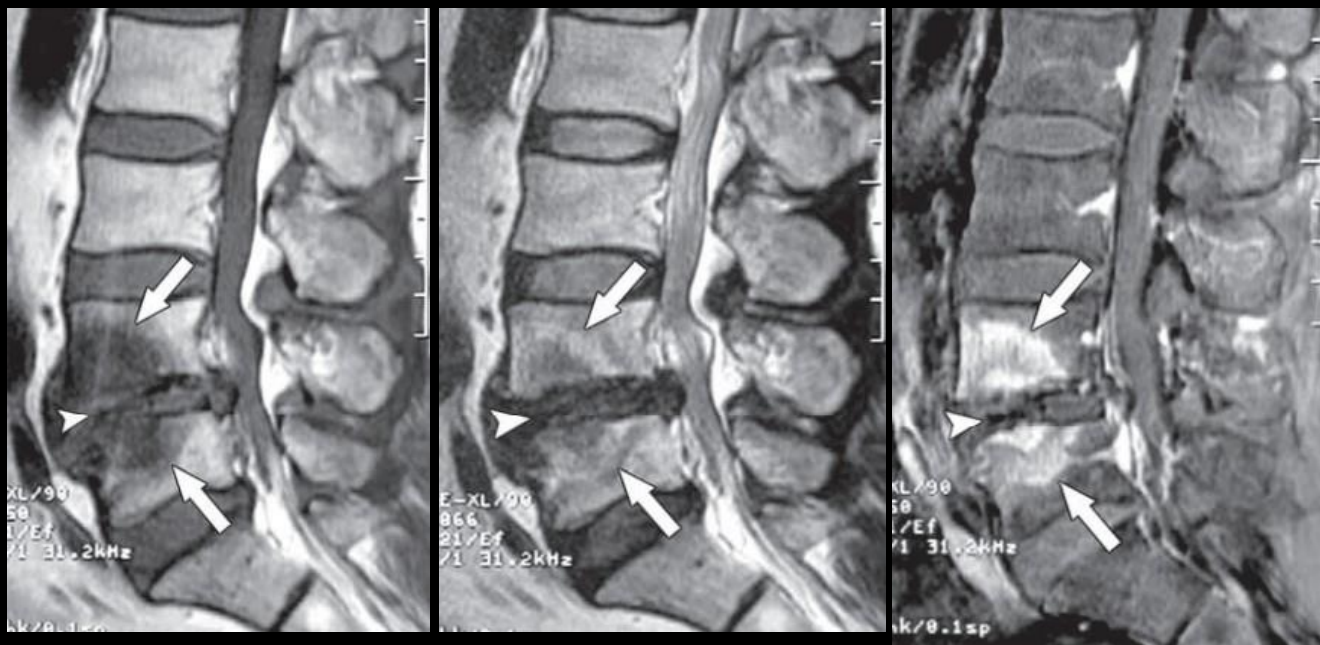
Finding	Neuropathic Spine (n = 6)		Disk Space Infection (n = 12)		Sensitivity (%)		Specificity (%)	
	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2	Reviewer 1	Reviewer 2
Endplate erosions	6	5	7	5	100	83	42	58
Endplate sclerosis	3	3	3	1	50	50	75	92
Paraspinal soft-tissue mass	2	3	5	4	33	50	58	67
Facet involvement	4	2	0	0	67	33	100	100
Osteophytes	5	4	7	7	83	67	42	42
Spondylolisthesis	4	4	1	2	67	67	92	83
Disorganization	2	2	0	0	33	33	100	100
Debris	2	1	1	0	33	17	92	100
Soft-tissue edema or enhancement	4	3	9	7	67	50	25	42
Disk appearance								
Decrease in disk height	5	3	11	11	83	50	8	8
T1 hypointensity	1	0	0	0	17	0	100	100
T1 isointensity	5	5	12	9	83	83	0	25
T1 hyperintensity	0	1	0	3	0	17	100	75
T2 hypointensity	1	2	5	4	17	33	58	67
T2 isointensity	5	4	5	5	83	67	58	58
T2 hyperintensity	0	0	2	2	0	0	83	83
Rim enhancement	4*	3	2†	2	80	60	82	91
Diffuse enhancement	0	1	6	6	0	20	45	55
No enhancement	1	1	3	3	20	20	73	82
Vertebral body appearance								
T1 hypointensity	6	6	10	8	100	100	17	33
Endplate T1 signal intensity pattern	3	3	9	6	50	50	25	50
Diffuse T1 signal intensity pattern	3	3	1	2	50	50	92	83
T2 hyperintensity	6	6	11	9	100	100	8	25
Endplate T2 signal intensity pattern	3	2	9	8	50	33	25	33
Diffuse T2 signal intensity pattern	3	4	2	1	50	67	83	92
Endplate enhancement pattern	2*	2	9†	9	40	40	18	27
Diffuse enhancement pattern	3	3	2	2	60	60	82	91

