Back Pain in Children

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Objectives

• List the common causes of back pain in children.
• Explain the pathology and clinical presentation of back pain in children.
• Outline the general management of back pain in children.
• Differentiate between cases which require referral and those which can be treated by pediatricians.
Cause of Back Pain in Children

- Mechanical back pain (muscle strain)
- Deformity:
  - Sheuremann kyphosis.
- Infection
  - Diskitis
  - Vertebral body osteomyelitis
  - TB spine
Cause of Back Pain in Children (Con’t)

• Trauma to spine:
  • Vertebral fracture.
  • Osteoporotic compression fracture.

• Spondylosis and spondylolisthesis

• Tumor
  • Osteoid osteoma (painful scoliosis).
  • Leukemia
Cause of Back Pain in Children (Con’t)

• Disk prolapse (Herniated nucleus pulposus)

• Sacroiliac (SI) joint pain:
  • Mechanical (muscle strain).
  • Limb length discrepancy.
  • Septic arthritis.
  • Inflammatory arthritis (Ankylosis spondylitis or Rieter).
General Approach to a Child With Back Pain

History:

• Assessment of the pain.
• History of one of the red flags
  • Weight loss or fever
  • Weakness or numbness of lower extremities
  • Bowel or bladder problems
  • Trouble walking (or inability to walk in small children)
  • Pain that prevents the child from sleeping.
• Age less than 5 years.
Examination

• Assessment of deformity (kyphosis, scoliosis)
• Assessment of the range of motion of the back:
  – Pain with extension of the spine, possible spondylosis or spondylolisthesis
  – Pain with flexion, possible vertebral body or disk disease
    • A child with diskitis or osteomyelitis will bend his hips and his knees (not his back) to pick up an object from the floor.
Examination (Con’t)

• Assessment of the sacroiliac (SI) joint
  – Palpation of the SI joint.
  – Compression of the iliac wings.
  – FABER test (Flexion, Abduction, External Rotation) of the hip will cause pain over the SI joint.

Examination (Con’t)

• Straight leg raising test:
  – Positive results requires shooting pain in the back of the lower extremity radiating distal to the knee level.
  – Causes of radiculopathy:
    • Disk prolapsed (herniated nucleus pulposus).
    • High grade spondylolisthesis.
• Neurological exam of the lower extremity:
  – Motor: assessment of the motor power of main muscle groups.
  – Sensory.
  – Reflexes.
Plain radiograph of the spine:

- Will assess bony lesion and the alignment of the spine.
- Two views (Anteroposterior and lateral) centered over the painful part of the spine
- If suspecting spondylolysis, add oblique views (Scottish dog collar appearance)
Imaging (Con’t)

• MRI:
  – Better assessment of the soft tissues (herniated disk, infection, intra thecal tumors).
  – Indication for MRI of the spine:
    • Presence of any signs of the red flags.
    • Severe low back pain not responding to medical treatment.
Imaging (Con’t)

• Bone Scan and SPECT (Single-photon emission computed tomography):
  – Helpful in detecting bone tumor and infections.
  – Can differentiate between acute and chronic spondyloysis.

• CT spine:
  – Better assessment of the bony structure.
  – Coronal, sagittal, and 3D reconstruction can show the deformities of the vertebra better than plain radiographs.
Laboratory studies

- Markers of infection (CBC with diff, ESR, and C-reactive protein).
- Markers of seronegative spondyloarthropathy (HLA B-27).
Mechanical (Muscular) Back Pain

Definition:
• Back pain due to muscle strain.

Clinical presentation:
• This diagnosis can only be given after exclusion of all other pathology by clinical exam and negative radiographs.
• More common in adolescent, very rare in young children less than 10 years old.
• Currently is the most common cause of back pain in adolescent.
Mechanical (Muscular) Back Pain

Treatment:
• Local heat, NSAID medication.
• Therapy for strengthening of abdominal and back muscles
• Decease physical activities (sports) until pain improves.
• Short term use of back brace (controversial)
• If condition persists: proceed with more imaging studies (bone scan or MRI)
Spondylolysis

Definitions:

• Spondylolysis is a bone defect in pars interarticularis of the vertebra

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Spondylolysis

Pathology and incidence:

• The condition may represent stress fractures, associated with sports that involve repeated extension position of the spine (football, gymnastics, and divers).
• The condition is present in about 7% in adolescents and up to 20% in participants of sports that involve repeated extension of the back.
• The condition is asymptomatic in the majority of cases.
• It is the most common cause of nonmuscular back pain in adolescents.
• Most commonly affected vertebra is L5, less common in L4.
Clinical presentation

- Patient will complain of low back pain that increase with extension of the spine during sports activity.
- Extension of the spine will cause severe back pain in the lower lumbar area radiating to the back of the thighs.
- Straight leg raising test: pain in the posterior thigh, but usually does not extend distal to the knee (hamstring tightness).
Imaging

• Can be discovered in the radiograph as an accidental finding.
• The defect can be seen in the lateral view of the lumbar spine but it is more obvious in the oblique view (Scotty dog with a collar appearance)

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CT scan will show the defect in the pars interarticularis.

