

SPINAL INFECTIONS

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EPIDEMIOLOGY

- 0.2-2 per 10000 hospital admissions
- Bimodal age peak : very young and very old
- $M > F$
- Immunocompromised more common: HIV/
Transplant/Steroid/Diabetic

Table 1 Primary sources of infection in spinal epidural abscess

Source of infection	Median (%)	Range (%)
Skin and soft tissue	18	7–45
Urinary tract	10	2–36
Previous sepsis of unknown origin	8	5–11
Respiratory tract	5	3–16
Abdomen	4	2–11
Endocarditis	3	1–8
Infected vascular access	2	1–8
Dental abscess	2	1–11
Ear, nose and throat	2	<1–11

Table 2 Predisposing conditions in spinal epidural abscess

Predisposing condition	Median (%)	Range (%)
Diabetes mellitus	21	15–46
Abnormality of the vertebral column	17	6–70
Trauma of the spine	15	5–33
Intravenous drug use	15	4–37
Immunosuppressive therapy	12	7–16
Cancer	7	2–15
HIV/AIDS	6	2–9
Alcoholism	5	4–18
Chronic renal failure	4	2–13

PATHOGENESIS

- Haematogenous
Arterial
Batsons vertebral venous plexus
- Contiguous spread eg from lung to T spine
- Iatrogenic eg LP, epidural anaesthesia, spine surgery

PATHOGENESIS

- Thrombus of metaphyseal artery->AVN->nidus for infection
- Equatorial zone less susceptible
- Endplates and disc more at risk
- Secondary septic thrombosis of epidural veins and resulting epidural abscess
- Sometimes don't find the whole constellation
- Neurological deficits: compression or ischemia

MICROBIOLOGY

- S.aureus
- Strep species
- Pseudomonas (IVDU)
- TB (3rd world)
- Fungi (immunesuppressed eg cryptococcus in HIV)
- Rarely anaerobes

CLINICAL FINDINGS

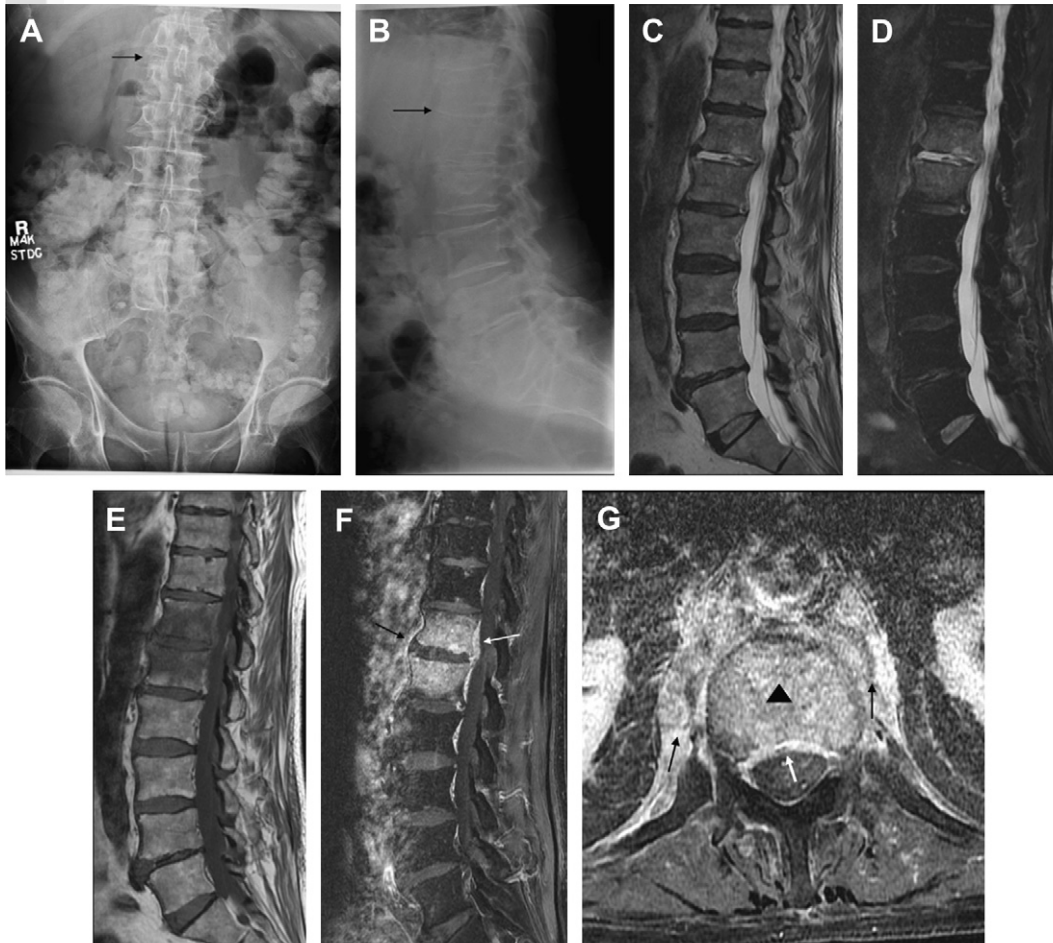
- Back pain
- Fever
- Spine tenderness
- Heusner: pain, radiculopathy, weakness, paralysis
- Constitutional symptoms
- Nocturnal/recumbency pain
- Sphincter disturbance
- Neurological deficit
- Thoracolumbar most commonly affected



