

Back pain in the child athlete



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Introduction

- back pain is a rather uncommon complaint in children
 - usually occurs in the lower back (1)
- associated with sports in which repetitive extension, flexion and rotation (2)
 - gymnastics, football, and dancing



Introduction

- overuse injuries occur more commonly than acute (2)
- back pain in the child athlete may generate from overuse syndrome (soreness), strain/sprain (small tears) within the back
 - usually temporary and resolves with time and rest and often physical therapy

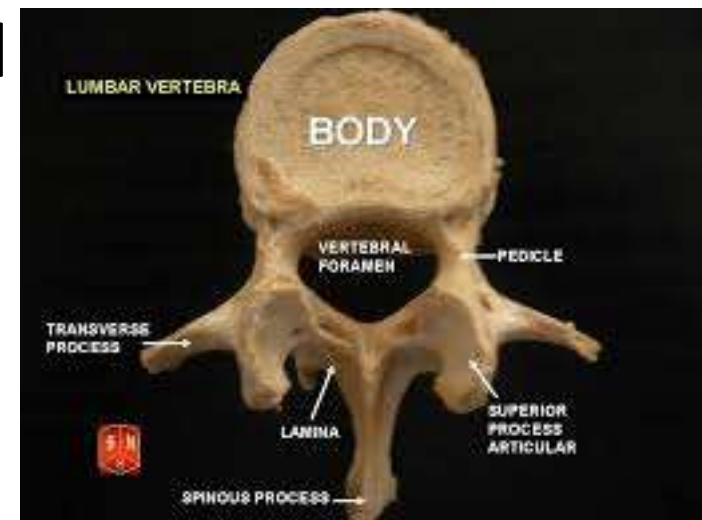


Introduction

- 3 important causes for persistent pain
 - isthmic spondylolysis
 - degenerative disc disease
 - Scheuermann's disorder

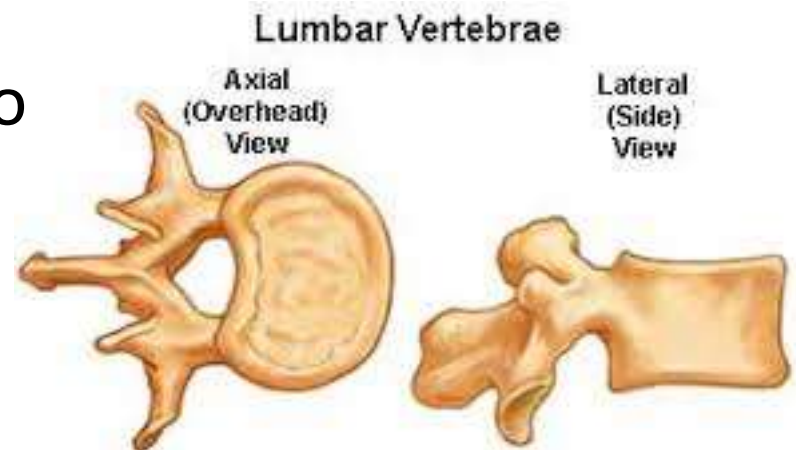
Anatomy

- The lumbar vertebra is shaped with a large body in the front to carry the loads of the chest and head and transfer the load to the disc.
- The disc is sandwiched in between the two vertebrae and is the shock absorber of the spine.



