The “Monster Back”: Non-Opioid Pain Management

16 February 2017

Paul F. Pasquina, M.D.
Professor and Chair, Physical Medicine & Rehabilitation
Director, Center for Rehabilitation Sciences Research
Uniformed Services University of the Health Sciences
Chief, Department of Rehabilitation
Walter Reed National Military Medical Center
Disclaimer

• No conflicts of interest to report.

• Medical Research Consultant for American Orthotic and Prosthetic Association (AOPA)

• Research support: MRMC, USUHS, DARPA, CNRM, CRSR

• The views expressed in this presentation are those of the author and do not reflect the official policy of the Department of Army, Department of Defense, or U.S. Government
Drug overdose death rates, United States, 2014*

Drug overdose deaths per 100,000 population
- 6.3 - 11.7
- 11.9 - 14.4
- 15.1 - 18.4
- 19 - 35.5

*Age-adjusted death rate per 100,000 population
Source: CDC National Vital Statistics System

Rate of Past Year Opioid Abuse or Dependence* and Rate of Medication-Assisted Treatment Capacity with Methadone or Buprenorphine

Rate per 1,000 persons aged 12 years and older
- Rate of dependence
  - 3.4 - 6.4
  - 6.5 - 9.2
  - 9.4 - 10.3
  - 10.8 - 12.9
- Treatment capacity
  - 0.7 - 3.0
  - 3.2 - 4.3
  - 4.4 - 7.2
  - 7.3 - 16.5

*Opioid abuse or dependence includes prescription opioids and/or heroin

Economic Impact of the Opioid Epidemic:
- $55 billion in health and social costs related to prescription opioid abuse each year¹
- $20 billion in emergency department and inpatient care for opioid poisonings²

2013;14(10):1534-47.²

On an average day in the U.S.:
- More than 650,000 opioid prescriptions dispensed¹
- 3,900 people initiate nonmedical use of prescription opioids²
- 580 people initiate heroin use²
- 78 people die from an opioid-related overdose³
Epidemiology

- Lifetime incidence ~ 85%
- Chronic (>3mo) 15-45% of population
- 90% improve within 3 months, 50% recur
- Second only to common cold as cause of lost work time
- Most common disability in those under 45
- Most expensive health care issue for patients between 20 and 50
- 10% of patients responsible for 80-90% of costs
Epidemiology

• Neuropathic (stenosis, HNP): 37-54%
• Discogenic: 35%-50%
• SI joint pain: 15%-35%
• Facetogenic: 10%-25%
• Myofascial: 20%
Differential Diagnosis

(Determine the pain generator)

- Pain Generators:
  - Bone
  - Soft Tissue
  - Nerve
  - Referred
- Lumbosacral Strain/Sprain
- Radiculopathy (sciatica)
- Spondylosis, Spondylolysis, Spondylolisthesis
- Visceral referred pain
- Cauda Equina Syndrome
- Cancer
- Infection
- Seronegative spondyloarthropathies
- Compression fractures
Normal Vertebral Anatomy
Intervertebral Disc

- Most common site of back pain
- Normally comprises ~ 25% of length of spine
- Consists of a central nucleus pulposus
  - Composed of ~ 88% water
- Annulus fibrosus
  - Consists of concentric lamellae of fibrocartilage fibers arranged obliquely
  - With each layer, they are arranged in opposite directions
Dynamic “corset” concept of lumbar stability

Stability of lumbar spine maintained by corset of abdominal and paraspinal musculature, ligaments, and fascia. Co-contraction of abdominal muscles (particularly oblique) helps maintain spinal position through various movements. Retraining and strengthening musculature help hold spine in neutral (pain-free) position.
History

• Intensity
• Location
• Radiation
• Duration
• Trauma
• Modifiers
• Sleep
• Anxiety
• Red Flags