DIAGNOSIS

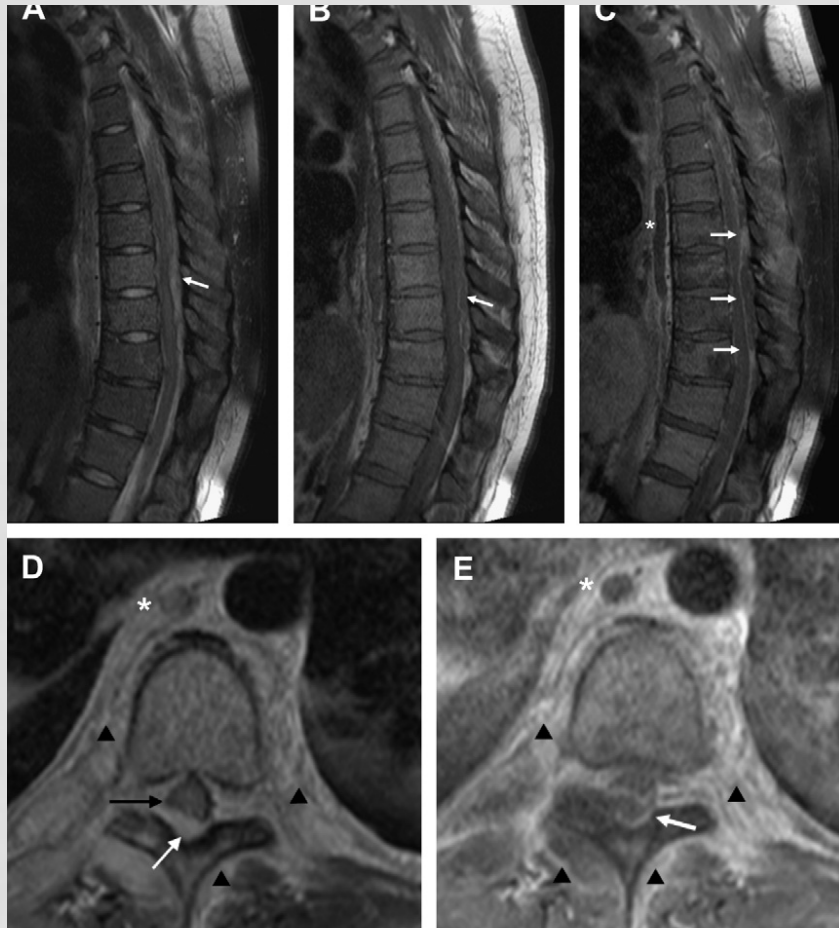
- ESR
- CRP: more useful in post-op
- WBC not a reliable marker
- Tuberculin test (not useful when BCG given)
- Test for HIV when high index of suspicion

