Pediatric Lower Back Pain in the Pediatric Patient

Ken Taylor MD

Chief, Primary Care Sports Medicine

Head PCSM San Diego Padres

*Nothing to Disclose

Spondylolysis Quiz

- 1. Which Vertebral Level is most common?
- 2. In Soccer athletes is the spondy usually ipsa or contralateral to the dominant leg
- 3. Which Imaging modality is most SENSITIVE for Spondy?

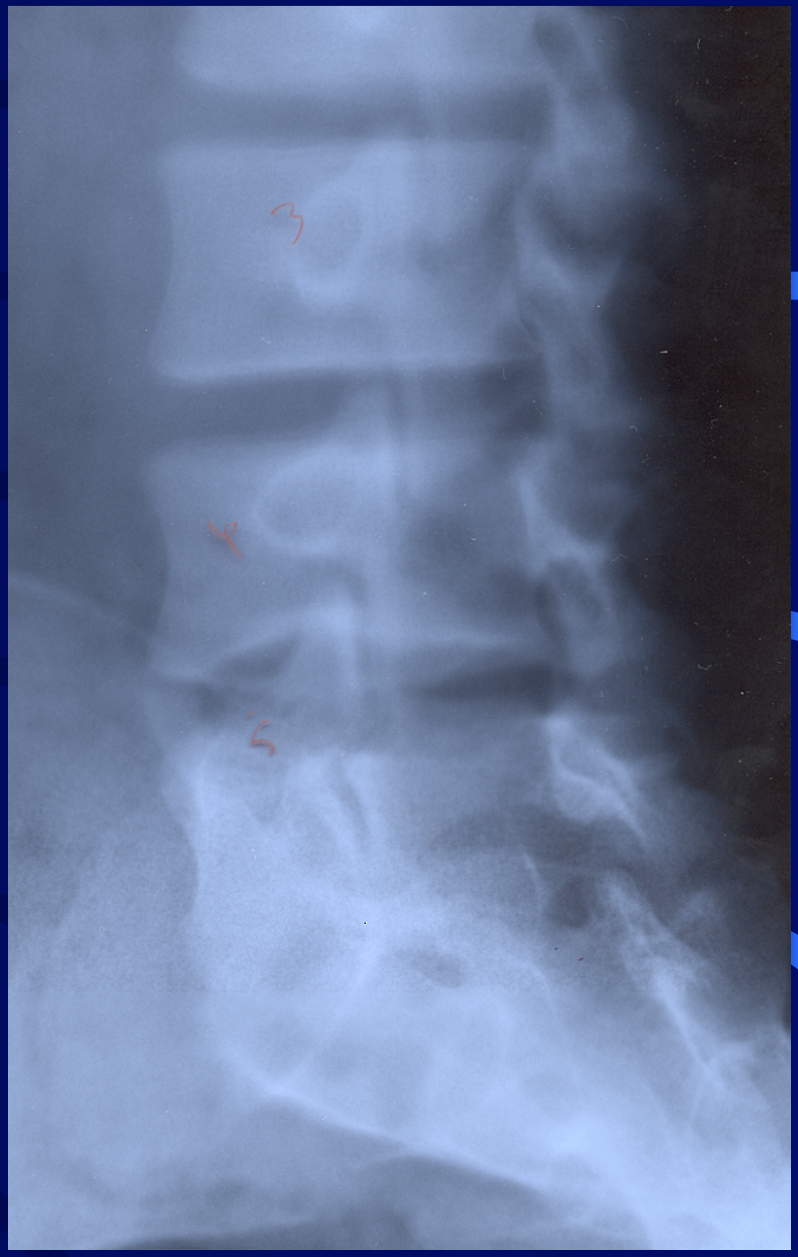
Case: History

- 15 y/o WM high school football player
- Referred by Pediatrician for Sports Medicine consult re: acute LBP
- MOI: One week ago, running back hit in chest after falling to knees hyper-extending lumbar spine, acute pain
- No previous LBP/injury
- No significant PMH/PSH

