

Cervical Spine Mobility Deficits

ICD-9-CM code: 723.1 Cervicalgia

ICF codes: Activities and Participation Domain code: **d4108** Changing a basic body position, other specified - specified as: rotating the head and neck, such as in looking to the left or to the right
Body Structure code: **s76000** Cervical vertebral column
Body Functions code: **b7101** Mobility of several joints

Common Historical Findings:

Neck pain, usually unilateral, pain referral from base of occiput to scapular region (location of pain referral is dependent upon which segment or segments are involved)
Strain; awkward, unguarded movement; or prolonged period of time in strained position ("Woke up with pain")

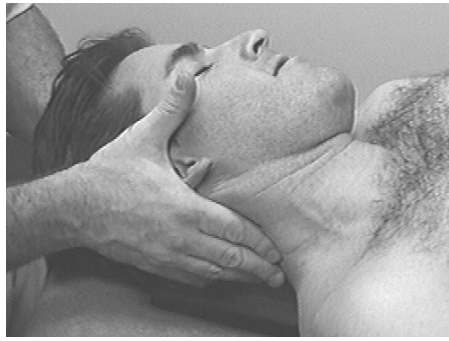
Common Impairment Findings - Related to the Reported Activity Limitation or Participation Restrictions:

Increase in pain at end range of rotation left or rotation right
Symptoms reproduced with palpation of the involved facet
Motion limitation and pain at end range of either anterior/superior glide or posterior/inferior glide of the involved spinal segment

Physical Examination Procedures:



Cervical Accessory Movement Test
Anterior/Superior Glide



Cervical Accessory Movement Test
Anterior/Superior Glide

Performance Cues:

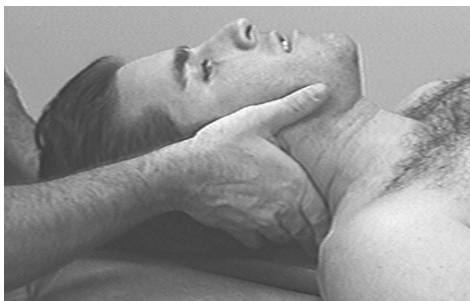
Use DIP, PIP, or MCP for contact

Use a "Flat Hand" - whole palm contacting side of neck and head

Slowly and predictably sink through the skin and myofascia until contact with "articular pillars" is made

Pull the top half of the "pea-sized" facet "toward the eyes" (ok to facilitate rotation to the opposite side of facet being assessed)

Assess mobility, resistance to movement, and symptom response of C2-3, C3-4, C4-5, C5-6, and C6-7



Cervical Accessory Movement Test
Posterior/Inferior Glide

Performance Cues:

Use PIP or MCP contact; flat, soft hand; predictable, uniform movement; sink through soft tissue

Push the top half of the facet down and back (ok to facilitate side bending to same side of facet being assessed)
Assess mobility, resistance, and symptom response of each segment

Cervical Spine Mobility Deficits: Description, Etiology, Stages, and Intervention Strategies

The below description is consistent with descriptions of clinical patterns associated with the vernacular term “Cervical Facet Syndrome”

Description: Dysfunction of the movement of the one vertebrae of the cervical spine relative to its adjacent vertebrae. This is usually a result of muscle imbalances, facet irregularities or trauma. Patients with this condition commonly complain of unilateral neck and upper back pain that increases at the end ranges of left or right sidebending or rotation. And, repeated flexion and extension movements do not improve or worsen the patient’s baseline level of pain

Etiology: The cause of this dysfunction is believed to be a movement abnormality where a segment of the spine is unable to either flex, extend, side bend or rotate normally in a pain free manner on its adjacent vertebrae. This movement abnormality can be caused by either a displacement of fibro-fatty tissue within the outer borders of the facet capsule or posttraumatic fibrosis of the facet capsule. The cause of the movement abnormalities and the associated pain is thought to be a sudden, awkward, twisting or bending motion. This results in a potentially reversible displacement of fibro-fatty tissue. The cause could also be a mild joint contracture following the fibrotic healing of a posttraumatic facet capsule.

