“So You Have a Low Back Diagnosis: Now What?”
Examining the Evidence to Craft an Appropriate Treatment Strategy...

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Our Goals for Today…

• Incidence of LBP in Athletics
• Theories on why LBP occurs
• Examine current therapeutic philosophies
• What the Research is telling us?
• Can we “tweak” exercises to make them more effective?
• Sample Low Back Protocols with Progressions
Changes to the original plan…

• This workshop was originally scheduled to be 1hr lecture & 1hr lab.
• To fit the material into one hour, and also go over some sample exercise progressions, we needed to modify a few topics:
  – Clinical Prediction Rules
  – Review of Common Diagnoses
  – Movement Screens
DISCLOSURE:

• I have NO CONFLICTS to disclose regarding this presentation.
• I have NO AFFILIATIONS or agreements with any of the systems or products discussed in this presentation.
• The opinions discussed herein are not endorsed by the Teaneck Board of Education, or in any way associated with the Teaneck School District.
Incidence of LBP in Athletics:

- School-aged BSK players had a point prevalence of LBP of 12.8% (Yabe, et al. 2020)

- Among all athletes, the 1 year prevalence of LBP ranged from 17 to 94%, and lifetime prevalence ranged from 33 to 84% (Farahbakhsh, et al. 2018)

- Among female athletes at the University level, 12 month prevalence was 39%, leading to a high absence rate from practices (27.9%) and matches (13%) (Noormahammadpour, 2016)
Sport Specific LBP Incidence:

- **Football:**
  - Up to 30.9% of injuries (Mall, et al. 2012)
  - 28% of injuries disc related (HNP)- L4/5 most common (Gray, et al, 2013)

**Basketball:**
- NBA Study (17 seasons)- LB 10.2% of all injuries (Drakos, et al, 2010)
- Lumbar injuries 2nd only to ankle in frequency (Drakos, et al, 2010)
Sport Specific LBP Incidence:

- **Ice Hockey:**
  - 95% of NHL players reported LBP in final year of play (Jonasson, et al, 2011)
  - Study: elite youth program over 9 years- 44% of those w/LBP ended up with spondylolysis dx (Donaldson, 2014)

- **Soccer:**
  - 76.6% of players had LBP in career (Hangai, et al, 2009)

... Gymnastics, Rowing, Baseball...
Why is LBP such an enigma?


• “LBP is a multi-dimensional disorder”

• “…relative contribution of different factors is variable, fluctuating, and unique to each individual…”
Influential Publications...
Is LBP due to BIOMECHANICAL factors?

• Forces attained in collegiate FB players hitting blocking sled often exceed those determined to cause pathology to IVD and pars. (Gatt, et al., 1997)

• Hyperconcavity of Lumbar Endplates common (33% vs. 8% in controls) in linemen assessed at NFL Combine (Moorman, et al, 2004)

• The shape of your disc (ovoid vs limecon) may determine what sports you will best tolerate (McGill, 2016)

• Each Sit-up produces LB compression levels that approximate or exceed NIOSH action limits (Axler & McGill, 1997)
Is LBP due to Neuromuscular Issues?

• Much of this is based upon the earlier works of clinicians like Janda, Lewit, and Lee.
• Hodges, Richardson, & Jull brought this concept to the forefront with their research and landmark text:
McNeill W. Core stability is a subset of motor control. *JBMT*. 2010;14:80-81

- Works of Hodges & Richardson (1996-2004) identified a timing delay in firing of TrA during rapid shoulder/arm movements in those with LBP.
- Hides (1996-2001) identified changes in multifidus in those with hx of LBP.
- LBP has been found to either inhibit activation (Hides, 1996) or increase activation (Van Dieen, 2003).
But, can we really change firing patterns (MC)?


- This study explored whether Abdominal region muscle activation onset changed after 3 different exercise approaches.

- N= 109 w/ cLBP > 3mos.

- 3 groups: low-load CS; high-load StabEx; GenEx. X 8 weeks.

- US eval of deep abd muscles in response to rapid shoulder mvmt.

- **Findings**: All 3 approaches had little or any effect on timing delay.

• Updated systematic review of published trials evaluating the effectiveness of MCE.
• 29 trials met inclusion criteria (n=2431).
• Sought to determine if MCE can improve pain, disability & QOL, not necessary firing rates.

• **Findings:**
  • 1. low-mod evidence MCE has clinically meaningful effect on pain
  • 2. VL-low evidence MCE any better than GE and EPA.
  • 3. low-mod evidence MCE has similar outcomes to any other exercise.
Choosing Your Patient Wisely…


- **Motor Control** (def): the way in which the nervous system controls posture and movement to perform a given motor task, and includes consideration of all motor, sensory, and integrative processes.