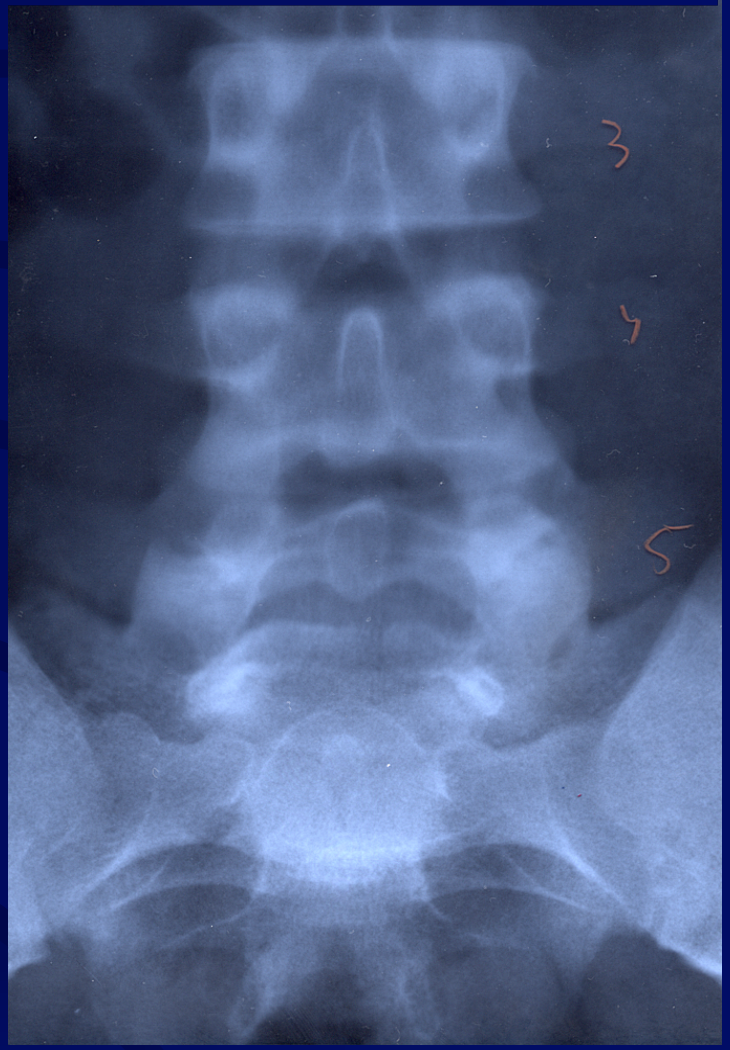
Case 2: PEx

- Muscular Male in NAD
- Normal Gait
- Minimal TTP L4-5 spinous processes
- Mild Hamstring Inflexibility
- Good Lumbar ROM, pain with extension
- (+) One- legged standing hyperextension (Stork) test
- Normal Neurological Exam

- Lumbar XRays
  - Oblique View



- Lumbar XRays
  - AP View



Diagnosis: Acute L5 Spondylolysis

- Treatment
  - Withheld Extension/contact sports 8 weeks
  - PT: hamstring flexibility/Abd & Spine flexion strengthening
  - 4 weeks symptoms resolve & PEx normal
  - 8 weeks XRay e/o healing & graduated return to sports

2 year follow-up

- Persistent nonspecific low back pain, mostly with heavy weight-lifting
- PEX: Normal, Stork (-)
- MRI: spondylolysis healed, disc bulges at L4/5, L5/S1

Back Pain in Children and Adolescents

- Common? Rare??
  - Prevalence 30-70% (Balague; Duggleby, Selhorst)
  - Chronic/recurrent 8.1%
  - Risk Factors for Lysis/listhesis: Fam Hx, Growth Spurt, Sports (age, training >15hours/week)

Back Pain in Children and Adolescents

- What percent seek care for back pain??
  - 15-26%
  - Incidence Adolescent athletes>non-athletes
- Natural Hx?
  - More common w/ age
  - Little to no deterioration
- 2013 study: athletes with appropriate rest 16X>positive long-term outcomes (Rassi)