• Age <20 or >50
• Systemic Illness
  – Fevers
  – Chills
  – Night sweats
  – Weight Loss
• Bowel or Bladder Changes
• Numbness/Weakness
• History of Cancer
• Rest pain
• Drug use
Physical Exam

- Vitals
- Inspection
- Palpation
- Range of motion
- Special Tests
- Motor
- Sensory
- Reflexes

“I’m stumped. We’ll have to wait for the autopsy.”
Inspection

• General appearance
• Cutaneous inspection
  – Infection
  – Trauma
  – Developmental Abnormalities
• Other deformities
Palpation

- Percussion of vertebral bodies
  - Fracture
  - Infection
- Spasms
- Trigger points
Range of Motion

- Flexion
- Extension
- Lateral bending
- Facet loading
Special Tests

- Tests to stretch spinal cord, cauda equina, or sciatic nerve
- Tests to assess the sacroiliac joint
- Spondylolysis - Stork Test
- Limb Length Tests
- Core stability testing
- Flexibility Tests
- Tests to assess for non-organic signs
Tests to Stretch the Spinal Cord or Sciatic Nerve

- Straight Leg Raise
- Lasegue’s Sign
- Cross Leg SLR
- Hoover Test
- Kernig Test
- Valsalva Maneuver
Fig. 40. The Hoover test.

Fig. 41. An absence of downward pressure on the foot opposite the one the patient has been instructed to raise indicates that he is not really trying.
Tests to Stretch the Spinal Cord or Sciatic Nerve

- Straight Leg Raise
- Lasegue’s Sign
- Well Leg SLR
- Hoover Test
- Kernig Test
- Valsalva Maneuver

Fig. 46. The Valsalva maneuver.
Test to Assess the Sacroiliac Joint

- Pelvic Rock Test
- Gaenslen’s Sign
- Patrick or FABER Test
Facet Pain vs. Spondylolysis

- Stork Test
True vs. Functional Leg Length Discrepancy

• Leg length assessment
  – Pelvic obliquity
  – Supine leg lengths
Flexibility Tests

- Thomas test
- Popliteal angle
- Ober test
- Piriformis test
Flexibility Tests

- Thomas test
- Popliteal angle
- Knee Flexion (measure heel from buttocks)
- Ober test
- Piriformis test
Flexibility Tests

- Thomas test
- Popliteal angle
- Ober Test
- Piriformis test
Flexibility Tests

- Thomas test
- Popliteal angle
- Shober test
- Piriformis test
Neuromuscular Screening

- Heel Walk - anterior tibialis (L4, 5)
- Toe Walk - tibial nerve (S1, 2)
- Strength testing
  - Quadriceps extension (L2, 3, 4)
  - Foot inversion - ant. tib (L4)
  - Great Toe / toe extension (L5)
  - Foot eversion - peroneus (S1)
- DTRS
  - Knee jerk reflex (L4)
  - Ankle jerk reflex (S1)
- Sensation:
  - L4: medial side of foot, medial leg
  - L5: dorsum of foot, lateral leg
  - S1: lateral side of foot
Fig. 49. Flexion muscle test for the iliopsoas muscle.
PHYSICAL EXAMINATION OF THE LUMBAR SPINE

L5

NEUROLOGIC LEVEL

MOTOR
Ext. Hal. Lg.

REFLEX
None

SENSATION
L5

Fig. 31. Neurologic level L5.
Fig. 49. Flexion muscle test for the iliopsoas muscle.
Fig. 32. Neurologic level S1.
### Accuracy of History & Exam Tests for Lumbosacral Radiculopathy

#### Herniated Disc (sens, spec)
- Sciatica (95%, 88%)
- Ipsilateral SLR (83%, 40%)
- Crossed SLR (25%, 90%)
- Ankle dorsiflexion weakness (35%, 70%)
- Great toe extensor weakness (50%, 70%)
- Impaired Achille’s reflex (50%, 60%)
- Ankle plantar flexion weakness (6%, 95%)

