BACK PAIN TREATMENT AND PREVENTION

Kenneth Nguyen, DO
Providence Physiatry
OBJECTIVES

1. Learn about the non-surgical treatment options for low back pain
   - Medication management
   - Overview of interventional pain injections and treatments
   - Overview of other options ie physical therapy, acupuncture, etc....

2. Evidence based low back pain prevention
CLINICAL PEARLS

• Manage expectations- 50% reduction is goal for chronic pain
  • Opioid goal is 40% reduction in pain
• Safety first- dose low and gradual titration
  • Try not to stop medication prematurely
• Combination therapy is beneficial but maximize one medication at a time
• Multidisciplinary approach: PT, medications, interventions, psychology
MEDICATION MANAGEMENT

• Muscle relaxants: Controversial but often used clinically
  • Benzodiazepines: some studies show effectiveness for short term (5-14 days)
    • No evidence that is more effective than cyclobenzaprin
    • Multiple side effects and dangerous with opioids
  • Cyclobenzaprin: similar to TCA, good for sleep
  • Carisoprodol: high abuse potential, especially with opioids
  • Baclofen- GABA derivative;
  • Tizandine- central acting alpha 2 agonist
• Antibiotics: Augmentin study for 100 days for Modic 1 changes
MEDICATION MANAGEMENT (CONT)

• Antidepressants
  • TCA: Many studies support the use of TCA’s for chronic neuropathic pain conditions
  • SNRI: Effexor (225 mg) and duloxetine

• Opioids: Commonly used for short term use, but use for chronic low back pain is controversial
  • Many side effects, high abuse potential
  • Should be considered last resort of LBP (tramadol is my 1st line)

• Anticonvulsants: Lamictal, Topamax (not common)

• Systemic steroids: Multiple studies have shown them to be not effective
  • (anecdotal) I use commonly for those with radicular pain
NSAIDS

- NSAIDS: Longest trial was 6 weeks, but short term evidence for effectiveness is good
  - Acetic acid: diclofenac, etodolac, indomethacin, Toradol, nabumetone
  - Coxibs: Celecoxib
  - Oxicams: meloxicam, piroxicam
  - Propionic acid: ibuprofen, ketoprofen, naproxen
  - Salicylates: aspirin

- Risk vs benefit dosing
- 2 weeks on, 2 weeks off (anecdotal); 10 days off per month
CALCIUM CHANNEL ALPHA 2 DELTA SUBUNIT

• Found in the dorsal horn and blockade of this channel can reverse tactile allodynia
• Gabapentin dose of 1200 mg reduced pain by 50% in 35% of study participants vs 21% in placebo
• Lyrica at 300 mg is more likely to have meaningful pain relief
NMDA ANTAGONISM

• Role in pain-related hyperexcitability
  • Also plays role in memory and cognition
• Ketamine, dextromethorphan, Magnesium
• **Memantine (Namenda)**
  • Non-competitive NMDA Receptor Antagonist
  • 100% bioavailability, peak plasma 3-8 hrs
  • Side effects: dizzy 6.3%, HA 5.2%, constipation 4.6%, htn 4.1%, somnolence 3.4%
MEMANTINE

• Inhibits prolonged influx of Calcium that causes neuronal excitotoxicity
  • Serotonergic receptor (5HT3) antagonist
  • Low affinity agonist of the nicotinic acetylcholine
• Reduces the neurotoxic effect of glutamate
• Conflicting data but some positive results in fibromyalgia, CRPS, and post-mastectomy
• Consider as 2nd line agent given the safety profile
COMPLIMENTARY TREATMENTS

• Complimentary treatments are still very important
  • Physical therapy (persistent pain program); pain psychologists, acupuncture, naturopathic medicine
    • Cognitive behavioral therapy* and mindfulness
    • Mirror therapy, guided visual imagery, etc

For chronic pain, educate the concept of “hurt vs harm”
Focus on function not numeric pain scale
NON-SURGICAL MANAGEMENT OF LBP

- **Aquatic therapy:** If patient can not tolerate land based, this is option
  - 90% reduction in gravitational stress if patient is immersed to the neck
  - Great for distinguishing mechanical versus chronic neuropathic pain (fibro)
  - Helps retrain the sensory system (gate-theory) via water temp, hydrostatic pressure, and turbulence
  - Good for patients with a lot of fear avoidance
  - Ok for pregnancy, but must be cool water pool
NON-SURGICAL MANAGEMENT OPTIONS

• Reassurance, education, and resuming ordinary activity as soon as possible

• Chronic LBP: 30 min of aerobic exercise 5/week

• Physical therapy program typically start with training of the deep stabilizers such as a the multifidi and transversus abdominis, then more complex dynamic and functional tasks.
  • Once patients have been signed off by the PT, they should do their home exercise program at least 3/week.
MODALITIES/OTHER