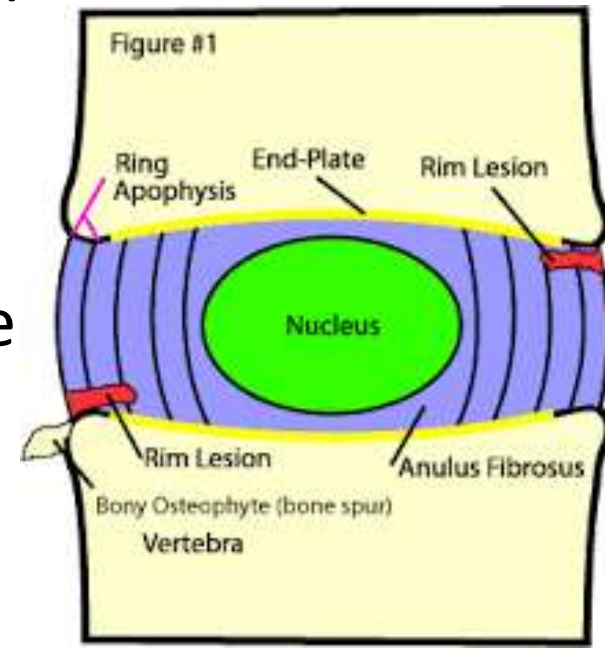
Anatomy

- The projections out of the back of the vertebra (the pedicles and lamina) contain the facets, the “doorstops” that hook one vertebra onto its neighbours above and below.
 - facets act like train tracks to guide the motion of the vertebrae.



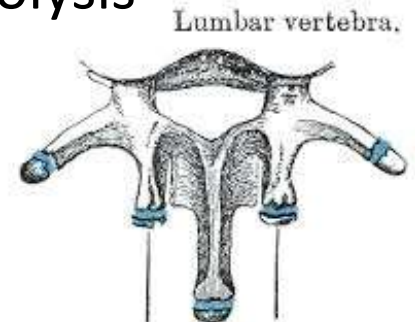
Anatomy

- In children and adolescents, there are open growth plates on the top and bottom of the body of the vertebra
 - these are attached to the vertebral body by cartilage and the ring apophyses
 - these are weaker than bone
 - ring apophyses are attached to the outer anulus fibrosus



Anatomy

- ossification of the posterior spinal elements starts anteriorly and proceeds posteriorly
 - may be congenitally incomplete in the pars interarticularis portion of lower lumbar vertebrae, especially L5
 - predisposing to spondylolytic stress fractures
 - spina bifida occulta at the lumbosacral junction appears to be an additional risk factor for spondylolysis



2 additional centers for mammillary processes

Physiology

- rapid bone growth exceeds that of muscles and ligaments leading to muscle imbalances and impaired flexibility
 - growth characteristics vary considerably
 - gender
 - individualized

Growth Characteristics	Girls	Boys
Age at start	9-10 y	11-12 y
Age at maximum growth	12 y	14 y
Age at which growth slows	>12 y	>14 y
Age until growth continues	16-18 y	18-20 y
Age at maximum height growth	11-13 y	13-15 y

Risk Factors

- size and age of child
- training volume and intensity
- poor technique
- additional specific risk factors
 - abdominal muscle weakness
 - hip flexor, hamstring, and thoracolumbar fascia tightness
 - increased femoral anteversion
 - genu recurvatum
 - increased thoracic kyphosis



History

- pain
 - onset and duration (acute vs overuse),
 - location, quality & severity
 - neurologic symptoms & aggravating factors
 - type of sport & position played
 - training volume & level of competition



History

- Red flag symptoms:
 - fever, malaise, weight loss, neurologic abnormalities, night pain, and morning stiffness
 - may suggest more sinister causes such as infection or tumour

Physical examination

- observation of the athlete's gait and posture
- spinal abnormalities such as scoliosis, kyphosis, or excess lordosis
- spine ROM
 - tight hamstrings can limit the amount of forward flexion
- SI joint tests & neural tension tests
- neurologic exam