Back Pain in Children and Adolescents

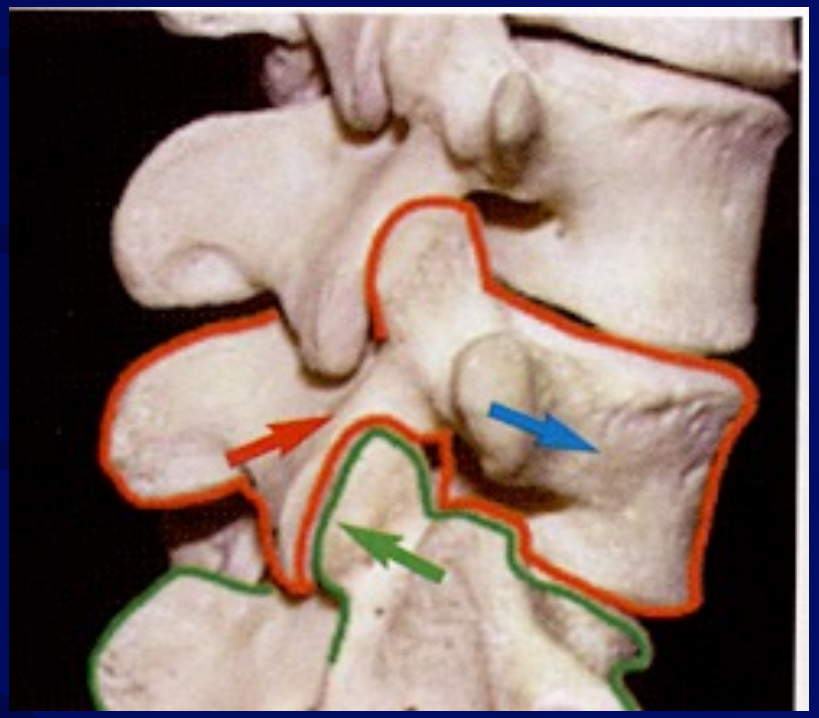
- Disabling Back Pain and get bone scan??
  - 78.3% no specific Dx
  - 10% mixed bag infx, disks, kidney
  - 6.9% spondylolysis
  - 5% tumor

Back Pain in Children and Adolescents

- Should kids have an aggressive workup??
  - Where and with whom do you work?
    - Sports Med Practice up to 50% spondylolysis (Micheli)
    - Elite Spaniard athletes 8% spondy
    - Attorneys: MD ratio!

Spondylolysis

- Fracture of the pars interarticularis
- Not present at birth
- Fatigue fx/ repetitive loads>acute traumatic fx
- Absent in primates



Spondylolysis

- Since 6000 BC Native Americans
- 600 BC Egyptian "Contortionist" L3-L5
- Guam: 21% rate around 1200AD thought due to hyperextention of lumbar spine lifting stones

Spondylolysis

- Sports involving repetitive hyperextension/rotation
  - Baseball
  - Diving
  - Gymnastics
  - Wrestling
  - Weightlifting
  - Surfing
  - Rowing
  - Football

Spondylolysis

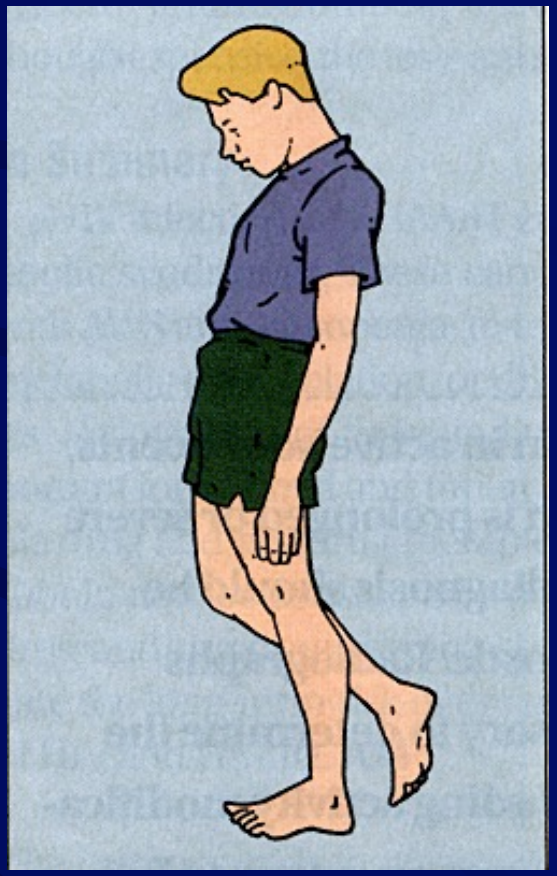
- Incidence
  - 2-6% general population
  - 7-10% gymnasts
  - Male>Female
  - 2-5X higher in adol athletes than non-athletes
- Prevalence
  - As high as 47% in some adolescent athletes
- 1990 Rossi 390 competitive athletes
  - 43% Divers
  - 30% Wrestlers
  - 23% Weight Lifters
- 2004 Gregory et al: location of spondy
  - Throwers-contralateral L>>R
  - Soccer-symmetrical

