

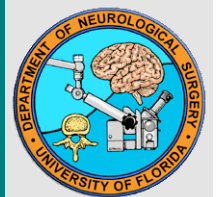
Infections of the Spine

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1 November 2000



Case #1

- ◆ *55 yo diabetic male*
- ◆ *4 mo h/o progressive lumbar pain*
- ◆ *muscle spasms*
- ◆ *neuro intact*



Case #1



Case #1



History

◆ *Tuberculous Spondylitis*

← *Hippocrates - 400 BC*

← *Percivall Pott - 1779*

- *“Remarks on That Kind of Palsy of the Lower Limbs Which is Frequently Found to Accompany Curvature of the Spine and is Supposed to be Caused by It. Together with its Method of Cure.”*



Classification of Spinal Infections

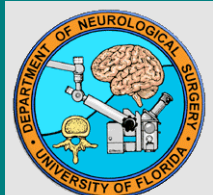
◆ *By host immune response*

← *pyogenic*

- *bacteria*
 - *vertebral osteomyelitis*
 - *spinal epidural abscess*
 - *discitis of childhood*

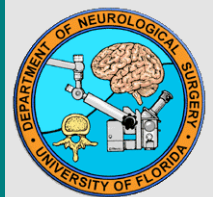
← *granulomatous*

- *tuberculosis*
- *fungi*
- *syphilis*



Classification (continued)

- ◆ *by anatomic location*
 - ← e.g. *body, disc, epidural, soft tissues*
- ◆ *by route of infection*
 - ← e.g. *hemotogenous, contiguous, post-operative*
- ◆ *by age*
 - ← *pediatric versus adult*



Vertebral Osteomyelitis

- ◆ *2% to 8% of all cases of osteomyelitis*
- ◆ *predilection for the elderly*
- ◆ *IVDA in younger patients*
- ◆ *2:1 male to female ratio*



Vertebral Osteomyelitis

- ◆ *Vast majority are due to hematogenous spread secondary to bacteremia*
 - ← *GU tract (29%)*
 - ← *soft tissue infections (13%)*
 - ← *upper respiratory tract (11%)*
 - ← *IV drug abuse (1 to 2%)*
 - ← *source unidentified (37%)*



Vertebral Osteomyelitis

- ◆ ***Risk factors:***

- ← ***diabetes***

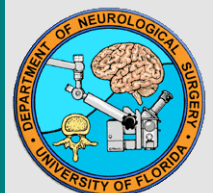
- ← ***renal failure***

- ← ***rheumatoid arthritis***

- ← ***AIDS***

- ← ***malignancy***

- ← ***elderly***



Vertebral Osteomyelitis

◆ *Offending organisms:*

← *Staph Aureus (>50%)*

← *Strep species*

← *from GU:*

• *E. choli, pseudomonas, proteus*

← *from IVDA:*

• *pseudomonas*



Vertebral Osteomyelitis

- ◆ *Starts in highly vascular metaphyseal region*
- ◆ *Can spread to disk and adjacent body*
- ◆ *Frequently destroys disk (unlike TB)*
- ◆ *Untreated, progress to abscess with spread to paravertebral structures or into spinal canal*



Vertebral Osteomyelitis

◆ *Clinical Presentation*

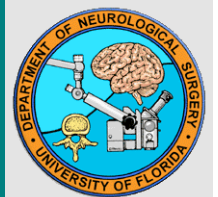
- ← *dependent on organism*
 - *acute, subacute, or insidious*
 - *>3 months symptom duration 50%*
- ← *localized spine pain with muscle spasm in 90%*
- ← *limited ROM/+SLR in 15%*
- ← *fever in only 52% (higher in kids)*



Vertebral Osteomyelitis

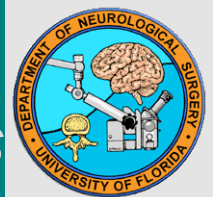
◆ *Site of infection*

- ← *lumbar spine 48%*
- ← *thoracic spine 35%*
- ← *cervical spine 6.5%*
- ← *thoracolumbar jxn 5%*
- ← *lumbosacral jxn 5%*
- ← *osteo at noncontiguous levels is uncommon*