#### Spinal Stenosis (sens, spec)
- Age > 65 (77%, 69%)
- Severe LE pain (65%, 67%)
- No pain when seated (46%, 93%)
- Symptoms worse with walking (71%, 30%)
- Numbness (63%, 59%)
- Wide-based gait (43%, 97%)
- Pinprick deficit (47%, 81%)
- Weakness (47%, 78%)
- Vibration deficit (53%, 81%)
- Absent Achille’s reflex (46%, 78%)
Motor/Strength Exam
Tests for Core Stability

- Trendelenberg Test
- Pelvic Bridging
Tests for Core Stability

- Trendelenberg Test
- Pelvic Bridging
WADDELL’S SIGNS

• Simulation (Axial Loading, Rotation)
• Tenderness (Superficial)
• Distraction
• Overreaction - Exaggerated painful response to a stimulus
• Regional weakness / sensory changes
Metastatic Disease

- BLT KP
- Myeloma, Lymphoma, Sarcoma
- 96% of spinal metastases, back pain is the initial symptom
Discitis
Spondylosis
Spondylolisthesis
Nerve Root Impingement (Radiculopathy)

• Only represent 1% of all patients with LBP

• Causes:
  – Herniated nucleus pulposus
  – Foraminal stenosis
  – Mass occupying lesion
Facet Joint Pathology

- True synovial joints
- Innervation by 2 medial branches
- Protect against axial rotation, shearing forces, and assist disc in resisting compressive forces in lordotic postures
- Prevalence varies between 5-15% in L-spine, 35-50% in C-spine, and 35-45% in T-spine
- Load borne by l-z-joints varies between 3-25% of axial load
Diagnosis

- No single historical or PE exam sign can reliably identify facet block responders
  - Paraspinal tenderness weakly associated with facet block and RF treatment outcomes
- Imaging has low specificity for identifying a painful z-joint
- Medial branch blocks and IA injections often touted as “equivalent”, but this is unproven.
- MBB may be more predictive of RF treatment outcome, and IA may be more specific for identifying a painful joint
  - Face Validity
  - Comparison of clinical trials evaluating RF denervation
Sacroiliac Joint Pain

Prevalence Rates

• Underestimated by surgeons & PCPs
• Heterogeneous condition
• Represents 15%-30% of cases of axial LBP below L5
• Bi-modal peaks in prevalence rates
• Intra- and extra-articular etiologies
• 40%-50% 2o to trauma
Predisposing Factors

- Rotation and axial loading
- Leg length discrepancy
- Pelvic & scapular obliquity
- Scoliosis
- Previous back surgery
- Lumbar pathology/ Transitional anatomy
- Pregnancy
Retrospective analysis in 50 pts diagnosed with SIJ pain based on diagnostic blocks (Slipman et al. 2000)

- 47 described buttock pain (94%)
- 36 described lower lumbar pain (72%)
- 25 had lower extremity pain (50%)
- 14 had leg pain distal to the knee (28%)
- 7 described groin pain (14%)
- 6 reported foot pain (12%)
### HLA-B27: Disease Associations

<table>
<thead>
<tr>
<th>Disease</th>
<th>Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankylosing Spondylitis</td>
<td>&gt; 90%</td>
</tr>
<tr>
<td>Reiter’s Syndrome</td>
<td>80%</td>
</tr>
<tr>
<td>Reactive Arthritis</td>
<td>85%</td>
</tr>
<tr>
<td>Inflammatory Bowel Disease</td>
<td>50%</td>
</tr>
<tr>
<td>Psoriatic Arthritis</td>
<td></td>
</tr>
<tr>
<td>With Spondylitis</td>
<td>50%</td>
</tr>
<tr>
<td>With Peripheral Arthritis</td>
<td>15%</td>
</tr>
<tr>
<td>Whipple’s Disease</td>
<td>30%</td>
</tr>
</tbody>
</table>
Evidence Based Treatments