* MR images were available for five patients.

† MR images were available for 11 patients.

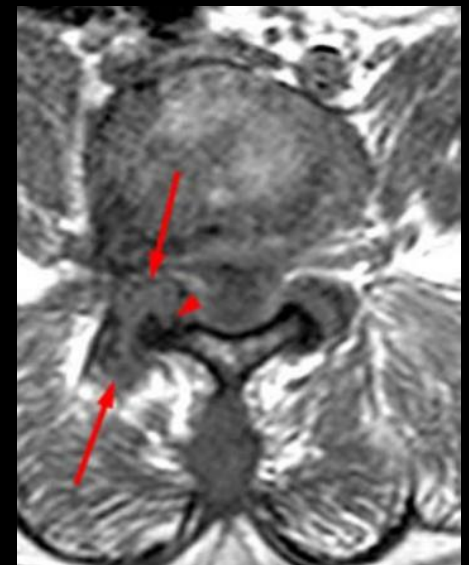
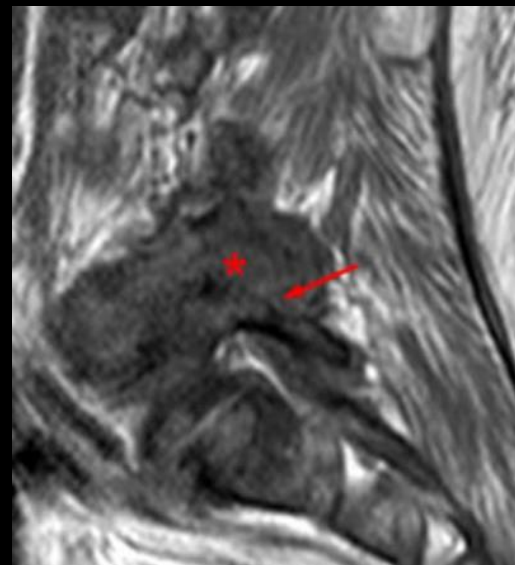
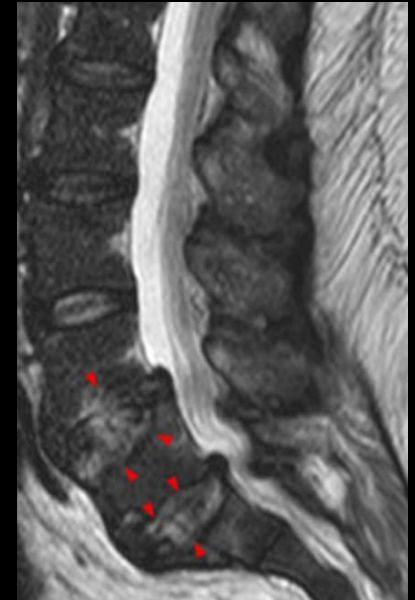
Disorders That Mimic Spinal Infection

- Modic Type 1 Degeneration
 - marrow edema on T2W images
 - marrow changes may also enhance
- Differential features from spinal infection
 - lack of abnormally high signal of the disk on T2W
 - no soft tissue involvement
 - vacuum phenomenon