Vertebral Osteomyelitis

- ◆ ***Associated neuro deficits***
 - ← ***in 4 to 17% of patients***
 - ← ***increased risk for paralysis:***
 - ***DM, RA, steroids, age>50, more cephalad infection, S. aureus***
 - ← ***etiology of paralysis:***
 - ***usually cord compression from instability or kyphosis***
 - ***can be inflammatory infiltration of neural elements, or***
 - ***septic thrombosis of cord vessels***



Vertebral Osteomyelitis

◆ *Diagnosis - lab studies*

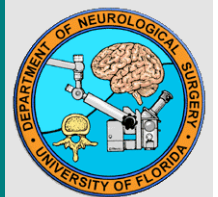
← *ESR*

- *elevated in 92%*
- *nonspecific, but sensitive*
- *useful in assessing response to therapy*

← *WBC elevated in 42%*

← *C-reactive protein*

- *useful in post-op eval*
- *normalization time shorter than ESR*
- *also nonspecific*



Vertebral Osteomyelitis

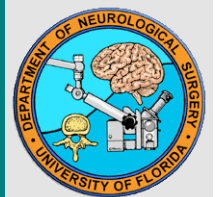
◆ *Diagnosis - lab studies*

← *Blood cultures*

- *less sensitive (16 to 24% positive)*
- *useful in identifying organism*

← *Urine cultures*

- *less useful because can be coincidental infection with different organism*



Vertebral Osteomyelitis

◆ *Radiographic Studies*

- ← *no abnormalities in first 2 to 4 weeks*
- ← *narrowing of disk space*
 - *earliest finding*
 - *74% of patients*
- ← *localized osteopenia*
- ← *lytic lesion of anterior vertebral body and endplates after 3 to 6 weeks*

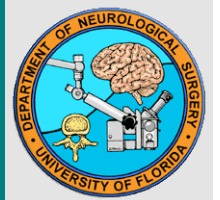


Vertebral Osteomyelitis

- ◆ **Radiographic Studies**
 - ← *progressive bony destruction, collapse and kyphosis late*
 - ← *radiographic findings lag **2 to 3 months** behind clinical response*
 - ← *reactive bone formation and sclerosis in 11% on presentation*
 - ← *vertebral sclerosis with disease resolution*
 - ← *spontaneous fusion in 50% (5 years)*

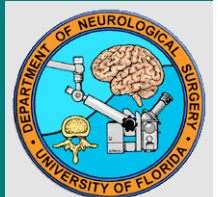






Vertebral Osteomyelitis

- ◆ **Computed Tomography (CT)**
 - ← *delineates vertebral bony changes*
 - ← *prevertebral soft tissue swelling*
 - *more than neoplasm, less than TB*
 - ← *useful to guide percutaneous biopsy*
 - ← *post myelography, useful to rule out epidural or subdural abscess*





Vertebral Osteomyelitis

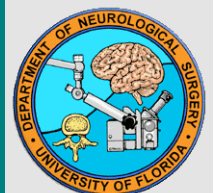
◆ *Nuclear Medicine Studies*

← *Technetium bone scan*

- *can detect early osteo*
- *90% sensitive, 78% specific*

← *Gallium scan*

- *neutrophil labelling*
- *migration to inflammatory focus*
- *89% sensitive, 85% specific*
- *becomes normal during healing*
 - *(unlike technetium)*

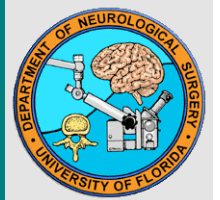


Vertebral Osteomyelitis

◆ *MRI*

- ← *now the primary diagnostic modality*
- ← *noninvasive, see neural elements*
- ← *96% sensitive, 93% specific*
- ← *with GAD*
 - *improved resolution*
 - *differentiate active from responding infection*
 - *differentiate discitis vs. osteo*