Spondylolysis

- History
  - Acute injury
  - Onset often insidious
  - LBP unilateral occas bilateral
  - Worse with extension
  - Spina Bifida Occulta
  - Fam Hx Spondy

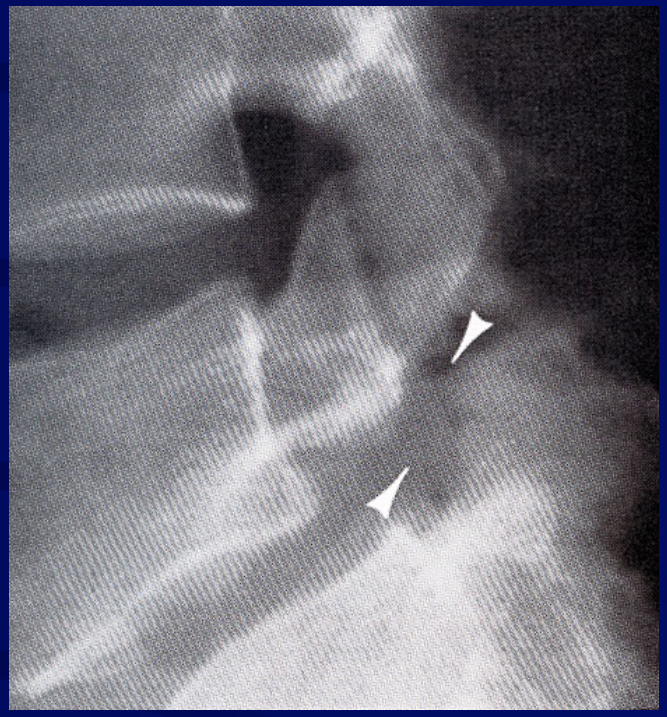
Spondylolysis

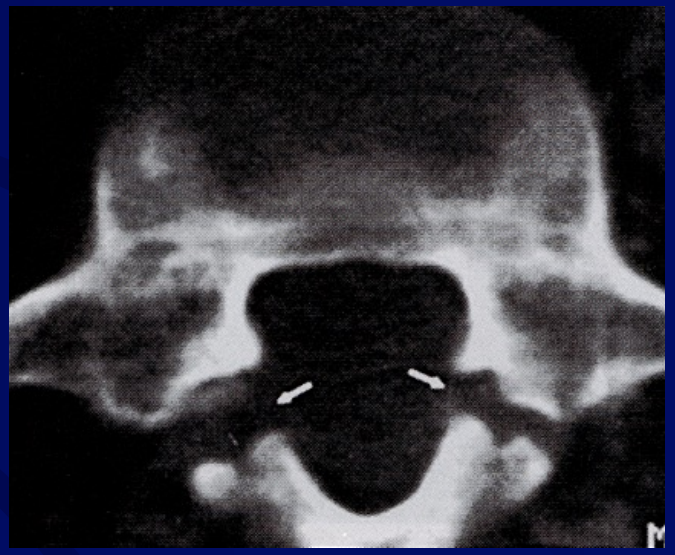
- Physical Exam
  - Lumbar skin hyperpigmented/hypertrichosis (assoc with spina bifida occulta)
  - Mild tenderness paravertebral
  - Pain with single-leg hyperextension test (Stork test)
    - Poor predictor (low sens/spec/NPV (Massi BJSM 2006)