• Manual Manipulation: More effective than placebo and effective for acute low back pain
  • Use with caution for patients who have cervical/lumbar fusion

• Traction: Mixed results from clinical trials
  • (Anecdotal) Give patients a trial of traction during PT

• Lumbar support braces: Conflicting evidence, poor compliance
  • Most important post-surgically, and when used for short term/task specific activities
    • For patients who have very mechanical symptoms, i.e. pain with extension, I find some patients respond well

• TENS unit: Meta-analysis shows a trend for pain reduction, but not statistically significant
INTERVENTIONAL PAIN MANAGEMENT

• Lumbar medial branch injections
  • Followed by radiofrequency ablation/neurotomy (RFA)

• Lumbar epidural steroid injections
  • Interlaminar vs transforaminal epidural

• Spinal cord stimulation

• Vertebroplasty/Kyphoplasty
FACET MEDIATED PAIN

Step 1: Lumbar medial branch injection (MMB)
- Pain diary to record the efficacy
- Repeat injection to confirm diagnosis (minimize chance of false positive)

Step 2: RFA to denervate the lumbar facet joint

EBM (Spine Journal 2017):
- Meta-analysis of 7 randomized controlled trials with 454 patients for 1 year follow up.
- 95% in RFA group had improvements in back pain
RADIOFREQUENCY ABLATION (RF)

• Lesions peripheral nerves
  • Conventional: >45 degrees celcius
  • Pulsed: less than 42 degrees
• Uses high frequency alternating current to heat tissue
• RF typically provides pain relief for over 6 months
LESION SIZE AND PROBE

- Conventional RF needle:
- Water-cooled RF needle:
WHY CONSIDER RF?

• Minimally invasive
• Recovery time is minimal
  • 2-5 days
• Excellent choice for patients who have axial LBP
  • Are not good surgical candidates
  • Don’t want surgery
  • Pain despite surgery
LUMBAR EPIDURAL INJECTIONS

• Therapeutic and/or diagnostic
  • Transforaminal (TF-ESI) can help the surgeon isolate the pain generator
  • Used in conjunction with physical therapy to improve patient function

• Effective for short term management

• TF-ESI delivers more steroid to the dorsal root ganglion

• Clinical judgement for chronic low back pain
SPINAL CORD STIMULATION (SCS)

- Chronic neuropathic pain
  - Failed back syndrome
  - Complex regional pain syndrome
  - Phantom limb pain
  - Diabetic peripheral neuropathy
- 5-7 day trial followed by implantation if successful
- Paresthesia or Paresthesia free stimulation patterns
- May reduce the affective component of pain
2014 SCS STUDY

- 60 patient, multi-center/international, open randomized parallel-control group design
- 2:1 design: best medical care +/- SCS
- Trial stimulation effective in 93%
(a) VAS scores for Pain

(b) MPQ Quality of Life scores
LONG TERM EFFICACY OF SCS

• Multiple studies have shown the SCS to be an effective treatment for painful diabetic neuropathy (DPN)
• Recent study in Diabetes Care released a long term prospective trial of 48 patients over 5 years
• NRS at baseline 6.7. Reduced to 3.8 at 1 yr f/u and still at 4.3 at 5 year f/u
• 80% of patients still used SCS after 5 years
• Constant improvements on technology
  • New waveforms
  • Dorsal root stimulation
  • Wireless systems
• Consistent evidence from prospective studies
  • After 24 months, 88% patients reported improvement in pain scores
  • Decrease opioid use and better functional goals
VERTEBROPLASTY / KYPHOPLASTY

- Vertebroplasty
- Kyphoplasty
VERTEBROPLASTY/KYPHOPLASTY DEBATE

• There is no consensus due to multiple conflicting studies
  • NEJM in Aug 2009 showed no pain relief, but there was no distinction between acute vs chronic VCF
  • Lancet in 2010 had their own randomized trial showing great pain relief at one month and one year later

• Practical management
  • Interventional procedures considered if patient is incapacitated (inpatient) or fails 2-4 weeks of conservative management
  • Vert/Kyphoplasty only done for acute/subacute fractures with some evidence of edema on MRI
HOW TO PREVENT LBP

• If I knew, I would be out of a job....