Vertebral Osteomyelitis

◆ **MRI**

- ← *T1 hypointensity of bodies and disk*
- ← *T2 hyperintensity and loss of intranuclear disk cleft*
- ← *GAD uptake in active infection and epidural abscesses on T1*



Vertebral Osteomyelitis

◆ *Biopsy*

- ← *required in the absence of positive cultures*
- ← *Craig needle percutaneous biopsy successful diagnosis in 68 to 86%*
- ← *Higher success with open bx*
- ← *Failure is often related to prior antibiotic therapy*



Vertebral Osteomyelitis

◆ *Differential Diagnosis*

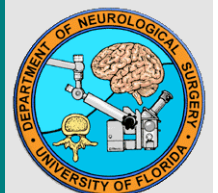
- ← *TB, fungal infections, metastatic carcinoma, epidural abscess, degenerative disease, trauma, osteoporotic compression fracture.*
- ← *15% of patients with osteo present with atypical symptoms*



Vertebral Osteomyelitis

◆ *Management Goals:*

- ← *establish diagnosis*
- ← *eradicate infection*
- ← *prevent recurrence*
- ← *prevent or reverse neurologic deficit*
- ← *relieve pain*
- ← *establish spinal stability*



Vertebral Osteomyelitis

◆ *Management*

- ← *Prognosis pre-antibiotic era 25 to 70% mortality*
- ← *now <5% mortality*
- ← *withhold abx until after biopsy unless septic*
- ← *select abx for max specificity and minimum toxicity*



Vertebral Osteomyelitis

◆ *Nonoperative Management*

← *IVABx for 6 weeks*

- *less than 4 weeks of IVABx results in a 25% infection recurrence rate*

← *Follow serial ESR*

- *decreases to 2/3 max in all successes*
- *to 50% max in most*

← *Immobilization and brace therapy*

- *pain control, prevention of deformity*
- *3 to 4 months*



Vertebral Osteomyelitis

◆ *Operative Management*

← *usually not necessary*

← *Indications:*

- *to obtain diagnosis when closed biopsy is unsuccessful or unsafe*
- *clinically significant abscess*
 - *I.e. spiking temps, septic course*
- *cord compression with neuro deficit (usually epidural abscess)*



Vertebral Osteomyelitis

◆ *Operative Management*

← *Indications (continued):*

- *significant deformity of vertebral body destruction, especially in cervical spine*
- *in cases refractory to prolonged non-operative therapy*
 - *(ESR remains high, pain persists)*



Vertebral Osteomyelitis

◆ *Operative Management*

← *Indications (continued):*

- *lumbar radiculopathy not an indication*
- *with myelopathy, surgical outcomes are better*
- *neurologic recovery has been noted as late as 5 months after onset of deficit*

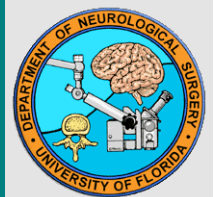


Vertebral Osteomyelitis

◆ *Operative Management*

← *Anterior approach is usually recommended*

- *direct access for debridement*
- *grafting and stabilization with reconstruction of anterior column*
- *laminectomy over the cord is contraindicated*
 - *post op instability*
 - *neurologic decline*



Vertebral Osteomyelitis

◆ *Operative Management*

← *posterior approach may be adequate in lumbar spine*

- *if no psoas abscess and no severe destruction of vertebral bodies*

- *preserve facets, autogenous transverse process fusion*

← *Autogenous iliac crest graft is recommended*



Vertebral Osteomyelitis

◆ *Prognosis*

- ← *mortality < 5%*
- ← *spontaneous fusion in 50%*
- ← *fibrous interbody ankylosis in most others - painless*
- ← *post-infectious deformity is rare and only common in thoracolumbar spine with >50% body destruction*