Spondylolysis

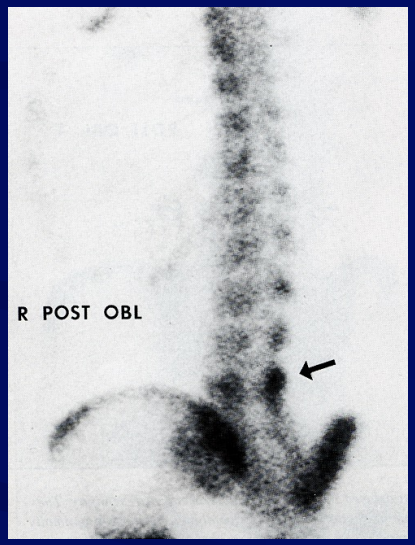
- Radiographs
  - Lumbar oblique view
    - Collared scottie dog
  - AP/Lateral
  - May be normal
- CT Scan
  - Best for assessing fractures

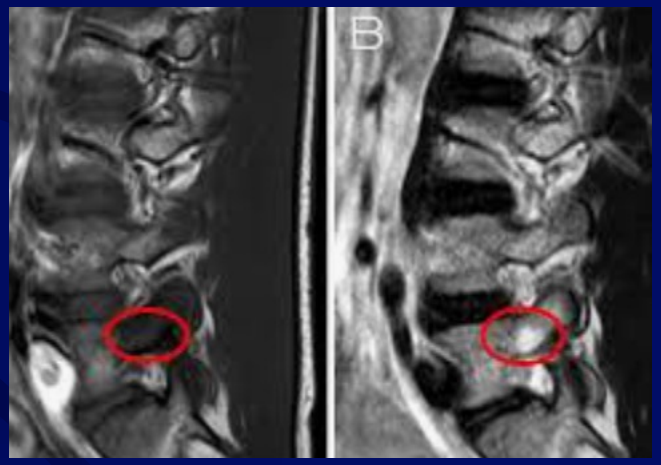




Spondylolysis

- Nuclear Imaging
  - Bone Scan
  - SPECT-Gold standard
    - most sensitive
    - XRays normal
    - Assess acuity
    - $$$
- MRI
  - Improves soft tissue resolution
  - No ionizing radiation
  - Slight redux in sensitivity for bone stress rxn vs SPECT
  - Bone marrow edema may precede stress injury and respond to early Tx (Kountouris BJSM 2019)



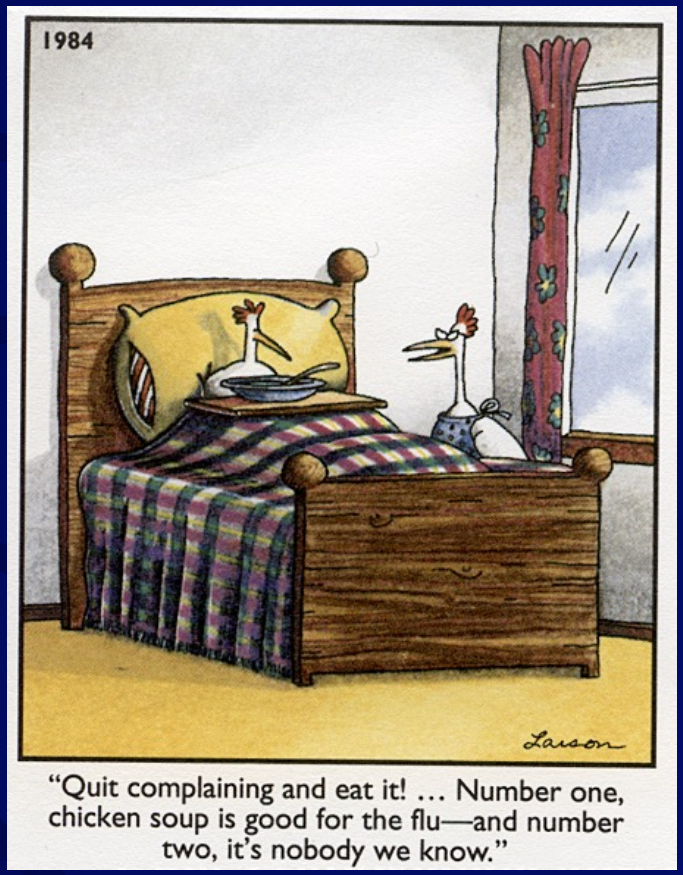


Spondylolysis

- Treatment
  - Activity restriction 4-8 weeks
  - Analgesics
  - Lumbosacral Orthosis: controversial, if conservative Tx doesn't relieve pain
  - Physical therapy: Hamstring stretches, Abd/Lumbar flexion strengthening/Pelvic tilts