• I asked my colleague and he said that we have to become spineless like politicians, lawyers, ____________ (fill in blank)
LBP PREVENTION IS SEVERELY UNDERFUNDED

• Most studies look at treatments, not prevention, for acute/chronic low back pain

• Also, most studies are retrospective or survey based
  • Few high quality, prospective studies
LUMBAR DEGENERATIVE DISC DISEASE (DDD)

• Not a direct cause of LBP but starts the degenerative cascade which can lead to spinal stenosis, facet arthropathy, and spondylolisthesis

• Large retrospective study found a high correlation between smoking, obesity, and diabetes were found in association with lumbar DDD.
SLEEP HYGIENE AND LBP

• Does buying an expensive mattress matter?
  • Medium-firm (subjective) and adjustable were found to promote more restful sleep
  • Mattress is which the spinal position while laying down is similar to standing improved sleep quality
WEIGHT/OBESITY AND LBP

- Very controversial subject. But overall, there is no direct causal relationship
  - We see this clinically. Patient loses 40 pounds but no change in pain.
- Multiple twin studies have shown that obesity alone does not cause low back pain
- Studies that have shown a relation between obesity and LBP are mostly cross-sectional and non-twin studies. (OR <2)
WEIGHT AND LBP

• The high correlation between obesity and LBP could partially be explained that patients who suffer from LBP start gaining weight and become more obese

• Clinically, I do recommend weight loss for general wellness and to reduce muscle fatigue
LBP EDUCATION AT WORK

Education at work is a simple and cost-effective means to reduce the incidence of LBP

• Proper lifting - lifting objects close to our body
• Using our body weight to lift
• Proper sitting position in chair for desk jobs
• Sitting vs standing
SITTING VS STANDING

[Image of a diagram illustrating the comparison between sitting and standing in terms of intradiscal pressure.]

- **Figure 2**
- **Intradiscal Pressure (kg):**
  - 275
  - 250
  - 225
  - 200
  - 175
  - 150
  - 125
  - 100
  - 75
  - 50
  - 25
  - 0

- **Weights:**
  - 275 kg
  - 220 kg
  - 185 kg
  - 150 kg
  - 100 kg
  - 75 kg
  - 50 kg
  - 25 kg
  - 0 kg

- **Positions:**
  - Sitting
  - Standing with different weight levels.
BALANCE BETWEEN SITTING VS STANDING

- There is no magic ratio. Conventional wisdom states 3:1 (45 min of sitting to 15 min of sitting).
- Not validated in any high quality studies. Prolonged standing causes its own set of problems.
- For people who do stand a lot, there is a correlation between hip abductor weakness (gluteal medius, TFl) and low back pain.
- Chairs that constantly force us to activate different lumbar muscles may be the future.
- Prolonged sitting is assoc with low productivity and obesity.
ERGONOMIC WORKPLACE
EXERCISE AND EDUCATION

• Meta-analysis of LBP prevention concluded that exercise combined with education was the only validated intervention to prevent low back pain

• While the effect was small, it was statistically significant compared to all others including back brace, shoe inserts, ergonomic intervention, and ergonomic school furniture
EXERCISE AND LBP PREVENTION

• Stretching before work is effective to prevent injuries, even for sedentary jobs
• Creates more blood supply to the muscles, creates body awareness and realization of what muscles may be sore or at risk of developing muscle fatigue, improves flexibility
• Strengthen muscles slowly to prevent ‘muscle fatigue’ which leads to sprain/strain injuries
EXERCISE OF OSTEOPOROSIS PREVENTION

• Medical studies have also shown that exercise from walking to strength training can prevent osteoporosis and prevent vertebral compression fractures

• Tai Chi is been also shown to have similar positive benefits to improve balance and prevent secondary injuries
DYNAMIC LUMBAR STABILIZATION

• https://youtu.be/g7sya5SfT_c
SEATED CORE EXERCISES

https://youtu.be/NTxmh2X3PZA
PLANK
ANECTODAL/LIMITED EBM

• Lumbar support braces: Cochrane reviews have shown no evidence to support its routine use

• Shoe inserts/orthotics

• Routine ergonomic equipment
• In general, there is a low back pain prevention that is vastly underfunded.
• Paucity of EBM makes it difficult for providers to properly inform our patients.
• Chronic pain treatment will likely move towards interventional and non-interventional neuromodulation:
  • Functional MRI
  • Virtual Reality
    • Need to confuse the brain and change perception

• https://youtu.be/FOTGlD5HC1A
SUMMARY

• Keep the patient moving!
• Hurt vs Harm concept for chronic pain
• Maximize conservative measures
• Consider spinal injections
  • Diagnostic value
  • Excellent non-surgical option for nociceptive low back pain
  • ‘Jump start’ the patient! Use pain relief to get the patient moving
• Non-surgical candidates or neuropathic pain, consider SCS
• Chronic pain needs to be treated holistically and with special attention to improving function
THANK YOU!

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  - Dr. Steven Andersen
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Questions?