5 - Examination – Stability
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Spinal Stability
“The Tail Wags the Dog!”
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Evidence-Based Practice
- Examination

“Let’s see if we can clean up the mess....”

What’s Important?

Stability Examination
History
• Pain with sustained postures
• Self-manipulator
• “Tightness”

Physical Examination
• Structure – increased activity
• Active – aberrant
• Resisted
• Standing Bracing
• Palpation
• Neurovascular
• Special Tests

The Patient-Specific Functional Scale
This word grid can you use to quantify activity limitations and measure functional outcomes for patients with any musculoskeletal condition. Complete the grid or use a similar grid to determine functional outcomes for each patient.

Initial Assessment:
• Assessing the patient’s patterns of abnormal gait, posture, and ambulation. This examination includes: 
  • Pain with engaged activities
  • Pain with movement
  • Pain with limited motion

Follow-up Assessment:
• Assessing the patient’s patterns of abnormal gait, posture, and ambulation. This examination includes:
  • Pain with engaged activities
  • Pain with movement
  • Pain with limited motion

Patient-specific activity scoring scale (Point to one number):

1. Can perform activity
2. Can perform activity only with assistance
3. Can perform activity with moderate assistance
4. Can perform activity with considerable assistance
5. Can perform activity with very considerable assistance
6. Can perform activity with extreme assistance
7. Can perform activity with extreme assistance
8. Can perform activity with extreme assistance
9. Can perform activity with extreme assistance
10. Can perform activity with extreme assistance

Personal Factors - Measurements

- PHQ-2; PHQ-9
- PSFS
- FABQ
- Keele
- Pain Catastrophizing Scale
- Oswestry
- Neck Disability Index

History/Interview

- Treat-Refer
- Identify common force moment arm
- Guide further testing
- Promote functional emphasis
**Special Tests**

**Cervical**
- Vertical Compression Test
- Cranio-cervical flexion test
- Lift Off Test
- Neck Extensor Endurance
- Lateral Endurance
- Cervical Joint Position Error Test
- Scapular retraction/depression

**Lumbar**
- Vertical Compression Test
- Spring Test
- Prone Instability Test
- Passive Lumbar Extension Test
- Multifidus Control
- Extensor Endurance
- Side bridge
- Quadruped hip/shoulder

**Notes/Impairment Focus**
- Instability catch
- Painful catch sign
- Apprehension sign

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**Vertical Compression Test**

- Patient positioned in natural relaxed posture
- Gentle sustained pressure applied downward through the patient's trunk
- Observe response to applied force segmentally and regionally; Note effect on symptom
- Efficient response force transitions evenly to the base of support
- Inefficient responses include segmental/regional sidebend, backward bending, translation, and/or rotation
- Springy endfeel is expected

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**Cranio-cervical flexion test**

- Supine, hooklying position, hands on abdomen
- BP cuff at 20mmHg to support lordosis
- Patient performs upper cervical forward nodding
- Hold in 2mmHg increments for 10 seconds up to 30mmHg
- Score is highest level holding 10 seconds

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**Craniochervical Flexion Test (CCF)**

- ICC Intra-rater reliability: 0.69 - 0.81
- ICC inter-rater reliability: 0.85 - 0.86
- Normative values: 30mmHg

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**Clinical Tests to Diagnose Lumbar Segmental Instability: A Systematic Review**

- Prone instability test
- Aberrant motions
- Beighton scale
- Segmental motion testing

**Notes/Impairment Focus**

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**Generally, most of tests...**

- High specificity (rule in)
- Low sensitivity (not much help to rule out)
- Very small to moderate +LR

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**Wise, 2015**
**Lift Off Test - Deep Neck Flexor Endurance**

- Tuck chin (forward nod)
- Lift and hold 1 inch
- 2 verbal cues
  - "Tuck your chin"
  - "Hold your head up"
- Terminate test
  - Inability to hold position
  - "Tuck your chin"

**Term Test**
- Pain/Unwilling, poor endurance/shaking/unwilling
- Lose chin tuck position

**Results**
- Normal group: 39s
- Neck pain group: 24s

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**Chin Tuck Endurance times for subjects with and without neck pain (P=0.01).**

![Graph showing chin tuck endurance times](image)

**DNF Test**

- **Reliability**
  - \( r = 0.75 \) Intra-rater reliability
  - \( r = 0.73 \) Inter-rater reliability

- **Normative Data**
  - Females: 29.4 ± 13.7
  - Males: 38.9 ± 20.1

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**Neck Extensor Endurance**

- Prone, head unsupported, arms at sides
- Initially support head with hand
- Head/neck in neutral position
- Timer starts when support withdrawn
- Test terminated by pain, unwillingness/endurance, loss of position

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**Neck extensor endurance test**

- Prone, head unsupported, arms at sides
- Initially support head with hand
- Head/neck in neutral position
- Timer starts when support withdrawn
- Test terminated by pain, unwillingness/endurance, loss of position
Neck extensor endurance test

- ICC intra-rater reliability 0.14 – 0.41
- ICC inter-rater reliability 0.19 – 0.25
- Normative Values: ?

