Low Back Injury in the Industrial Athlete: An Anatomic Approach

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Epidemiology

* 60-90% lifetime prevalence
  Frymoyer 1988, Walker 2000

* 50% will have recurrent episode

* Greater than 5% annual incidence
  Svennson 1983, Hoy 2010
Work Related Low Back Injury

- According to Bureau of Labor Statistics 1 million work related back injuries per year
- 20% of all work related injuries are to the low back
- Number one cause of loss of work days in the United States
#1 cause of disability patients < 45 years old
One Third of Work Related disability is due to Low Back Injury
Low Back Injury

- Low Back Pain is a complaint not a diagnosis
- The diagnosis of a low back injury should specify the anatomic structure which is the pain generator
- May be more than one structure injured
Collaboration

- Treatment of the Injured Industrial Athlete requires a team approach.
- Physician for initial diagnosis, pain control, education and work modification
- Therapist for hands on treatment, education, and feedback to team
- Nurse Case Manager and Adjustor for facilitation, education and communication.
Common Causes of Low Back Pain in the Industrial Athlete

* Soft Tissues Muscles, Tendons and Ligaments
* Intervertebral Disc
* Zygapophophysial Joint
* Nerve Root
* Sacroiliac Joint
* Vertebra body
History

- Listen to the patient
- Ask the right questions
  - When
  - How
  - Pain/Numbness/Weakness
  - Change
  - Where
    - Where does the pain radiate
    - What percentage of the pain is where
Physical Examination

- Inspect
- Palpate
- Joint Range of Motion
  - What recreates pain
- Strength
- Sensation
- Reflexes
- Special Tests
Testing

* Extension of the Physical Examination
* Imaging
  * X-Ray
  * MRI
  * Bone Scan
* EMG
* Diagnostic Injection
The history, physical examination and the testing should agree on the diagnosis.

Abnormal testing on its own is not enough for a diagnosis.

The Physical Therapist and the Nurse Case Manager often have information to help with diagnosis.
Ligaments

* Strain/Sprain
* Injury
  * Traumatic
    * Lifting most often
* Diagnosis
  * Clinical Suspicion
  * Physical Examination
  * Testing
* Testing
  * Testing is most often negative
Paravertebral Muscles and Gluteal Muscles

* Treatment
  * Physical Therapy and Exercises
    * Exercises specific for the injured tissue
    * Heat/Ice/Electricity/Ultrasound
    * Massage/Myofascial Release/ASTM
  * Pain Control
    * NSAIDS
    * Narcotics
    * Muscle Relaxers
Hydroelastic structure
  - annulus fibrosus (tough outer)
  - nucleus pulposus (jelly center)
FIGURE 2.  A, Normal disc. Note the concave posterior margin of the disc (arrows).  B, Bulging disc. Image from a CT-myelogram showing the broad-based margin of the bulging disc (arrows) pushing on the anterior thecal sac.  C, Left posterior disc herniation (arrow).  D, Right posterior disc herniation. The abnormal soft tissue from the herniated disc is seen in the right lateral recess on this CT-myelogram (arrow). Note the normally opacified nerve root sheath on the contralateral side (open arrow).  E, Herniated discs L₄–L₅ and L₅–S₁; the L₄–L₅ herniation is the larger of the two. There is posterior displacement of the low signal posterior longitudinal ligament (arrow). (From Barckhausen RR, Math KR: Lumbar Spine Diseases. In Katz DS, Math KR, Groskin SA (eds): Radiology Secrets. Philadelphia, Hanley & Belfus, 1998, pp 322–335, with permission.)
Intervertebral Disc Injury

* **Injury**
  * combination of bending, lifting and twisting

* **Diagnosis**
  * Clinical Suspicion
  * Physical Examination
  * Testing

* **Testing**
  * MRI Lumbar Spine
  * Looking for Disc Abnormality
  * Not always required
**Intervertebral Disc Injury**

* Physical Examination
  * Pain increase with Forward Flexion
  * Reduced pain on Extension
  * Minimal Pain to Palpation
  * No significant loss of Strength, Sensation or Reflexes
  * Negative Straight leg raise
Intervertebral Disc Injury

* Treatment
  * Pain Control
  * Physical Therapy and Exercises
    * Lumbar Extension and Core Stabilization
    * Traction
    * Modalities
  * Corticosteroids oral or injection
* Surgery
  * Fusion
  * IDET not commonly used
Intervertebral Disc

* **Pearls**

  * Pain worse with forward flexion
  * Pain relieved with hyperextension
  * Majority of pain remains in the Low Back

* **Bulge**

  * Large radius protrusion
  * Rarely pain generator
  * Found with MRI or CT myelogram
  * Look for different pain generator
  * 30 -50% of individuals without back pain will have disc bulges
Mechanical Low Back Pain
Injury to Zygapophysial Joint

* Injury
  * Hyperextension injury or chronic repetitive use

* Diagnosis
  * Clinical Suspicion
  * Physical Examination
  * Testing

* Testing
  * MRI Lumbar Spine
  * Lumbar X-rays with Flexion and Extension
Mechanical Low Back Pain
Injury to Zygapophysial Joint