- Evidence suggests specific patient characteristics may predict those who will respond well to MCE.

- However, consensus on how to best sub-group is lacking. TBC (Delitto) vs MDC (O’Sullivan) vs MSI (Sahrmann)?

- More research still needed…

**Teaneck HS Athletic Training**
How prevalent is MC issues in athletes with LBP?


- Investigated changes in MC which may be present in athletes with LBP.
- 28 studies met elig criteria.
- A range of sports were evaluated, including dance.

- **Summary of Findings:**
  - Athletes exhibit a range of MCI in the trunk, lumbopelvic region, & extremities.
  - Inconsistencies across studies... no clear evidence of a pattern.
Same… and yet, different


• Clinical commentary paper. C/C 4 systems approaches: MSI (Sahrmann); MDT (McKenzie); MCT (Hodges) and ISM (Gray).

• **Findings:**
  – All approaches use detailed assessments & consider the role of tissue loading and postures.
  – Evidence to guide tx differs, and not effective in all instances...
Summary of Motor Control Approach:

• Suggests that cLBP may be due to issues of motor control or timing delay…
• Much of the work based in the early literature out of Queensland.
• Likely to be helpful in some patients, but not all.
• No strong evidence to support that a brief timing delay can predispose to recurrent injury.
Is There a Role for Stabilization Exercise/Core Stability Training?
Evidence for Stabilization Exercise?

• Concepts heavily based upon the works of researchers like Bergmark (1989) identifying local & global systems.

• Furthered by the writings of Lee, Vleeming, Hodges, etc.

• Still a vigorous debate on what constitutes “core stability” or even “stabilization” exercise....

• No real evidence to support any one exercise approach over another (Koes, 2010; van Middelkoop, 2010)
Making the case for stabilization exercise…

- There are a variety of studies that support LSE as an effective approach in the SHORT TERM to address pain and disability (Haladay, 2013; Standaert, 2008; Hauggaard, 2007; Alzubeidi, 2020; Nowotny, 2018).
- Several studies support LSE as a more effective alternative to other approaches, like Pilates (Bhadauria, 2017) or “routine” PT exercises (Akhtar, 2017).
- But LSE may not be any more effective than other forms of exercise, such as walking (Suh, 2019) or MDT (Karlsson, 2020).

- N = 55 females (age 51-58) EXP group vs 51 in CG.
- Excluded: Red flags, prior hx surgery, prior hx LSE.
- PT supervised exercise program- 24 total sessions.
- Assessed at baseline, 1 & 2 months post.
- Measures: Oswestry & VAS

**Findings:**
- Isokinetic peak torque at 60d/s demonstrated ↑ EXT 41.25% and Flexion ↑ 21.53%.
- Multifidus CSA ↑ avg 37%.
- VAS ↓ avg 44% and ODI ↓ avg 48%.

- Meta-analysis sought to review the effects of CSE vs GE for those with cLBP.
- Included 5 trials with 414 participants.
- Findings:
  - CSE > GE for reducing pain (CI=95%. p=0.003)
  - CSE > GE for reducing disability at short term (CI=95%. p=0.002)
  - However, no difference at 6 & 12 months followup (CI=95% p=0.25)

89 studies included (n= 5578).
- 131 exercise interventions (n= 3924)
- 59 non-exercise interventions (n= 1654)

Findings:

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Teaneck HS Athletic Training
Summary on Stabilization Exercise…

• Likely to be a more effective approach in the short term…
• Most of the research has concentrated on cLBP.
• Little evidence to show it is superior to any other exercise approach in the long term (> 6mos).
• No consensus on what truly constitutes “stabilization exercise” or “core stability” and if this approach is any better than another…
• It’s efficacy is likely to be patient-specific and condition specific…
Are There Exercise Variations to Consider?

- Examined the effect of 3 modified side-bridge exercises on spinal muscle activity.
- N= 20 “healthy” males.
- Participated in: 1. traditional side-bridge. 2. both legs lifted in side-lying, 3. torso lift on 45deg bench, and 4. wall side-bridge.
- Surface EMG of EO, IO, QL.
- **Findings:** TSB, BLLS, and TLBS showed similar activity in all tested muscles vs WSB.

- N=13 males, no hx of LBP.
- Performed 14 types of bridge exercises. Fine wire EMG of QL-a and QL-p regions.
- **Findings:** Both regions of QL had highest activity (%MVC) with SB with Hip Abd.

• Used MRI (diffusion-weighted) to assess recruitment of PM and QL during exercise.
• N=9 (males).
• Performed 3 variations of “bird dog” + Seated knee raise and RSB.
• dMRI performed pre and post exercise.
• **Findings:** elbow-toe bird dog and SB created greatest change in muscles studied (ADC).