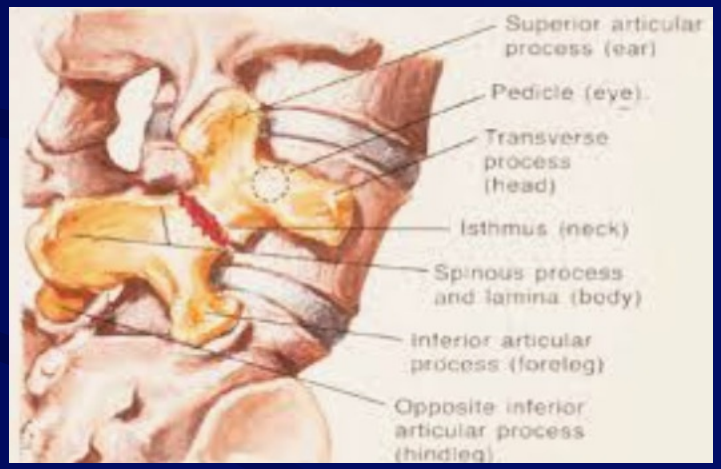
Spondylolysis

- Treatment
  - Bone stimulator
    - Electromag vs US
  - Surgery: spondylolisthesis at least grade 3 (>50% slippage) and 6 month failure conservative Tx
- Return to play
  - Pain resolves
  - XRay e/o healing (not a requirement)
  - Graduated return to sport



Spondy Lit Review

- Natural History Study
- 45 year F/U case/control Baker et al 2003
- Unilateral Lysis-many healed, Bilateral-none
- No sign difference in back pain c/w controls

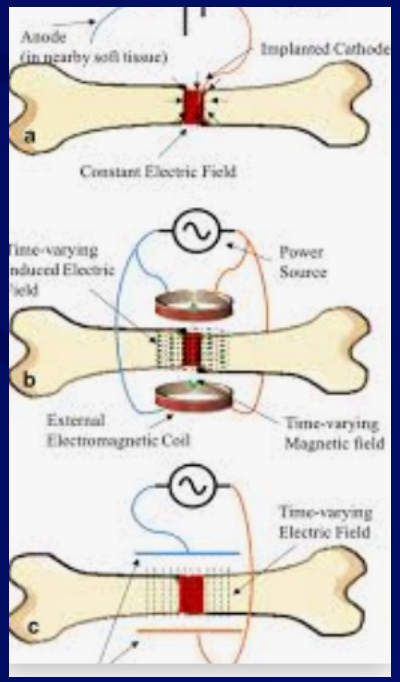


Spondy Lit Review

- Athlete study 2004 AJSM, Miller et al
- 32 spondy, age<20
- Conservative Tx
- Unilateral spondy- good healing, bilateral-none
- 91% good fxnal outcome 11 years later