IMAGING



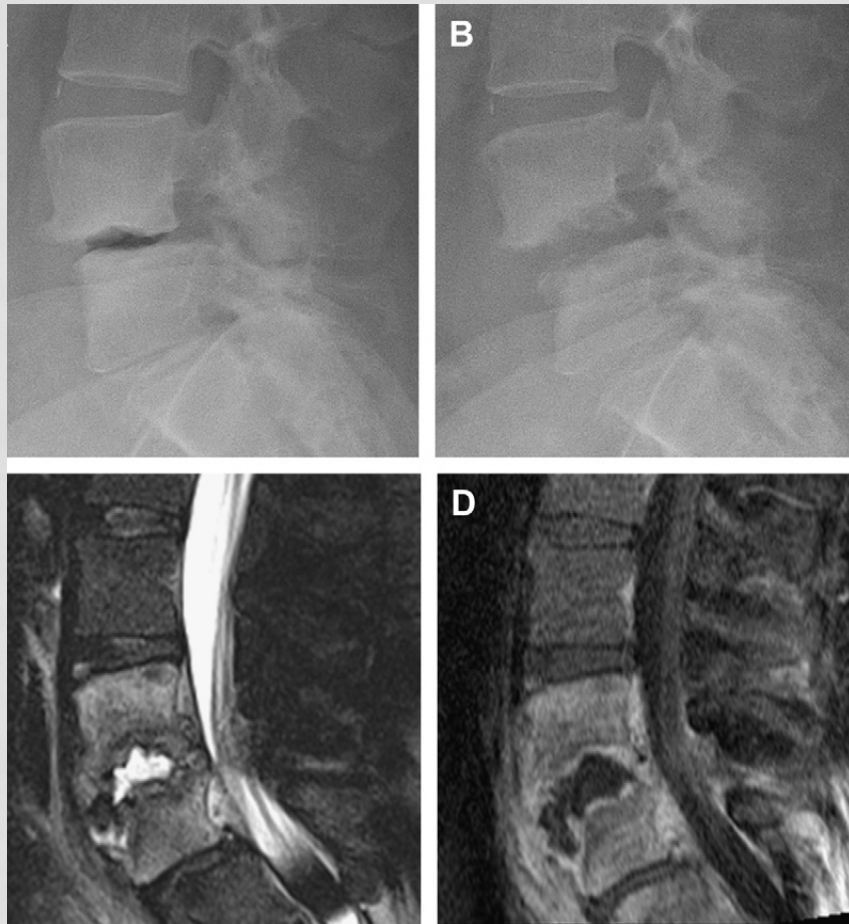
- Xrays non-specific: help in deformity assessment
- MRI-gold standard
- T1 hypointensity esp marrow
- T2 hyperintensity esp disc
- Loss of T2 intranuclear cleft
- Enhancement with gadolinium

EPIDURAL ABSCESS



- T2 hyper, T1 hypo
- Contrast enhancement
- Peripheral enhancement with central non-enhancement and T2 hyperintensity suggests liquid abscess
- Homogenous enhancement with T2 iso/hypo-intensity suggests solid phlegmon

DIFFERENTIATING FROM DEGENERATION/MODIC 1



ic spondylodiscitis: classic imagi

ace: T2 hyperintensity, enhance
OSS

at vertebral bodies: endplate
hypo-, T2 hyperintensity, enhance
nal soft tissues: ill-defined inf
elling, abscess

l space: reactive enhancement
listention, phlegmon, abscess

CT/NUCLEAR MEDICINE

- CT myelogram: pitfall- iatrogenic meningitis
- Nuclear med: technetium-blood flow
- gallium-Fe binding
- labelled WBC
- FDG PET
- Indium labelled biotin

BACTERIOLOGICAL DX

- Blood cultures : -ve in 40-75%
- Confounded by Abx
- Biopsy: CT guided vs open (80% +ve)
- Consider TB/fungi in -ve cases

OTHER IX

- HepB/C IVDU
- HIV
- TOE
- Fundoscopy
- Nail bed
- Retropharyngeal/Psoas abscess

DDX

- pyogenic arthritis of the hip
- septic or autoimmune sacroiliitis
- pyelonephritis
- primary psoas abscess
- autoimmune spondylitis
- spinal trauma
- osteoporotic compression fractures
- spinal epidural hematoma
- spontaneous spinal subarachnoid hemorrhage
- leptomeningeal metastatic disease

MANAGEMENT

- Antibiotics (iv 6/52) and immobilization
- Surgery for any neurological deficit
- Approach depends on collection site (ventral v dorsal, C/T/L spine) and consistency (liquid v phlegmon)
- Aggressive debridement
- Mild deficit such as radiculopathy may be closely observed
- Surgery: Failed medical Rx
 - Chronic pain
 - Instability
- Instrumentation/grafting
- Bracing
- f/u: serial CRP/ESR and clinical; routine MRI not indicated

CURRENT CONCEPTS
SPINAL EPIDURAL ABSCESS
RABIH O. DAROUICHE
N ENGL J MED 2006;355:2012-20

Table 1. Common Diagnostic and Therapeutic Pitfalls and Recommended Approaches.