• Examined the effects of additional isometric hip ADD on abdominal muscle activity.
• N= 20 males.
• Surface EMG= RA, IO and EO.
• 3 exercise variations: Plank, Plank+ uni ADD, Plank+ b/l ADD.
• Findings: Bilateral IO, EO, RA activity significantly increased (p=0.05) in unilateral resisted ADD w/Plank.
Sought to compare the effects of 4 different ankle conditions on activity of: RA, EO, TrA/IO, and ERS.

N= 22 with hx cLBP.

Surface EMG of above + TibA and Gastroc.

4 positions: Plank; Plank+DFiso; Plank+Pfiso; No ankle contraction.

**Findings:** EMG activity of RA, EO and TrA/IO significantly greater in Plank +DF isometric contraction.
Summary of Exercise Variations…

• There is a variety of variations in exercise position and technique that can influence parameters, such as activity of specific muscles and %MVC.

• These variations can add variety and possibly influence specific muscle groups to enhance effects.

• HOWEVER, we cannot at this time determine whether these increases in activity of specific muscles, or whether increases in %MVC positively influence the effectiveness of these interventions with regards to lumbar stability, and to what degree…
Designing a Treatment Plan to Address LBP in Your Athlete
Pre-intervention considerations...

• Is this an Acute episode, Chronic sub-acute LBP, or an exacerbation?
• What is the age range of the patient in question?
• Are there any Red flags? Yellow flags?
• Co-morbidities?
• Did you institute any outcomes assessment?
• History, history, history....
Therapeutic Approaches to LBP

Acute LBP
- Pain modulation.
- ↓ disability.
- Non-aggressive exercise...
- Pain education.

- Examples: Modalities; low load exercises (pelvic tilts, abd hollowing); MDT; Manipulative therapies; Meds...

Sub-acute LBP
- Reassurance.
- ↑ activity as tolerable.
- Modalities prn.
- Mod Intensity Exercise.

- Examples: Treadmill walking, start Stabilization exercise (McGill-3). Bird Dog Variations. Progress to higher level activity as tolerated.
Therapeutic Approaches to LBP...

Chronic LBP
- Pain Neuroscience approach...
- Identify provocations.
- Develop resilience.
- Nutrition?

- Examples: Progressive stabilization program; Endurance capacity training; education (eg. Back Mechanic); Manual Therapies.

Chronic LBP- exacerbation
- Control acute flare up.
- Passive modalities- initial.
- Manual Therapies.
- Back to basics.

- Examples: Ice/heat; Stim; SMT; ROM exercises; regress to basic stab exercises-briefly.
Sample Exercise Progression: Level 1

• **Dead Bug Progression:**
  - Alternate Arms (x5-10/3)
  - Alternate Legs (x5-10/3)
  - Alternate Arms/Legs (x5-10/3)
  - Tubing Arms with Leg Cycles (10-20/3)
  - Anti-ROT tubing with Leg Cycling (x10-20/3)

• **Wall Push w/Leg Cycling (x5-10/3)**
• **KB Pullover w/alt Legs (x5-10/3)**
Sample Exercise Progression- Level 2

- **McGill “Big 3”:**
- **Curl Ups** (1-2-1 tempo) x10
- **Side Bridge** Levels 1-4
  - Elbow/knee pivot
  - Elbow/Foot pivot
  - SB w/ hip ABD
  - SBL-plank-SBR
- **Bird Dogs** Levels 1-3
  - Level 1: 3 sec holds x10
  - Level 2: hold w/ circles
  - Level 3: hold with square “pops”
Sample Exercise Progression - Isometric Stabilization

• “Paloff” Progressions (TK/ HK/ ST):
  • TK/HK/St **Anti-Rotations** - 3-5sec x 10-20reps
  • TK/HK/St **Anti-EXTENSION** - 3-5sec x 10-20reps
  • TK/HK/St **Anti-Flexion**: 3-5sec x 10-20reps
Sample Exercise Progression - Planking:

- **Planking Progression:**
  - Level 1- Knee-Elbows (timed)
  - Level 2- Toes-Elbows (timed)
  - Level 3- w/ Tubing Resist Adduction (timed) “or”
  - Level 3- Plank with isometric DF (5sec x10-20reps)
  - Level 4- Plank w/alt arm/leg lifts (10-20reps)
Functional Exercise Progressions- Loaded Gait:

- **Functional Options:**
  - KB Overhead Lunge Walks: 10-20 steps
  - Farmer’s Carries (for distance)
  - Suitcase “Waiter” Carries (for distance)
Isometric/Loaded:
- PhysioBall “Stir the Pot” (3-8 reps each CW/CCW)
- Jammer Rotations (5-8 reps/3)
- OH Med Ball Swings (10-30 revolutions)
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