Lateral Endurance

Cervical Joint Position Error Test (JPE) (Repositioning test)

- Measures the subject’s ability to relocate head to a starting position
- Assess accuracy of returning to start position using a laser pointer
- Following active cervical range of motion in flexion, extension and bilateral rotation.

Cervical Joint Position Error Test (JPE) (Repositioning test)

- Intra-rater Reliability: 0.50 - 0.80
- Inter-rater reliability: 0.51 - 0.57


- Results – greater accuracy during head repositioning in freeflyers (4) than in nonfreeflyers (20)
- “The present findings suggest that the cervical joint position sense could be improved through extensive specific sports training.”
Scapular Retraction/Depression

- Sarig-Bahat 2003: Systematic Review
  - Proprioceptive exercises and dynamic resisted strengthening exercises of the neck–shoulder musculature are effective for treating neck pain.

Lumbar Spring Test

- Prone instability test is performed in 2 steps
  - Step 1: PA in resting position
  - Step 2: PA with legs extended
- Positive if painful lumbar segment in Step 1, but not painful (or reduced pain) in Step 2

Passive lumbar extension test

- Most accurate clinical test
- High sensitivity (84%)
- High specificity (90%)
- +LR 8.8

Passive Lumbar Extension Test

- Prone, lift LE's 30cm
- Reproduction of LBP
  - or heavy feeling in LB
  - or "LB coming off"
- Pain relief upon return to rest position
Testing Segmental Lumbar Multifidus

- Test begins w/palpation of muscle at each segment adjacent to spinous process.
- Compare side-to-side and above and below for loss of muscle consistency. (Richardson et al., 2004)

Testing Segmental Lumbar Multifidus: Prep for Formal Test

- Fingers are gently sunk into muscle belly.
- Instructions for breathing same for TrA test.
- Patient is asked to gently and slowly swell out the muscle into the fingers, then resume normal breathing. (Richardson et al., 2004)
- Tester assesses if tonic holding is achievable via palpation.

Flexor Endurance

"Sit back 45 degrees maintaining neutral."

Extensor Endurance


SIDE BRIDGE

- Lie on side, propped up on elbow, top foot in front of bottom
- Raise body, forming a straight line from toes to shoulders
- Record time maintaining position

Quadruped Hip/Shoulder

1. Assume quadruped position
2. Brace the abdomen, and at this, lift one hand and hip opposite, knees just off of floor
3. Maintain neutral
4. Hold for 10 seconds then return to hands and knees on ground position
5. Alternate

SIDE BRIDGE

Quadruped Hip/Shoulder
**Special Tests**

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**Task Analysis**

- HAP EP
  - Assess task performance
  - Symptom reproduction
  - Dosage considerations
  - Static, Transition, Dynamic
  - Environmental Considerations
  - Personal factors

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**Reactive Neuromuscular Training**

- Preparation Phase
- Phase I: Static Stabilization
- Phase II: Transitional Stabilization
- Phase III: Dynamic Stabilization
- Function

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**Balance Control**

- Sensory
  - Where am I?
  - What am I going to do?

- Motor
  - Choice of Foot Placement
  - Cervical, Sacroiliac and Coccygeal Spine
  - Pelvis and Abdominal Muscles Control

- Function
  - Preparation Phase
  - Phase I: Static Stabilization
  - Phase II: Transitional Stabilization
  - Phase III: Dynamic Stabilization
  - Function
Progressions — Gentile’s Taxonomy of Tasks

- Body
  - Stability
  - Mobility
- Environment
  - Stationary
  - Moving Environment

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<td>Lunges — forward or backward</td>
<td>Lunges — forward or backward — holding weights</td>
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<td>Manipulation</td>
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General Considerations

- Identify external moment arm
- Gravity
- Relate Special Tests to Function
- Identify level of control
  - Retrain, Attain, Maintain, Sustain
- Static, Translational, Dynamic
- Emphasize muscle contraction spectrum
  - Concentric (force production)
  - Eccentric (force reduction)
  - Isometric (dynamic stabilization)
- Correlate HIAPEP