

## Cervical Spine Movement Coordination Deficits

ICD-9-CM code: 847.0 Neck ligament sprain

ICF codes: Activities and Participation Domain code: **d4159** Maintaining a body position, unspecified

Body Structure code: **s76000** Cervical vertebral column

Body Functions code: **b7601** Control of complex voluntary movements

### *Common Historical Findings:*

Significant trauma (e.g., MVA, fall, blow to head)

Muscle “tightness” or “spasm”

### *Common Impairment Findings* - Related to the Reported Activity Limitation or Participation Restrictions:

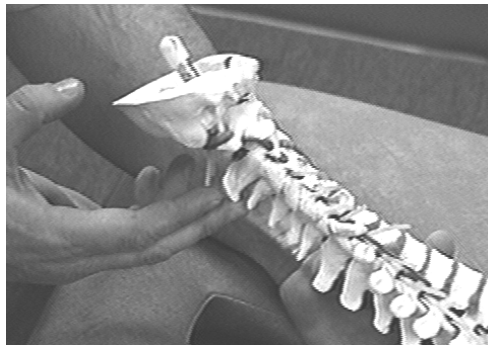
Pain with mid-range motions - increases at end range of painful motion

Tender with palpation of area (ligamentum nuche, spinous process and interspinous space) of the involved segment(s)

Pain with central posterior-to-anterior PA pressures

If upper cervical ligament strain: laxity and/or symptom alteration with ligaments stability exam

### Physical Examination Procedures:



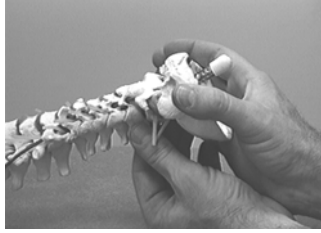
Palpation of Midline Soft Tissue  
Central Posterior-to-Anterior Pressures

### Performance Cues:

May need to slightly flex head and neck to differentiate segments

Support head and neck to limit muscular contraction

Palpate areas near ligamentum nuche, spinous processes, and interspinous spaces – determine symptom response



Alar Ligament Integrity Test



Alar Ligament Integrity Test

Performance Cues:

Keep head supported to limit muscle guarding

Place head and neck in midline

Pinch C2 spinous between left thumb and index finger

Side bend skull 10-15 degrees to the right

Normal - lateral aspect of the C2 spinous *immediately* moves into thumb

Abnormal - the C2 spinous process does not move or the movement is noticeably delayed as the head is sidebent

Involuntary or voluntary muscle guarding may produce false negative results to these examination procedures



Sharp-Purser Test for Ligamentus  
Integrity for the Transverse Ligament

Performance Cues:

Flex skull slightly while sitting - about 25 degree or until the motion is “taken up” - do not take up slack in tissues below C2.

In the abnormal - head flexion allows the occiput and C1 vertebrae to translate anteriorly relative to C2. Thus, this position may provoke symptoms.

Posteriorly translate the skull-with the head in slight flexion - while stabilizing the spinous process of C2 with an anteriorly directed force

In the abnormal - relative posterior translation of the skull is noted (approximately 5mm). This position may alleviate the patient's symptoms

In the normal - no symptoms are produced with head flexion and no translatory motion is detected with occiput/C1 (posteriorly directed) translation (while C2 is stabilized)

The stabilization (anteriorly directed) force of C2 is firm

## Cervical Spine Stability Deficits: Description, Etiology, Stages, and Intervention Strategies

The below description is consistent with descriptions of clinical patterns associated with the vernacular term  
“Cervical Instability or Cervical Ligament Strain”

*Description:* A sudden jerky movement, “whiplash” to the neck, or blow to the head could lead to cervical ligament sprain. Pain is usually felt in the back of the neck that gets worse with movement. Muscle spasms and pain are the common complaint. The pain may be referred to the upper back, shoulder girdle or upper extremity. The pain may be more noticeable a day after the injury. The pain symptoms worsen with movement. Headaches, increased fatigue, irritability, and restless sleep are also associated with this disorder.