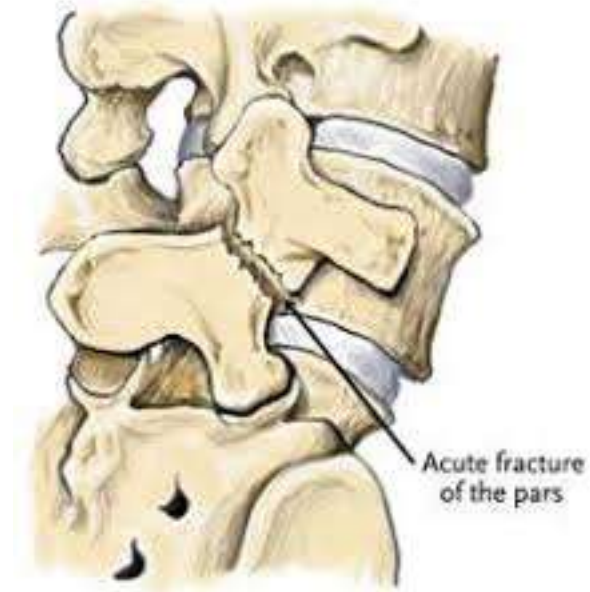
Spondylolysis

- defect in pars interarticularis from a stress fracture
- normally occurs at L5 – usually on left
- estimated to 1:20 adolescents
- occurs with sports that require repeated extension (bending backwards) and torsion (twisting) like gymnastics, football, tennis, diving and wrestling



Spondylolysis

- bone fatigues and does not have time to heal before the next round of activities again stresses the area (which can cause or worsen a fracture(s) in the spine)



Spondylolysis

- pars injuries are more common in this age group than in adults
 - seen in up to 47% (3)
- bilateral spondylosis can lead to spondylolisthesis

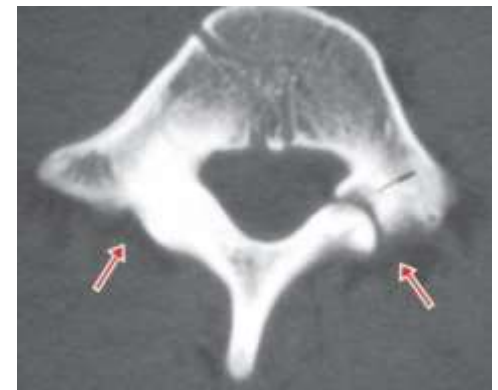
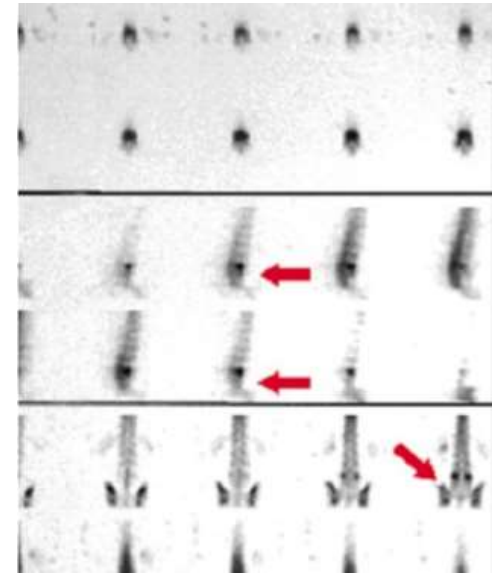
Spondylolysis

- insidious pain - extension & impact related
- hamstring tightness frequent
- persistent lower back pain (>3 weeks) in young athlete should be investigated
 - plain radiographs: AP & lateral
 - oblique – increased dose radiation & can miss 1/3



Isthmic Spondylolysis

- bone scan SPECT
- CT – confirms diagnosis
 - reserved for non-responders
- MRI – less sensitive



Spondylolysis

- Catching this impending fracture early before the bone actually breaks makes treatment easier and more successful.
- If the bones fracture on both sides, treatment is more difficult and surgery may be in order.

Spondylolysis

- Management
 - activity modification
 - muscle strengthening & stretching exercises
 - ? bracing
- gradual return to sports once pain-free

Spondylolisthesis

- followed up every 4 to 6 months with standing lateral films until skeletal maturity to assess for progression of slip.
 - athletes are at low risk for worsening of spondylolisthesis.
 - if the slip progresses beyond 50%, or if there are neurologic symptoms or persistent pain, surgical stabilization is indicated