Bone scan with single-photon emission CT (SPECT) will help differentiate between acute and chronic lesion (hot lesion in acute cases and cold in chronic cases).
Treatment

- NSAIDs, and rest from the sport until the pain decreases.
- Adolescent can resume sport activity when they are pain free.
- Brace (lumbar corset), if the pain does not improve with rest.
- Acute lesion can be treated with more aggressive immobilization (Thoraco-lumbar-sacral orthosis (TLSO))
- Orthopedic referral if no improvement (Surgery is rarely indicated in Spondylolysis).
SPONDYLOLISTHESIS

Definition:

• Forward slippage of upper vertebra in relation to the vertebra below
Incidence

• Only about 5% of cases of spondylolysis progress to symptomatic spondylolisthesis.
• Despite spondylolysis being more common in boys, high grade spondylolisthesis is more common in girls.
Clinical presentation

- Low back pain with extension activities.
- Hamstring tightness
Radiographs

- Forward slippage of L5 over S1.
- The degree of slippage is expressed as a percentage of the vertebral width.
Treatment

• Orthopedic referral.
  – Surgical treatment is usually needed for high slip.
  – No contact sports if the slippage is more than 50% of the vertebral width.
SCHEUEREMANN KYPHOSIS

Definition:

• Juvenile developmental disease with increase thoracic or thoraco-lumbar kyphosis due to structural deformity of the spine with increased anterior wedging of the vertebrae.

• Osteochondritis of the growth plate of the vertebra. This will cause abnormal growth of the vertebra with anterior wedging.
Clinical presentation

• Deformity (bent back deformity)
  – The deformity is fixed and cannot be corrected by straightening the back (in contrast to postural kyphosis).

• Mid-back pain (50% of patients).

• Increased thoracic hump with forward bending.

• Neurological deficits with advancing disease.
Imaging

• presence of 3 consecutive vertebrae with more than 5 anterior wedging.
• Increase thoracic kyphosis > 50.
• Narrowing of the disk space.
• Schmorl nodes, which is a herniation of the disk material (nucleus pulposus) in the body of the vertebrae.
Treatment

• Physical therapy:
  – Aggressive thoracic extensor strengthening and hamstring stretching exercises.

• Referral for orthopedics:
  – Bracing for curves less than 70 degree if the child still has more than 2 years of skeletal growth
  – For curves more than 70 degrees: possible surgical treatment to correct the deformity.
    • Indications: Unacceptable appearance, Persistence back pain and neurological manifestation
INFECTION OF THE SPINE

Definitions:
- **Diskitis:**
  - Inflammation of the intervertebral disk usually seen in toddlers.
  - The most common location is lumbar vertebrae.
- **Vertebral body osteomyelitis:**
  - Inflammation of vertebral body.
  - Usually starts at the vertebral end plates.
- The distinction between diskitis and vertebral osteomyelitis is hard and most cases will have some affection of both the inter-vertebral disk and the vertebral body.
Etiology

• Hematogenous spread
• Staphylococcus aureus is the most common organism isolated
• Other organisms include: Kingella kingae, group A streptococcus, and E Coli
Clinical presentation

• Back pain
• Limping or refusal to walk
• Most patients will have mild or no fever
• Spinal motion is voluntarily reduced to alleviate the pain
  – Paraspinal muscle spasm is common
  – Flexion of the spine compresses the anterior element and causes discomfort (the child will refuse to pick up an object from the ground)
• Older children might have fever and abdominal pain
Laboratory

- Complete blood count may remain normal
- ESR and CRP are usually elevated.
- Blood cultures.
- Image guided biopsy from the affected area.
Imaging

Radiographs:

• Characteristic findings often takes 2-3 weeks to appear
  – Narrowing of the disk space
  – Irregularities of the adjacent vertebral end plates

• Osteopenia.
Imaging

Technetium bone scan:
• Hot spot in the affected disk

MRI:
• Most sensitive imaging study
• Becomes positive early in the disease process.
• Can identify abscess formation (which is an indication of surgical interference).

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Treatment

• Start antibiotics covering for Staph Aureus.
• Length of therapy is 4–6 weeks.
• 1–2 weeks of IV antibiotics, followed by oral antibiotic.
• The treatment protocol varies according the response (clinical response and ESR).
• Rest, analgesic, and immobilization in spinal orthosis.
Surgical treatment is rarely required.

Indications:
- No improvement after appropriate antibiotic treatment.
- Abscess formation.
- Marked deformity (kyphosis)
Thank you