*Etiology:* The cause of this disorder could be due to significant trauma such as car crash, or applying sudden brakes in which the head goes backward while the body stays back due to the seat belt. This causes head and neck to extend and get overstretched causing stress on the ligaments of the neck. Contact sports are also a common cause of cervical ligament sprains. Individuals with a long history of a collagen vascular disease, such as rheumatoid arthritis, may have upper cervical ligamentous instability as an unfortunate consequence of their disease.

### Physical Examinations Findings (Key Impairments)

#### Acute Stage / Severe Condition: Physical Examinations Findings (Key Impairments)

*ICF Body Functions code: b7601.3* SEVERE impairment of motor control/coordination of complex voluntary movements

- Pain with end range cervical motion
- May have swelling or bruising at the injury site
- Muscle spasms at the associated spinal segment
- Central or unilateral posterior-to-anterior pressures reproduce the reported symptoms
- May exhibit laxity with ligamentous integrity tests (e.g., alar ligament integrity test or the Sharp-Purser test)

#### Sub Acute Stage / Moderate Condition: Physical Examinations Findings (Key Impairments)

*ICF Body Functions code: b7601.2* MODERATE impairment of motor control/coordination of complex voluntary movements

- As above – the severity of the tenderness and muscle guarding may resolve at a slow rate if the injury was significant.
- **Be cautious of an underlying instability that is potentially dangerous to the patient’s neural structures.** Muscle guarding at the segment may mask this instability.
- Weakness of neck musculature, especially the neck flexors

#### Settled Stage / Mild Condition: Physical Examinations Findings (Key Impairments)

*ICF Body Functions code: b7601.1* MILD impairment of motor control/coordination of complex voluntary movements

As above with the following differences:

- Symptoms worsen or peripheralize with sustained end range positions or with repeated movements into the patient's available range

### Intervention Approaches / Strategies

#### Acute Stage / Severe Condition

Goals: Allievate pain while in neutral cervical positions  
Prevent further stress on injured tissues

- Re-injury Prevention Instruction
  - Limit active and passive movement to painfree ranges
  - Instruction is proper neutral positions for common activities such as sleeping, sitting, reading, driving, and eating, as well as for movements such as moving from supine to a sitting position
- External Devices (Taping/Splinting/Orthotics)
  - A rigid cervical collar is often indicated for acute cervical sprains to limit further stress on the damaged tissues
  - A soft cervical collar may be useful in less severe strains to cue the patient to maintain the neutral position
- Physical Agents
  - Ice packs applied with the neck in a neutral position may be applied for 15-30 minutes every few hours to reduce pain and inflammation

#### Sub Acute Stage / Moderate Condition

Goals: Prevent re-injury  
Strengthening of neck musculature to improve dynamic stability  
Improve mobility in areas superior or inferior to the injured, hypermobile segment

- Approaches / Strategies listed above
- Therapeutic Exercises
  - Initiate cervical stabilization/strengthening program – with emphasis on the deep cervical neck flexors (i.e., longus colli)
- Manual Therapy
  - Soft tissue and joint mobilization to restricted segments in the upper thoracic, mid-cervical, or upper cervical region. Caution not to mobilize any segment that is potentially hypermobile or unstable.
- Ergonomic Instruction
  - Promote efficient, painfree, motor control of the neck, scapulae and arm
  - Modify activities to prevent overuse and re-injury

Modify workstation to reduce risk of mounting pressure on the neck

- Re-injury Prevention Instruction
  - Emphasize the importance of neutral posture
  - Emphasize the importance of maintaining adequate stabilization through muscular control of the unstable segment – especially in individuals who participate in contact sports or other activities involving potential stress to the cervical spine.

#### Settled Stage / Mild Condition

Goal: Progress activity tolerance

- Approaches/ Strategies listed above
- Therapeutic Exercises
  - Provide endurance training to maximize muscle performance of the neck, scapulae, and shoulder girdle muscles required to perform the desired occupational or recreational activities

#### Intervention for High Performance / High Demand Functioning in Workers or Athletes

Goal: Return to desired occupational or leisure time activities

- Approaches/ Strategies listed above
- Ergonomic Instruction
  - Add job/sport specific training

#### Selected References

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