Disorders That Mimic Spinal Infection

- Dialysis-related spondyloarthropathy
 - most likely related to amyloid deposition in the disc and ligamentum flavum
 - on radiographs and CT, destruction of endplates and disk space narrowing can mimic infection
- Differential features from spinal infection
 - no hyperintensity of disk on T2W images
 - often involves posterior elements
 - most commonly involves lower cervical spine



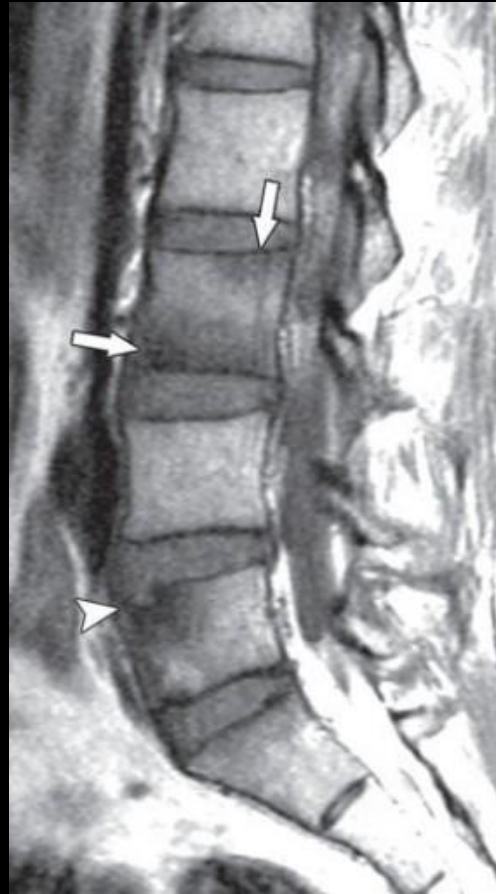
Disorders That Mimic Spinal Infection

- Acute Cartilaginous Node
 - vertebral body marrow edema
 - contrast enhancement
- Differential features from spinal infection
 - concentric ring of high signal around the node on T2W images
 - involvement of only one endplate
 - no diffuse signal abnormality of the disk



Disorders That Mimic Spinal Infection

- SAPHO syndrome
 - most commonly involves anterior chest wall followed by the spine
 - focal or diffuse marrow signal abnormalities
 - hyperintense signal indicative of paravertebral soft tissue swelling
 - end plate irregularities
 - disk space narrowing
 - increased disk signal on T2W and disk enhancement
- Differential features from spinal infection
 - anterior vertebral corner erosion, multilevel abnormalities
 - noperavertebral or epidural abscess



Spinal Neuroarthropathy/Charcot Spine

- can occur alone or with neuroarthropathy of other joints; spine is affected 6-21% of patients
- can occur with a number of disorders associated with loss of proprioception and pain sensation
- thoracolumbar junction and lumbar spine are most frequently involved or just above or below orthopedic fixation
- one or more vertebral segments may be involved
- destructive changes lead to fracture, followed by formation of large osteophytes, sclerosis, and loss of disk space
 - large paraspinal mass may develop because of improper healing
 - end stage may be pseudoarthrosis
- may be difficult to distinguish between advanced degenerative disk disease, primary tumor/metastasis, and infection

Causes of Neuropathic Osteoarthropathy

Diabetes mellitus
Syringomyelia
Tabes dorsalis (syphilis)
Spinal cord tumors
Meningomyelocele
Extrinsic compression of the spinal cord
Peripheral nerve tumors
Multiple sclerosis
Poliomyelitis
Alcoholism
Uremia
Amyloidosis
Intraarticular or systemic steroid injections
Pernicious anemia
Congenital insensitivity to pain
Familial dysautonomia (Riley-Day syndrome)
Hereditary sensory and motor neuropathy
(Charcot-Marie-Tooth disease)
Leprosy

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