Pitfall	Recommendation
Ordering imaging studies of an area that is not the site of epidural infection	Clinically assess patients for spinal tenderness and level of neurologic deficit to more accurately identify the region to be imaged.
Identifying only one of multiple nonadjacent epidural abscesses	Suspect the presence of other undrained abscesses if bacteremia persists or neurologic level changes after surgery.
Ascribing all clinical and laboratory findings to vertebral osteomyelitis	Determine whether osteomyelitis is associated with epidural abscess, particularly if a neurologic deficit is evident.
Being unable to adequately evaluate sensorimotor function in patients with altered mental status	Check for depressed reflexes and bladder or bowel dysfunction, which can indicate spinal cord injury.
Asking nonphysicians who may not appreciate the urgency of the case to order consultations for patients with suspected or documented epidural abscess	Directly communicate with consultants to ensure timely diagnosis and treatment.
Surgically managing a spinal stimulator–associated epidural abscess by removing only the implant	Decompress the abscess to preserve neurologic function and remove the implant to increase the likelihood of curing the infection.
Medically treating <i>S. aureus</i> bacteremia without attempting to identify the source	Consider a spinal source of infection if clinically indicated.

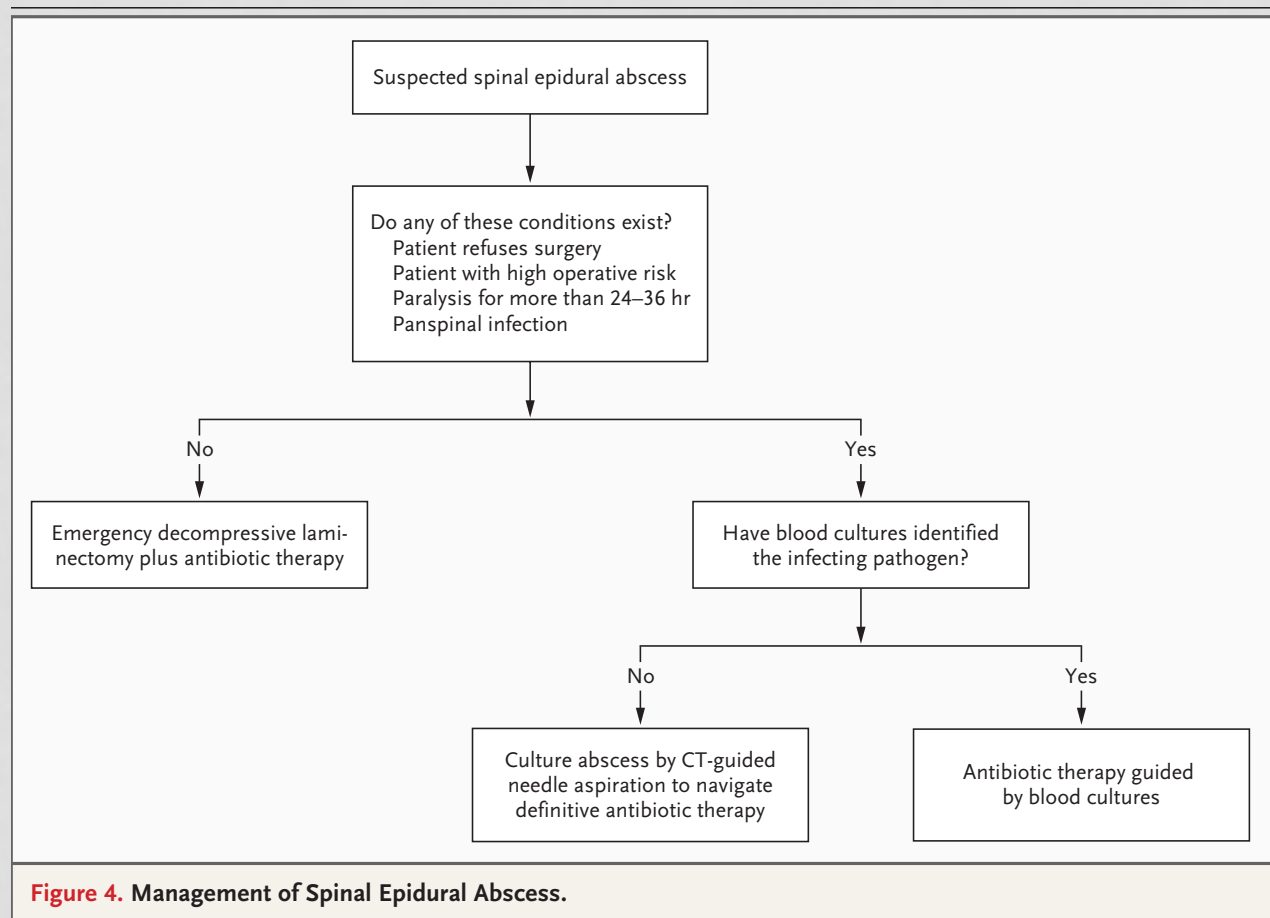


Figure 4. Management of Spinal Epidural Abscess.

Surgical treatment of pyogenic vertebral osteomyelitis with spinal instrumentation

Wei-Hua Chen · Lei-Sheng Jiang · Li-Yang Dai

Table 1 Summary of most recent clinical series of pyogenic spondylodiscitis treated with debridement and instrumentation

References	No. of patients	Average age (years)	Pre-op antibiotic duration (weeks)	No. of patients					Bone graft	Instrumentation
				Stage		Approach				
				Acute	Subacute chronic	Anterior	Posterior	Combined		
Masuda et al. [49]	5	63.8	1.5–2.5	3	2	0	2	3	Unknown	Rod and sublaminar wires
Korovessis et al. [36]	17	54.4	N/A	N/A	N/A	0	0	17	Iliac–rib	Mesh cage and pedicle screws