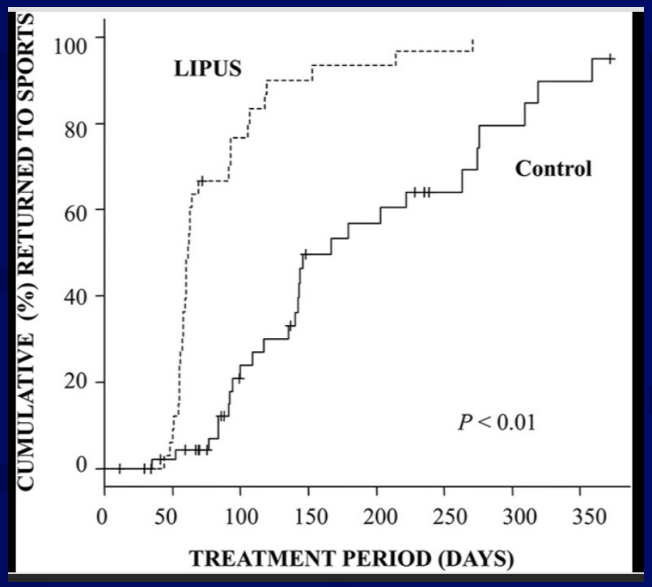
Electromagnetic Bone Stim

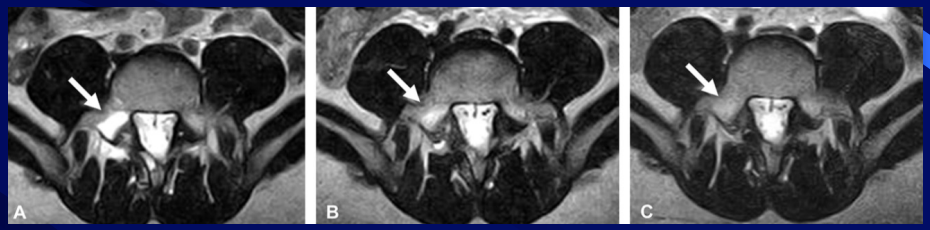
- Case report 2004 BJSM
  - 17 y/o Male athlete: Bilat Spondy complete healing using EM bone stim during sleep for 8 months
  - 16 y/o female volleyball, 16 y/o male soccer bilat L5 spondy
    - 14 mo Tx including Boston brace, PT= incomplete healing, persistent pain
    - 4 mo EM bone stim 30'/day resulted in eventual complete healing



Low Intensity Pulsed Ultrasound (LIPUS)

- 82 Young athletes 14.8 yrs
  - 11 sports but mostly Baseball
- Brace(soft corset)/rest/PT +/- LIPUS (>3d/week 20' during PT)
- End point=disappearance T2 signal on MRI
  - Standard Tx return=167 days
  - With LIPUS= 61 days p<0.01





Mashahiro Tsukada et. Al; Low-Intensity Pulsed Ultrasound for Early-Stage Lumbar Spondylosis in Young Athletes, Clin J Sports Med 2019;29:262-266

2022 Meta-analysis

- 80 studies
- Incidence
  - 12-month: 36%
- Prevalence
  - 12-month: 42%
- Most common morphology
  - Spondylolysis
- Risk factors
  - Ballet, gymnastics, rowing
  - Sport volume/intensity
  - Leg pain
  - High BMI
  - Older
  - Female
  - Fam Hx LBP

Wall, Julia et al; Br J Sports Med;56:1299-1306. Sept 2022

Spondy Quiz

1. Which Vertebral Level is most common?

- L5

2. In Soccer athletes is the spondy usually ipsa or contralateral to the dominant leg

- Ipsalateral

3. Which Imaging modality is most SENSITIVE for Spondy?

- SPECT

References

- Mashahiro Tsukada et. Al; Low-Intensity Pulsed Ultrasound for Early-Stage Lumbar Spondylosis in Young Athletes, Clin J Sports Med 2019;29:262-266
- Selhorst M et al: Prevalence of Spondylolysis in Symptomatic Adolescent Athletes: an Assessment of Sport Risk in Nonelite Athletes. Clin J Sports Med 2019;29:421-425
- Stasinopoulos D. Treatment of spondylolysis with external electrical stimulation in young athletes: a critical literature review. BJSM 2004;38:352-354
- Whiteside, JA: Elbow Injuries in Young Baseball Players. Phys and Sportsmedicine 1999
- Safran, M: Elbow injuries in athletes. Clinical Orho and RR 1993
- Hall, T: OCD of the elbow. Phys and sportsmedicine. 1999
- Perron A: Orthopedic pitfalls in the ED: Pediatric growth plate injuries. Am J Emerg Med 2002
- Ralston, B: OCD of knee. Phys and sportsmedicine. 1996
- Moeller, J: Spondylolysis in active adolescents. Phys and sportsmedicine. 2001
- El Rassi G et al: Effect of sports modification on clinical outcome in children and adolescent athletes with symptomatic lumbar spondylosis. Am J Phys Med Rehab 2013;92;1070-1-74
- Masci L et al. Use of one-legged hyperextension test and MRI in the diagnosis of active spondlolysis. BJSM 2006;40:940-946
- Bracker, M: 5 Minute Sports Medicine Consult. 1st Ed. 2001
- Staheli, L: Fundamentals of Pediatric Orthopedics. 2nd ed. 1998
- Eiff, Hatch, Calmbach: Fracture Management in Primary Care. 1st ed. 1998
- Mercier, L: Practical Orthopedics. 3rd ed. 1991
- Resnick, D: Bone and Joint Imaging. 2nd ed 1996
- Martire, J: Imaging of Athletic Injuries. 1st ed. 1992