Overuse syndrome

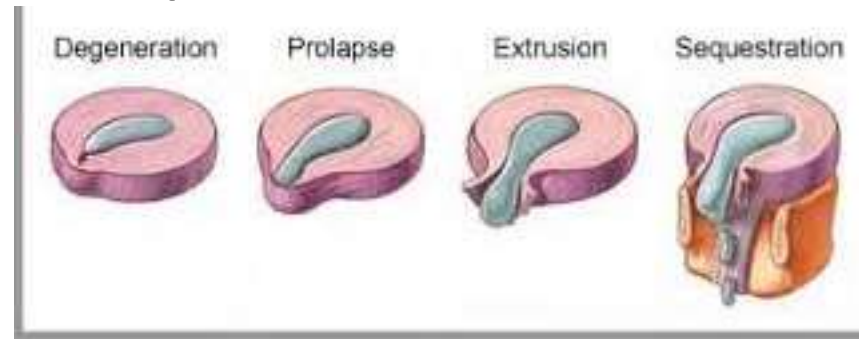
- a constellation of conditions involving muscle-tendon units, ligaments, facet joints, and joint capsules
- hyperlordotic low back pain, mechanical low back pain, or muscular low back pain
- 2nd most common & present similar to spondylolysis – normal imaging
- management is symptomatic

Sacroiliac joint pathology

- mechanical – excessive or reduced motion
 - +/- lumbar spine pathology
 - sacrum stress fracture
- inflammatory causes – infection (Reiter's syndrome), etc
- imaging for persistent pain – MRI defines anatomy
- management is conservative

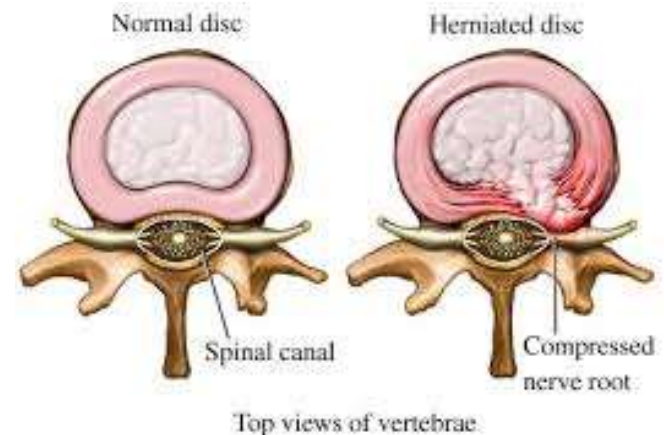
Disc Injuries

- rare in this age group compared to adults but does occur (3)
 - usually in adolescents
- genetics
- can occur in two ways, through a standard tear in the disc wall (a herniated disc) or through a fracture of the endplate of the vertebra.



Disc Injuries

- children and adolescents with disc herniations that compress nerves normally do not develop leg pain
 - resilience of the nerves
- pain is typically found in the back but can radiate down to the buttocks and possibly the upper thigh – flexion-related



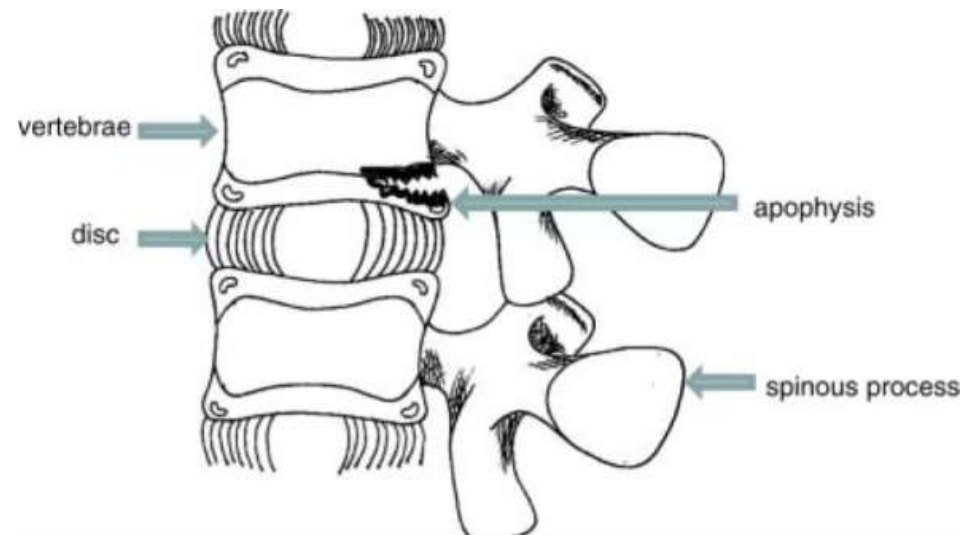
Disc Injuries

- plain radiographs to rule out osseous injuries
- MRI for progressive symptoms that are refractory
- 90% improve with conservative management



