Overview of Evidence Based Spinal Treatment

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Why Should We Treat Back Pain Aggressively???
• Miss work for >6 months $\rightarrow$ 50% chance of returning to work

• > 1 year out of work $\rightarrow$ 25%

• >2 years out of work $\rightarrow$ <5%

• “The patient should be an active participant in the healing process”
Back Pain Treatment Algorithm

Early interventions

1. Medicines: NSAIDS
   Acetaminophen
   Muscle Relaxants
   Narcotics (short duration)

2. Short Term Bed Rest (2 days maximum)

3. Physical Therapy

4. Chiropractics

Later alternatives

1. Medicines: Anti-Depressants

2. Orthotic devices

3. Physical Therapy – Back School

4. Therapeutic Injections: Epidural
   Nerve Root
   Medial Branch
How much rest?

- Pivotal study in 1986
- Group I - 2 days of bedrest
- Group II - 7 days of bedrest
- Group I missed 45% fewer days of work (3.1 vs 5.6)

Deyo RA; NEJM 1986
• No increase in morbidity upon reducing the duration of prescribed rest from 7 to 2 days

• No more systematic rest!

• “As much activity as possible!” are the current recommendations
Management Patterns in Acute Low Back Pain

The Role of Physical Therapy

• A national 20% sample of the Centers for Medicare and Medicaid Services physician outpatient billing claims

• (n 439,195)

• Lower risk of subsequent medical service usage among patients who received PT early after an episode of acute low back pain

Gellhorn AC; Spine 2010
Management Patterns in Acute Low Back Pain
The Role of Physical Therapy

- PT within 30 days → decreased likelihood of receiving subsequent surgery or epidural steroid injections
- PT within 30 days → significantly decreased office visits
- Wide variation exists between medical specialties regarding the use of PT, with patients seen by generalist medical specialties receiving PT least often

Gellhorn AC; Spine 2010
Increased symptom duration due to lumbar disc herniation is related to worse outcomes following both operative and nonoperative treatment.
HOW TO PREVENT BACK PAIN???
Most episodes of back pain are not preventable

“Low back pain should be understood as a remittent, intermittent predicament of life”

Its cause is indeterminate, but its course is predictable
• LBP is typically recurrent
• 24% to 87% of individuals who have an episode of LBP will suffer a recurrence within 1 year
• Only exercise was found to be an effective intervention for prevention of back problems

• All other interventions studied were found ineffective:
  – including programs for reducing lifting (no lift policies, ergonomic training, and mechanical lifting aids), ergonomic/back education alone, stress management, lumbar supports and shoe inserts
• Only two high quality studies showed significant reductions in LBP intensity with exercise
• Core strengthening has a strong theoretical basis in treatment and prevention of LBP
• In 1983, the first randomized controlled trial showing the benefit of therapy in herniated nucleus pulposus

• Although the surgical group did better at 1 year postoperatively, the 2 groups showed no significant difference in outcomes at 4 years after intervention

Weber H; Spine 8:131-140, 1983
Direction of Preference

• The direction of preference is the direction in which centralization occurs

• Patients are treated with progressive exercises in the direction of the preference to restore strength and range of motion

Centralization

- Centralization occurred in 87% of patients with low back pain and radiating leg pain.
- Of those who centralized:
  - 98% acute symptoms had good or excellent outcomes.
  - 77% of patients with subacute symptoms and 81% of patients with chronic symptoms had good or excellent outcomes.
- Only 4 patients in the study needed surgery, and all 4 of these patients did not centralize on examination.

• Lack of centralization on exercise predicts the need for surgery
The McKenzie Method Compared With Manipulation When Used Adjunctive to Information and Advice in Low Back Pain Patients Presenting With Centralization or Peripheralization

- McKenzie method is slightly more effective than manipulation
Therapies with good evidence of moderate efficacy for chronic or subacute low back pain are exercise, spinal manipulation, and interdisciplinary rehabilitation.
Chiropractic Treatment

- 5% of US population seek chiropractic caregivers
- Chiropractic treatment and physical therapy have equivalent success

Coulter ID. Spine 2002; 27: 291-8
Yoga for Chronic Low Back Pain
A Randomized Trial

• 12-week yoga program to adults with chronic or recurrent low back pain led to greater improvements in back function than did usual care