Nather et al. [56]	12	62.5	N/A	N/A	N/A	8	3	1	Iliac	Pedicle screws
Dimar et al. [17]	42	60	N/A	N/A	N/A	0	0	42	Autograft or allograft	Delayed pedicle screws
Fayazi et al. [22]	11	56.3	13(0–60)	N/A	N/A	0	0	10	Allograft	Mesh cage, Delayed stage pedicle screw
Mann et al. [47]	24	63	0–5 days	24	0	6	4	14	Unknown	Carbon cage, Ventral plate
Lee et al. [42]	30	56.7	N/A	N/A	N/A	7	6	17	Autograft or allograft	Cage, plate, rod or pedicle screw
Fukuta et al. [25]	8	63.5	2	N/A	N/A	0	0	8	Unknown	Pedicle screw, rod, or other posterior instruments
Liljenqvist et al. [44]	20	68	N/A	N/A	N/A	0	0	20	Autograft	Mesh cage and pedicle screws
Hee et al. [32]	21	57	N/A	N/A	N/A	11	0	10	Autograft or allograft	Mesh cage, pedicle screws or hooks
Przybylski et al. [65]	17	58.7	IV: 0–8 PO: 0–20	6	11	10	7	0	Iliac	Plate or pedicle screws
Schuster et al. [71]	47	49.3	N/A	N/A	N/A	7	0	40	Allograft	Plate or pedicle screws
Faraj et al. [21]	31	55.6	3	N/A	N/A	1	0	30	Unknown	Plate or pedicle screws
Total	287					42	17	195		

CONTROVERSIES

- Hodgson 1956 : bone graft
- Kostuik 1983 : instrumentation
- No evidence to contraindicate instrumentation in the setting of infection
- Autograft v allograft
- Titanium (porous nature allows abx delivery and vascular tissue attachment) v stainless steel (? glycocalyx for bacteria)
- Controversial
- BMP- not FDA approved

OUTCOME: POORER PROGNOSIS

- older patients
- sepsis
- neurological deficits of longer than 72 hours duration
- significant compression of the spinal cord on imaging studies
- immunocompromised

IATROGENIC INFECTIONS

- 2%
- Immunosuppression, diabetes, steroid, malnutrition, neoplasm, radiation, intercurrent infection
- ?Bovie monopolar
- ?muscle retraction/ischemia
- Superficial v deep : fascia
- ?r/o instrumentation in deep infection

PAEDIATRIC

- Frequent bacteremia
- Profuse anastomoses b/w intraosseous spinal arteries
- Disc (retains blood supply)/endplate more affected
- child with fevers refuses to bear weight
- clinical and radiographic disease in children may often be milder than that seen in adults
- Abx + immobilization usually adequate
- Surgery rare