Vertebral Body Apophyseal Avulsion Fracture

- associated with activities that involve repetitive spine flexion and extension
- fractures of the cartilaginous ring apophysis may occur with displacement posteriorly into the spinal canal, along with the intervertebral disc



Vertebral Body Apophyseal Avulsion Fracture

- Plain radiograph & CT can show ossified fragment in canal
- conservative management unless neurological deficits (rare)

Scheuermann's Disease

- thought to occur from overloading of growth plates
 - weaker – fracture under load
- sports that significantly compress the spine
 - football, wrestling, weight lifting, bump skiing and gymnastics.

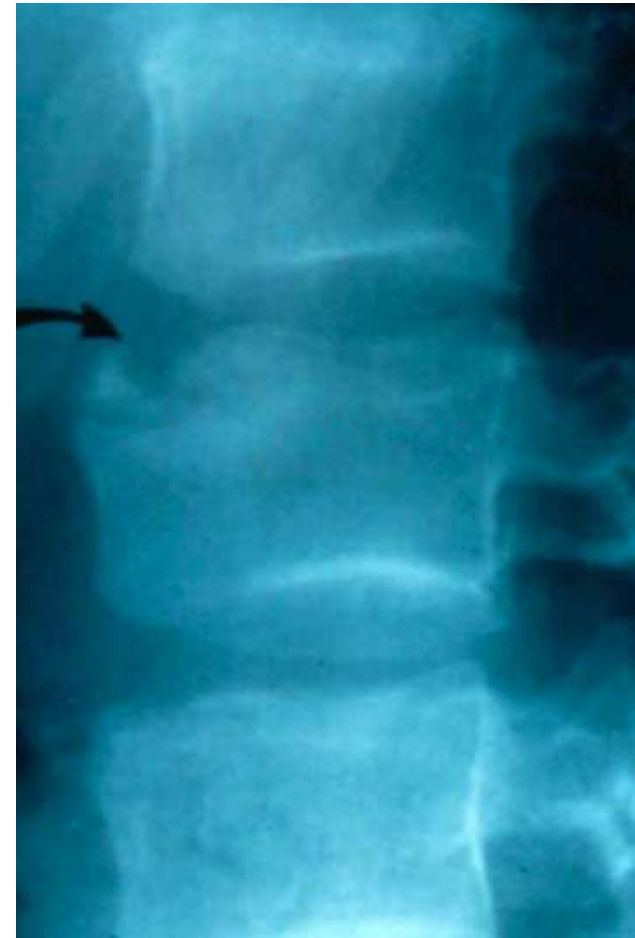


Scheuermann's Disease

- pain tends to be the upper portion of the lower back and the thoracic spine
- flat back (decreased thoracic kyphosis and lumbar lordosis) and tight thoracolumbar fascia

Scheuermann's Disease

- Diagnosis
 - radiographs - end-plate fractures of the lumbar vertebrae, Schmorl nodes, and vertebral apophyseal avulsions



Scheuermann's Disease

- Management
 - physiotherapy – core strengthening, stretching thoracolumbar fascia
 - bracing in 15° lordosis may help return to sport

Conclusion

- Young athletes who present with low back pain are more likely to have structural injuries and therefore should be investigated fully.
- Muscle strain should be a diagnosis of exclusion.
- Treatment should address flexibility and muscle imbalances.

Conclusion

- injuries can be prevented by recognizing and addressing risk factors.
- return to sport should be a gradual process once they have attained full pain-free range of motion, full strength, and have progressed through sport-specific activities in a controlled setting
- **BEWARE OF MORE SINISTER CAUSES!!!**

References

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- (3) Back pain in young athletes. Significant differences from adults in causes and patterns. Micheli LJ, Wood R Arch Pediatr Adolesc Med. 1995 Jan; 149(1):15-8.