- Acute Low Back Pain
- Chronic Low Back Pain

Bliss

“What’s the difference between being addicted to painkillers and just really, really liking them a lot?”
Negative Outcome Predictors for Back Pain

- Previous LBP episode
- Low education
- High physical job stress
- Physically demanding job
- Poor job satisfaction
- Obesity
- Somatization
- Low levels of physical activity
- Older age
- Poor coping skills

- High anxiety levels
- Depression
- “Negative” attitude
- Smoking
- Fear-avoidance
- Catastrophization
- Ongoing litigation
- Higher baseline pain & disability
- Not having opportunity for reduced work load after RTD

Adapted from Cohen et al. BMJ 2009
**Appendix Table 5. Level of Evidence and Summary Grades for NonInvasive Interventions In Patients with Acute Low Back Pain**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Level of Evidence</th>
<th>Net Benefit</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>Fair</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Skeletal muscle relaxants</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Superficial heat</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Advice to remain active</td>
<td>Good</td>
<td>Small (no significant harms)</td>
<td>B</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Fair</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Opioids and tramadol</td>
<td>Fair</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Self-care education books</td>
<td>Fair</td>
<td>Small (no significant harms)</td>
<td>B</td>
</tr>
<tr>
<td>Herbal therapies (devil’s claw and white willow bark, unable to estimate)</td>
<td>Fair (devil’s claw and white willow bark)</td>
<td>Moderate (devil’s claw and white willow bark)</td>
<td>B (devil’s claw and white willow bark)</td>
</tr>
<tr>
<td>Spinal manipulation</td>
<td>Fair</td>
<td>Small to moderate</td>
<td>B/C</td>
</tr>
<tr>
<td>Advice to rest in bed</td>
<td>Good</td>
<td>No benefit</td>
<td>D</td>
</tr>
<tr>
<td>Exercise therapy</td>
<td>Good</td>
<td>No benefit</td>
<td>D</td>
</tr>
<tr>
<td>Systemic corticosteroids</td>
<td>Fair</td>
<td>No benefit</td>
<td>D</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Back schools</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Interferential therapy</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Low-level laser</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Lumbar supports</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Massage</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Modified work</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Shortwave diathermy</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Transcutaneous electrical nerve stimulation</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Superficial cold</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
</tbody>
</table>

*See Appendix Tables 1, 2, and 3 for explanation of grades. Low back pain is considered acute if its duration is <4 weeks.*
<table>
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<th>Grade</th>
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<td>Acetaminophen</td>
<td>Fair</td>
<td>Small (no significant harms)</td>
<td>B</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>Fair (some inconsistency vs. sham acupuncture)</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Psychological therapy</td>
<td>Good for cognitive-behavioral, fair for progressive relaxation</td>
<td>Moderate (cognitive-behavioral) to substantial (progressive relaxation)</td>
<td>B</td>
</tr>
<tr>
<td>Exercise therapy</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Interdisciplinary rehabilitation</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Spinal manipulation</td>
<td>Good</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Opioids and tramadol</td>
<td>Fair (primarily indirect evidence from trials of patients with other pain conditions)</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Brief individualized educational interventions</td>
<td>Fair</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Fair</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Massage</td>
<td>Fair</td>
<td>Moderate</td>
<td>B</td>
</tr>
<tr>
<td>Yoga</td>
<td>Fair (for Viniyoga) to poor (for Hatha yoga)</td>
<td>Moderate (Viniyoga), unable to estimate (Hatha yoga)</td>
<td>B (Viniyoga)</td>
</tr>
<tr>
<td>Tricyclic antidepressants</td>
<td>Good</td>
<td>Small to moderate</td>
<td>B/C</td>
</tr>
<tr>
<td>Antiepileptic drugs</td>
<td>Fair (for gabapentin) to poor (for topiramate)</td>
<td>Small (gabapentin in patients with radiculopathy), unable to estimate (topiramate)</td>
<td>C (gabapentin), I (topiramate)</td>
</tr>
<tr>
<td>Back schools</td>
<td>Fair (some inconsistency)</td>
<td>Small</td>
<td>C</td>
</tr>
<tr>
<td>Firm mattresses</td>
<td>Fair</td>
<td>No benefit or harm</td>
<td>D</td>
</tr>
<tr>
<td>Traction</td>
<td>Fair</td>
<td>No benefit (continuous or intermittent traction), small to moderate (autotraction for sciatica)</td>
<td>D (continuous or intermittent traction), C (autotraction for sciatica)</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Biofeedback†</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Interferential therapy</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Low-level laser</td>
<td>Poor</td>
<td>Unable to estimate</td>
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<td>I</td>
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<tr>
<td>Transcutaneous electrical nerve stimulation</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
<tr>
<td>Ultrasoundography</td>
<td>Poor</td>
<td>Unable to estimate</td>
<td>I</td>
</tr>
</tbody>
</table>