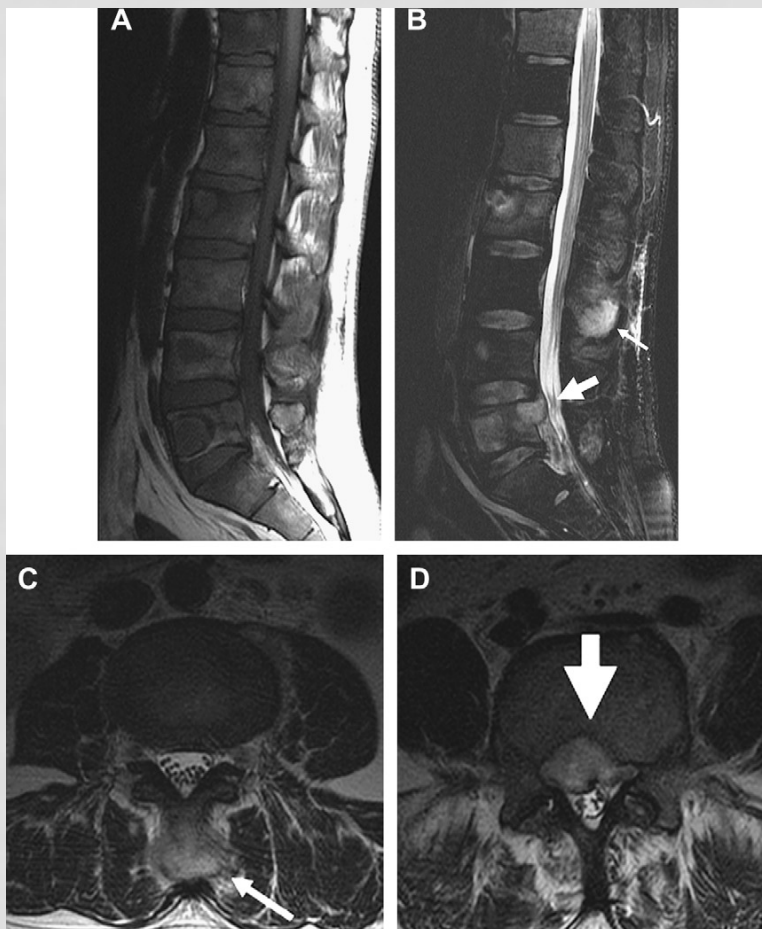
TB: POTTS DISEASE

- Lungs: haematogenous/contiguous
- Indolent fashion
- Involves posterior elements
- Spares disc
- Deformity w/o neurological compromise
- Difficult to distinguish from neoplasm

TULI GRADING

- stage I : no weakness but there is clumsiness of gait and a suggestion of upper motoneuron signs
- stage II : weakness and clear upper motoneuron signs, but the patient is able to walk.
- stage III : bedridden because of total muscle weakness and maintains signs of upper motoneuron paraplegia, less than 50% sensory loss
- stage IV : complete motor weakness, greater than 50% loss of sensation, loss of bowel/bladder control, or any combination of these findings, as well as probably flaccid paraplegia and possibly flexor spasm.

TB



Box 2

Imaging clues: tuberculous spondylitis

Classic:

- Similar to pyogenic spondylodiscitis
- Disc space involvement less severe
- Large paraspinal abscess, smooth wall, \pm calcifications
- Subligamentous spread

Atypical:

- Disc sparing, with either single or multilevel bony involvement only
- Multilevel involvement, contiguous or skip lesions
- Vertebra plana
- Posterior element involvement
- Panvertebral involvement

SPINAL TB MX

- RIPE abx and immobilization
- Surgery for neurological deficit, instability or deformity
- Jain et al: ≥ 2 column damage
- MRI evidence of edema or myelitis within the spinal cord and compressive lesion is predominantly fluid in the extradural space will respond well to nonoperative therapy
- extradural compression from a lesion that appears to be mostly granulation or caseous tissue, one that compresses the cord circumferentially, cord edema, myelitis, or myelomalacia are more likely to be candidates for early surgical intervention
- Poor prognosis: paralysis lasting longer than 6 months, late-onset paralysis with inactive disease and significant deformity, paralysis as a result of vascular injury to the spinal cord, atrophic-appearing spinal cord seen on MRI