- Physical Examination
  - Reproduction of pain with Lumbar Extension
  - Reduced pain with Forward Flexion
  - No significant loss of Strength, Sensation or Reflexes
  - May or may not have tenderness
  - Negative Straight leg raise
Mechanical Low Back Pain
Injury to Zygapophysial Joint

- Treatment
  - Pain Control
  - Physical Therapy and Exercises
    - Flexion and Core Stabilization
    - Modalities
    - Traction
  - Corticosteroids Oral or Zygapophysial Joint injection
  - Surgery not indicated
  - Work Modification
Mechanical Low Back Pain
Injury to Zygapophysial Joint

* Pearls
  * Pain worse with Hyperextension
  * Pain improved short term with Forward Flexion
  * Radiation to Buttocks but little to the leg
Z-Joint
Spinal Root Injury
Radiculopathy

* **Injury**
  * Nerve Root Impingement
    * Disc displacement
    * Spondylosis
    * Mass
  * Chemical Irritation
    * Diabetes or Disc Annular Tear

* **Diagnosis**
  * Clinical Suspicion
  * Physical Examination
  * Testing
Spinal Root Injury
Radiculopathy

Testing

- MRI of the Lumbar Spine
  - Looking for Impingement
- EMG of the Extremity
  - Looking for Signs of Nerve Cell damage
- CT myelogram rarely required
Spinal Root Injury
Radiculopathy

* Physical Examination
  * Reproduction of radiating pain depends on the cause of the impingement
  * Often Gluteal Muscles are tender to Palpation
  * Straight leg raise may be
  * May see weakness, reflex and sensory loss in neurologic pattern
  * Possible Surgical Emergency if Bowel or Bladder dysfunction or significant weakness
Spinal Root Injury
Radiculopathy

* **Treatment**
  * **Pain Control**
  * **Physical Therapy and Exercises**
    * Exercises vary with cause of impingement
    * Modalites
    * Traction
  * **Corticosteroids**
    * Oral or Epidural or Selective Nerve Root Injection
  * **Work Modification**
  * **Surgery**
Causes
- Congenital Stenosis
- Cyst
  - Dural
  - Spinal Cord
  - Z-Joint
- Infection
- Intervertebral Disc
- Tumor
- Zygapophysial Joint Hypertrophy
Spinal Root Injury Radiculopathy

**Pearls**

- Majority of Pain is in the Leg
- Straight Leg Raise mainly helpful in L5 and S1
Sacroiliac Joint Dysfunction

* **Injury**
  - Asymmetric trauma through the pelvis

* **Diagnosis**
  - Clinical Suspicion
  - Physical Examination
  - Testing

* **Testing**
  - Testing is most often negative
Sacroiliac Joint Dysfunction

Treatment

- Pain Control
- Physical Therapy and Exercises
  - Exercises vary with cause of impingement
  - Modalites
  - Joint Mobilization
  - Traction
- Corticosteroids
  - Oral or Sacroiliac Joint Injection
- Prolotherapy Injection
- Work Modification
- Surgery
Sacroiliac Joint Dysfunction

**Pearls**

- Pain much greater one side than the other
- Classically 80% back and 20% leg pain
- Increased pain with Extension
- Asymmetric Pelvic Movement on Forward Flexion
Vertebral Compression Fracture

- Significant axial compression
  - Falls and Motor Vehicle Accidents

- Diagnosis
  - Clinical Suspicion
  - Physical Examination
  - Testing

- Testing
  - X-Rays often show wedge deformity
  - Bone Scan or MRI for acuity
Vertebral Compression Fracture

- Physical Examination
  - Increased pain with forward flexion
  - Little pain with extension and palpation
  - Normal Strength and Reflexes

- Treatment
  - Pain control
  - Forteo injections
  - Thoracic Extension Brace
  - Vertebroplasty
  - Work Modification
Vertebral Compression Fracture

* Pearls
  * Sharp Pain with forward flexion
  * May look similar to disc related pain
  * Often no leg pain
Waddell signs

* Sign of symptom magnification
  * Tenderness tests
  * Simulation tests
  * Distraction tests
  * Regional disturbances
  * Overreaction disturbances
Spinal Cord

- Traumatic Injury
- Cyst
- Impingement by outside mass
- Neuropathic Process
  - ALS
  - Multiple Sclerosis
  - Ect.
Systemic

- Rheumatologic
  - RA
  - Lupus
  - Ankylosis Spondylitis
  - Fibromyalgia
* Kidney
* Hip Joint
* Abdominal Aorta
* Pelvic
  * Endomet
  * Bowel
  * Bladde
* Psychogenic
* Failed Low Back
Conclusions

- Low Back Injury in the Industrial Athlete
  - A team approach is most effective in the treatment of an Industrial Athlete with low back injury.
  - The team must localize the diagnosis.
  - The team must understand the anatomic tissues of the low back that are most commonly injured in the Industrial Athlete.
  - The team must treat the patient using specific exercises, modalities, medications, education and when necessary injections.
Questions?