* See Appendix Tables 1, 2, and 3 for explanation of grades. Low back pain is considered subacute at 1–3 months’ duration and chronic at >3 months’ duration.
† The use of auditory or visual signals reflecting muscle tension or activity to learn how to inhibit or reduce the muscle activity.
YOU WON'T FEEL A THING

MITCHELL REPORT
Trigger Points:

- Treatments
  - Spray and stretch
  - Ultrasound
  - Massage
  - Manipulation
  - Trigger point injection

- Injection material
  - 1cc lidocaine
  - +/- Corticosteroid
  - Dry needle (more post injection soreness)

- Disrupts the pain cycle
  - Stops hyper-responsive signals
Fig 3. Example of an S1 transforaminal epidural injection on the anterior-posterior fluoroscopic projection demonstrating contrast outlining the right S1 nerve roots.
Sacroiliac Joint Injections
Intra-articular Facet Injection
Intra-Articular & MBB as Treatments

- IA injections shown to be ineffective in 3 RCTs
  - Anecdotal evidence & results of a small (n=46) RCT comparing it to MBB in those with (+) SPECT scans suggests they may provide intermediate-term relief in a subset of patients with acute inflammation
- MBB blocks: Very weak evidence in the form of clinical trials by one group showing > 1-year benefit, and a very small uncontrolled study showing MBB in SPECT (+) pts (n=28) fared better than in SPECT (-) pts (n=5) @ 1-month
Exercises Should Target Physical Exam Findings
FIG. 53-20. Stabilization exercises. Gymnastic ball exercises. Degree of difficulty increases from A to C.
Aerobic Conditioning/
Activity Specific Exercise
Questions?
Take-Home Points

• Almost all procedural interventions have conflicting evidence behind them, but are likely provide short to intermediate-term benefit to a well-selected population
• More effective for subacute pain in an anatomical distribution
• Factors predicting success for interventional procedures mirror predictive factors for back pain in general
  – Moderate-strong evidence for intermediate-term relief with facet & SI joint radiofrequency denervation
  – Moderate evidence for very short-term benefit with SI joint injections
  – Moderate evidence for short benefit for ESI in a carefully selected population with clear-cut radicular pain
  – Conflicting evidence for TPI’s
  – Moderate evidence for very short-term benefit with SI joint injections
• Procedures as adjunct for physical therapy interventions
RCT’s Involving Muscle Injections for LBP

**Trigger Point Injections**

- Garvey et al. 1989: DB study comparing lidocaine, lidocaine/steroid, acupuncture and vapocoolant spray with acupressure: No difference between groups
  - No difference between injectates c/w other studies
- Di Cesare et al. 2011: DB clinical trial that found acupuncture mesotherapy injections > TPI mesotherapy

**Botulinum Toxin**

- Botox vs. Saline for nonspecific LBP: 1 of 2 positive
- Botox vs. steroid/LA for piriformis syndrome: 1 of 1 positive
- Botox vs. acupuncture for LBP: 1 of 1 positive