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

ICF Body Functions code: b7101.3 SEVERE impairment of mobility of several joints

- Unilateral posterior-to-anterior pressures at the involved segment reproduce the patient’s pain complaint
- Motion restrictions are present at the involved segment
- Myofascia associated with the involved segment is usually hypertonic and painful

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

ICF Body Functions code: b7101.2 MODERATE impairment of mobility of several joints

As above with the following differences:

- The patient’s unilateral symptoms are reproduced only with overpressures at end ranges of left or right sidebending
Note: Improved segmental mobility is commonly associated with improving symptomatology

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

ICF Body Functions code: b7101.1 MILD impairment of mobility of several joints

As above with the following differences:

- The patient's unilateral symptoms are reproduced only with end range overpressures in either a combined extension and sidebending motion or a combined flexion and sidebending motion

Now when the patient is less acute examine for muscle flexibility and strength deficits that may be a predisposing factor for future injury. For example:

- Muscles that commonly exhibit flexibility deficits in patients with facet abnormalities are middle and posterior scaleni, SCM, upper trapezius, and the myofascia associated with the involved cervical segment
- Muscles that are commonly weak are the cervical neck flexors (i.e., longus colli), upper thoracic extensors and scapular retractors/adductors (i.e, middle and lower trapezius)

Intervention Approaches / Strategies

Acute Stage / Severe Condition

Goal: Restore painfree active spinal mobility

- Physical Agents
Ice (or heat) to provide pain relief and reduce muscle guarding
- Manual Therapy
Soft tissue mobilization to the myofascia associated with the involved cervical segment
Isometric mobilization and contract/relax procedures to the involved segment to reduce muscle guarding
Passive stretching procedures to restore normal cervical segmental mobility
- Therapeutic Exercises
Instruction in exercise and functional movements to maintain the improvements in mobility gained with the soft tissue and joint manipulations
Strengthening exercises for the neck flexors

- Re-injury Prevention Instruction
Instruct the patient in efficient, painfree, motor performance of movements that are related by the patient to be the cause of the current episode of neck pain

Sub Acute Stage / Moderate Condition:

Goal: Restore normal, painfree response to overpressures at end ranges of cervical rotation and sidebending

- Approaches / Strategies listed above – focusing on:
- Manual Therapy
Soft tissue mobilization and joint mobilization/manipulation to normalize the segmental mobility

Note: Performing upper cervical joint mobilization/manipulations with the patients upper cervical spine at end ranges of extension or the end ranges of combined of extension/rotation movements is contraindicated due the potential disastrous effects that these manipulative procedures have been reported to have on some individual's vertebral artery. Thus, all upper cervical manipulations are performed with the head and neck in the neutral or flexed position

- Therapeutic Exercises
Instruction in exercise and functional movements to maintain the improvements in mobility gained with the soft tissue and joint manipulations (e.g., towel SNAGs)

Settled Stage / Mild Condition:

Goals: Restore normal, pain free responses to overpressures of combined extension and sidebending/rotation and/or combined flexion and sidebending/rotation
Normalize cervical and upper thoracic flexibility and strength deficits

- Approaches / Strategies listed above
- Therapeutic Exercises
Stretching exercises to address the patient's specific muscle flexibility deficits
Strengthening exercises to address the patient's specific muscle strength deficits

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

Goal: Return to desired occupational or leisure time activities

- Approaches / Strategies listed above
- Therapeutic Exercises
Encourage participation in regular low stress aerobic activities as a means to improve fitness, muscle strength and prevent recurrences
- Ergonomic Instruction
Provide body mechanics instructions and modify work area as indicated to prevent symptoms. This typically emphasizes neutral cervical position for sitting, driving, traveling as a passenger in a car, bus, or airplane, reading, eating, and resting/sleeping.

Selected References

Di Fabio RP. Manipulation of the cervical spine: risks and benefits. *Phys Ther.* 1999;79:50-65.

Jackson RP. The facet syndrome: myth or reality? *Clin Orthop Rel Res.* June, 1992.

Taimela S, Takala E, Asklof T, Seppala K, Parvianen S. Active treatment of chronic neck pain. a prospective randomized intervention. *Spine.* 2000;25:1021-1027.