• (Usual care was instructional pamphlet)
How Yoga Can Wreck Your Body

By WILLIAM J. BROAD
Published: January 5, 2012
Evidence is insufficient to recommend for or against the routine use of interventions to prevent low back pain in adults in primary care settings.
• There is strong evidence that insoles are not effective for the prevention of back pain
• There is limited evidence that insoles alleviate back pain or adversely shift the pain to the lower extremities
Moderate evidence that lumbar supports are not more effective than no intervention or training in preventing low-back pain.
• There is no evidence that advice on lifting and handling prevents back pain or consequent disability
Modifiable Risk Factors???
Greater fat, but not lean tissue mass, was associated with high levels of low back pain intensity and disability.
The Impact of Body Mass Index on the Prevalence of Low Back Pain

The HUNT Study

- Obesity is associated with a high prevalence of low back pain
Smokers

- Increased LBP and disc herniations in smokers
- 3x increased lumbar disc herniations
- 3.9X increased cervical disc herniations
- Smoking $\rightarrow$ interferes with bone metabolism $\rightarrow$ decreased disc nutrition by exchange $\rightarrow$ disc degeneration

Deyo RA; Spine 1989; 14: 501-6
An HS; J Spinal Disord. 1994; 7:369-73
Medications???
Medications with good evidence of short-term effectiveness for low back pain are

- NSAIDs
- Skeletal muscle relaxants (for acute low back pain)
- Tricyclic antidepressants (for chronic low back pain)
Nonsteroidal Anti-Inflammatory Drugs for Low Back Pain
An Updated Cochrane Review

- Evidence from 65 trials included suggests that NSAIDs are effective for short-term symptomatic relief in patients with acute and chronic low back pain

• Even short-term treatment with most NSAIDs was associated with increased risk of death and recurrent MI in patients with prior MI
• Neither short- nor long-term treatment with NSAIDs is advised in this population, and any NSAID use should be limited from a cardiovascular safety point of view.

- Opioids may be effective for short-term pain relief
- Long-term effectiveness of 6 months or longer is variable
Pharmacologic Management of Chronic Low Back Pain

- For chronic LBP, opioids are more effective than placebo
- Much greater effect on pain than disability
- When compared to NSAIDs, opioids did not confer a significantly greater benefit with regard to effects on pain and disability
• Short-acting narcotics can cause sleep deprivation despite use to help people with pain preventing sleep
• Combining acetaminophen and oxycodone works better than either alone
• Muscle relaxants work only for a limited period of time
Muscle Relaxants

• Muscle relaxants reduce pain when compared with placebo
• They should be used in combination with analgesics for no longer than 1 week

MRI Spinal Imaging

- Lumbar spine MRI on 67 asymptomatic subjects
- Abnormalities in 28%
- Disc herniations were found in 16
- Bulging discs were found in 54% of those less than 60 years old and in 79% of those older than 60

MRI Spinal Imaging

- Subjects w/o back pain on lumbar spine MRI:
  - 36% normal
  - 52% disc bulge
  - 27% protrusion
  - 1% extrusion
  - 14% annular defects
  - 8% facet arthropathy

Jensen MC, NEJM 1994 Jul 14;331(2):69-73
Summary of Recommendations
Clinicians **should not** routinely obtain imaging with nonspecific low back pain.

Clinicians **should** explain that early, routine imaging usually cannot identify a precise cause, do not improve patient outcomes, and incur additional expenses.

Chou R; *Ann Intern Med.* 2007;147:478-491
Summary of Recommendations

• Clinicians **should** perform diagnostic imaging for patients with severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical examination

Chou R; *Ann Intern Med.* 2007;147:478-491
Clinicians should evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis with magnetic resonance imaging (preferred) or computed tomography only if they are potential candidates for surgery or epidural steroid injection.

Chou R; Ann Intern Med. 2007;147:478-491
Summary of Recommendations

• Clinicians **should** inform all patients of the generally **favorable prognosis** of acute low back pain with or without sciatica, including a high likelihood for substantial improvement in the first month.

• General advice on **remaining active**, which is more effective than resting in bed.

Pengel LH, BMJ. 2003;327:323
Hagen KB, Cochrane Database Syst Rev. 2004:CD001254
Hilde G, Cochrane Database Syst Rev. 2002:CD003632
“You called me just in time. Another day or two, and you would have been up and around.”
Epidural Injections
Corticosteroids suppress the immune response by anti-inflammatory and antinociceptive mechanisms as well as mechanical debridement.

- They help to arrest the “painspasm” cycle.
- Corticosteroids stabilize nerve root membranes by suppressing ectopic discharges, diminishing the migration and accumulation of lymphocytes, and blocking phospholipase A2 activity.
- Corticosteroids block C fiber transmission.

Franson RC, Spine 17:S129-S132, 1992(S)
Anesthetic agents act by blocking sodium channels, which then inhibit firing of neurons.

- They block small-diameter C fibers.
- Lidocaine improves blood flow and reduces endoneurial pressure in the dorsal root ganglion.

Onda A, Spine 26:2186-2191, 2001
Epidural Steroid Injections

- The level of evidence for TFESI was considered strong for short-term pain relief and moderate for long-term pain relief.

Epidural Steroid Injections

• The 2010 ASA guidelines recommended that: Epidural steroid injections with or without local anesthetics may be used as part of a multimodal treatment regimen to provide pain relief in selected patients with radicular pain or radiculopathy

• American Academy of Neurology (AAN): In 2007, the Therapeutics and Technology

• The routine use of ESIs for radicular lumbosacral pain was not recommended
• American Association of Neurological Surgeons and the Congress of Neurological Surgeon: A guideline from the American Association of Neurological Surgeons and the Congress of Neurological Surgeons states that there is no evidence in the clinical literature supporting the long-term benefit of epidural injections
Epidural Steroid Injections

- Fluoroscopically guided lumbosacral transforaminal epidural corticosteroid injections are effective in the short term, and possibly at 6 months, in treating acute/subacute lumbosacral radicular pain

Epidural Steroid Injections

• Fluoroscopically guided lumbosacral transforaminal epidural corticosteroid injections are more effective than placebo at preventing future surgeries.
Epidural Steroid Injections

• The proposed underlying mechanism of action of epidurally administered steroid and local anesthetic injections is still not well understood
  – The neural blockade alters or interrupts nociceptive input, reflex mechanisms induced by afferent fibers, self-sustaining activity of the neurons, and central neuronal activities
  – Corticosteroids reduce inflammation via inhibiting pro-inflammatory mediators and causing a reversible local anesthetic effect
• Epidural steroid injection is moderately effective for short-term symptom relief
Epidural Steroid Injections

• Fair evidence supporting TFESIs as superior to placebo for treating radicular symptoms
• There is good evidence that TFESIs should be used as a surgery sparing intervention

Roberts ST; PM&R J 2009
Many articles have been published both in favor and against epidural steroid injections, and the range of success is anywhere from 33% to 77%.

Bush K, Spine 17:1205-1212, 1992
Acupuncture Treatment
Acupuncture for Neck Disorders

- Moderate evidence that acupuncture relieves pain better than some sham treatments
- Moderate evidence that acupuncture is more effective than inactive treatments for relieving pain post-treatment, and this is maintained at short-term follow-up

Trinh K; Spine 2007
# Acupuncture Recommendations

<table>
<thead>
<tr>
<th>Clinical recommendation</th>
<th>Evidence rating</th>
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<tbody>
<tr>
<td>Acupuncture should be considered as a treatment option in the following conditions:</td>
<td></td>
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<tr>
<td>Low back pain</td>
<td>A</td>
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<tr>
<td>Shoulder pain</td>
<td>B</td>
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<tr>
<td>Neck pain</td>
<td>A</td>
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<tr>
<td>Headache (chronic idiopathic)</td>
<td>A</td>
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<tr>
<td>Headache (migraine)</td>
<td>A</td>
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<tr>
<td>Knee osteoarthritis</td>
<td>B</td>
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<tr>
<td>Fibromyalgia</td>
<td>B</td>
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<tr>
<td>Temporomandibular joint pain</td>
<td>B</td>
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<tr>
<td>Postoperative pain</td>
<td>B</td>
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</tbody>
</table>

Kerry RB; AFP 2009
• Mild adverse effects (e.g., tiredness, local pain, headache, temporary exacerbation of symptoms) occurred at least once in approximately 10 percent of patients treated over three months

• More significant adverse effects (e.g., severe nausea, fainting, severe or prolonged exacerbation of symptoms, strong emotional reactions) occurred at a rate of 1.3 per 1,000 treatments

Effectiveness of Acupuncture for Low Back Pain
A Systematic Review

Jing Yuan, PhD,* Nithima Purepong, MSc,* Daniel Paul Kerr, PhD,* Jongbae Park, KMD, PhD,† Ian Bradbury, PhD,† and Suzanne McDonough, PhD*

• Moderate evidence that acupuncture is more effective than no treatment, and strong evidence of no significant difference between acupuncture and sham acupuncture, for short-term pain relief

Yuan J; Spine 2008
Lumbar Stenosis
Treatment
# Comprehensive Review of Therapeutic Interventions in Managing Chronic Spinal Pain

Laxmaiah Manchikanti, MD¹, Mark V. Boswell, MD, PhD², Sukdeb Datta, MD³, Bert Fellows, MA⁴, Salahadin Abdi, MD, PhD⁵, Vijay Singh, MD⁶, Ramsin M. Benyamin, MD⁷, Frank J.E. Falco, MD⁸, Standiford Helm, MD⁹, Salim Hayek, MD, PhD¹⁰, and Howard S. Smith, MD, PhD¹¹

## Results of effectiveness in evaluation in managing spinal stenosis.

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Characteristics</th>
<th>Methodological Quality Scoring</th>
<th>Participants</th>
<th>Pain Relief</th>
<th>Pain Relief</th>
<th>Results</th>
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<td>3 mos.</td>
<td>6 mos.</td>
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<tr>
<td>Manchikanti et al 2008 (254)*</td>
<td>RA, DB</td>
<td>70</td>
<td>40</td>
<td>50% to 65%</td>
<td>60% to 65%</td>
<td>55% to 65%</td>
</tr>
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<td>Ciocon et al 1994 (255)</td>
<td>O</td>
<td>57</td>
<td>30</td>
<td>SI</td>
<td>SI</td>
<td>NA</td>
</tr>
<tr>
<td>Botwin et al 2007 (258)*</td>
<td>O</td>
<td>61</td>
<td>34</td>
<td>65%</td>
<td>62%</td>
<td>54%</td>
</tr>
</tbody>
</table>

RA = randomized; DB = double blind; O = observational; NA = not available; SI = significant improvement; vs = versus; P = positive; N = negative

*Indicates use of fluoroscopy
Lumbar Spinal Stenosis

- **PROGNOSIS** — The natural history of lumbar spinal stenosis (LSS) due to degenerative spondylosis is relatively benign.

  - 32 Patients with LSS

    - 49 months (nonsurgically)
    - 70% unchanged
    - 15% improved
    - 15% worsened

- However, LSS causes discomfort, often limiting activities of daily living, and can lead to progressive disability.

  Clin Orthop Relat Res. 1992 Jun; (279):82-6
Effectiveness of Physical Therapy and Epidural Steroid Injections in Lumbar Spinal Stenosis

Zarife Koc, MD, Suheda Ozcakir, MD, Koncuy Sivrioglu, MD, Alp Gurbet, MD, and Selcuk Kucukoglu, MD

• Randomized single blind control trial
• All patients received Diclofenac 75 mg BID
• All patients received home based exercise program of stretching exercises for the hip flexors, hamstrings and lumbar paraspinal muscles, and strengthening exercises for abdominal and gluteal muscles to be performed twice daily for a period of 6 months
Effectiveness of Physical Therapy and Epidural Steroid Injections in Lumbar Spinal Stenosis

Zarife Koc, MD, Suheida Ozcakir, MD, Koncuy Sivrioglu, MD, Alp Gurbet, MD, and Selcuk Kucukoglu, MD
Effectiveness of Physical Therapy and Epidural Steroid Injections in Lumbar Spinal Stenosis

Zarife Koc, MD, Suheda Ozcakir, MD, Koncuy Sivrioglu, MD, Alp Gurbet, MD, and Selcuk Kucukoglu, MD

**Physical Therapy**
- Inpatient 5 days/wk for 2 weeks
- U/s, hot packs, TENS

**ESI**
- Intralaminar injection through most stenotic level
- Kenalog, bupivacaine, saline

**Control**
- Baseline Diclofenac for 2 wks
- Baseline home exercises for 6 months
Effectiveness of Physical Therapy and Epidural Steroid Injections in Lumbar Spinal Stenosis

Zarife Koc, MD, Suheda Ozcakir, MD, Koncuy Sivrioglu, MD, Alp Gurbet, MD, and Selcuk Kucukoglu, MD

- **Pain Severity by Visual Analog Scale (VAS)**
  - 0-100 scale
- **Finger Floor Distance (FFD) (cm)**
  - The distance between finger tip and floor was measured
- **Treadmill Walk Test**
  - walk on a flat treadmill platform with a constant speed of 2 mph (3.2 km/h). Time to first symptoms (TFS) and total ambulation time (TAT), were recorded
- **Sit-to-Stand Test (Seconds)**
  - Time to stand up from a chair without using his/her arms
- **Weight-Carrying (WC) Test (Seconds)**
  - The patient was asked to walk 20 m as fast as possible carrying 10% of body weight
- **Roland Morris Disability Index (RMDI)**
- **Nottingham Health Profile**
Effectiveness of Physical Therapy and Epidural Steroid Injections in Lumbar Spinal Stenosis

Zarife Koc, MD, Suheda Ozckir, MD, Koncuy Sivrioglu, MD, Alp Gurbet, MD, and Selcuk Kucukoglu, MD

• Both epidural steroid and physical therapy groups demonstrated significant improvement in pain and functional parameters
• No significant difference was noted between the 2 treatment groups
• Pain and functional assessment scores (RMDI, NHP physical activity subscore) were significantly more improved in group 2 compared with controls at the second week
Effectiveness of Physical Therapy and Epidural Steroid Injections in Lumbar Spinal Stenosis

Zarife Koc, MD, Suheda Ozcahir, MD, Koncuy Sivrioglu, MD, Alp Gurbet, MD, and Selcuk Kucukoglu, MD

• Epidural steroid injections and physical therapy both seem to be effective in LSS patients up to 6 months of follow-up.
Epidural steroid injections are a reasonable treatment option in LSS patients.

In fact, 23% of all epidural steroid injections are performed for the treatment of LSS.
Degenerative lumbar spinal stenosis: an evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spinal stenosis

- Transforaminal epidural steroid injection or caudal injections can produce long-term relief of pain in lumbar spinal stenosis
- Approximately 20% to 40% of patients with mild to moderate lumbar spinal stenosis initially will ultimately require surgical intervention
- 50% to 70% will have improvement in their pain
Degenerative lumbar spinal stenosis: an evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spinal stenosis

- In patients with mild to moderate symptoms of lumbar spinal stenosis, medical/interventional treatment is effective up to 70% of the time.
- In patients with severe symptoms of lumbar spinal stenosis, decompressive surgery alone is effective about 80% of the time.
Facet Joint Treatment
Systematic Review Of Diagnostic Utility Of Facet (Zygapophysial) Joint Injections In Chronic Spinal Pain: An Update

- Diagnostic facet joint blocks are safe, valid and reliable
- There is strong evidence that controlled diagnostic blocks distinguish painful from painless facet joints in the diagnostic work up of chronic spinal pain
Facet joint pain radiofrequency (RF) ablation

• Validated
  – 2 randomized controlled trials
  – 1 uncontrolled trial

Lord S NEJM 1996, Dreyfuss P; Spine 2000
Systematic Assessment of Diagnostic Accuracy and Therapeutic Utility of Lumbar Facet Joint Interventions

- Evidence for diagnosis of lumbar facet joint pain with controlled local anesthetic blocks is Level I or II-1.
- Evidence for therapeutic lumbar facet joint interventions is Level II-1 or II-2 for lumbar facet joint nerve blocks, Level II-2 or II-3 evidence for radiofrequency neurotomy.
Percutaneous Lumbar Zygapophysial (Facet) Joint Neurotomy Using Radiofrequency Current, in the Management of Chronic Low Back Pain

A Randomized Double-Blind Trial

- Radiofrequency facet denervation is not a placebo and could be used in the treatment of carefully selected patients with chronic low back pain
Cervical Pain/Radiculopathy
Treatment of Neck Pain: Noninvasive Interventions
Results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders

- Manual Therapy and exercise more effective with neck pain
- Acupuncture also with some proven benefit

Hurwitz, EL
For participants with acute and subacute neck pain, spinal manipulation therapy was more effective than medication in both the short and long term.

However, a few instructional sessions of home exercise with advice resulted in similar outcomes.

Bronfort G; Ann Int Med 2012
Most patients with cervical radiculopathy will be self-limited and will resolve spontaneously over a variable length of time without specific treatment.
• Anti-Depressants (TCAs, Effexor) and Tramadol alleviate chronic neck pain
Epidural steroid injections for cervical radicular pain leads to short-term symptomatic improvement in radicular symptoms

Cervical Radicular Pain

• Complications for Cervical ESI for cervical radicular pain 1.66% with <1% of that being major (spinal cord injury, etc)

• Either ACDF or posterior foraminotomy are suggested for the treatment of single-level degenerative cervical radiculopathy secondary to foraminal soft disc herniation

Korinth MC, Spine 2006;31:1207–14
Treatment of Neck Pain

Injections and Surgical Interventions: Results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders

- Surgical treatment and limited injection procedures for cervical radicular symptoms may be reasonably considered in patients with severe impairments.
- Surgical treatment for neck pain alone, without radicular symptoms, seems to lack scientific support.

Carragee EJ; Spine 2008
Sacroiliac Joint Pathology
Evaluation of Sacroiliac Joint Interventions: A Systematic Appraisal of the Literature

• Evidence for the validity of diagnostic sacroiliac joint injections is moderate
• Evidence for the accuracy of provocative maneuvers in the diagnosing of sacroiliac joint pain is limited
Questions???