Jull G, Trott P, Potter H, Zito G, Niere K, Shirley D, Emberson J, Marschner I, Richardson C. A randomized controlled trial of exercise and manipulative therapy for cervicogenic headache. *Spine.* 2002;27:1835-1843.



Posterior Cervical Myofascia
Soft Tissue Mobilization



Suboccipital Myofascia
Soft Tissue Mobilization

Impairment: Limited and Painful Cervical Flexion, Right Rotation or Right Sidebending



Cervical NAG

- Cues:
- Hug the patient's head with your right forearm and anterior lateral trunk
 - It usually helps to be in front of the patient's shoulder
 - The 5th finger of right hand is the "dummy" finger positioned on the spinous process or articular pillar
 - Provide traction or other combined movements by weight shifting to the backward (right) leg
 - Mobilize in the direction of the facet plane (superiorly more than anteriorly) using the left lateral wrist/thenar eminence to provide the force
 - Generate the superior-anterior glide using left elbow flexion
 - "Catch" the skin with the "dummy" finger a segment of two below the involved
 - If the procedure is painful, stop. Consider naging in a slight different treatment plane or on a different cervical segment

The following reference provides additional information regarding this procedure:
Brian Mulligan MNZSP, DipMT: Manual Therapy, p. 12-15, 1995

Impairment: Limited and Painful Cervical Right Rotation



Cervical SNAG

Cues: Use the right thumb as the “dummy” thumb over either the spinous process or the articular pillar

The left thumb provides the SNAG

Sustain the NAG pressure in the plane of the facet – think superiorly more than anteriorly

Remember: 1) NAG, 2) Sustain the NAG, 3) Overpressure end range, 4) Sustain the NAG during left rotation back to neutral, 5) Release NAG

Use the ulnar aspect of the left hand or little finger, if possible, to limit thorax right rotation by manually cuing the anterior aspect of the left clavicle

Remember: A SNAG is indicated if it permits (and improves) painfree motion

Alteration of the direction of the active cervical motion while performing this SNAG can also be used to treat limited and painful cervical sidebending, extension, or flexion

The following reference provides additional information regarding this procedure:

Brian Mulligan MNZSP, DipMT: Manual Therapy, p. 18-25, 1995

Impairment: Limited Cervical Segmental Sidebending/Rotation



Cervical Superior/Anterior Glide

Cues: Contact the articular pillar of the superior vertebrae of the involved segment and glide it “toward the eyes”

Stabilize the vertebrae below by contacting its spinous process (i.e., stabilize the right side of the spinous process of C6 with the left middle finger as the right middle finger contacts the posterior aspect of the right C5 articular pillar and provides a superior/anterior glide of C5)

Utilize this procedure to address both the segmental myofascia and joint mobility deficits

The following reference provides additional information regarding this procedure:

Freddy Kaltenborn PT: The Spine: Basic Evaluation and Mobilization Techniques, p. 260, 1993

Impairment: Limited Cervical Segmental Rotation



Cervical Rotation in Neutral

Cues: Assess the amplitude (and end feel) of cervical rotation (using an anterior/superior glide) of the involved segment in neutral

Add combined movements of cervical sidebending, side gliding, slight anterior (or posterior) gliding, slight extension (or flexion), traction, and compression (firm “hug” of the head and neck), until the anterior/superior glide motion barrier (i.e., end feel) is as “crisp” as possible

Mobilize (or manipulate) with a low amplitude force into this barrier

The following reference provides additional information regarding this procedure:

Laurie Hartman DO: Handbook of Osteopathic Technique, p. 171-172, 1997

Impairment: Limited Cervical Segmental Flexion, Right Sidebending, and Right Rotation



Cervical Spine Contract/Relax
(of segmental extensors and left sidebenders)

Cues: “Slump the cervical spine as best as possible to create the maximal available posterior translation of the involved segment
Maintaining the posterior “slump”, translate the involved segment to the left to obtain the maximal available lateral translation
The intention is to create an apex of both posterior translation and left lateral translation at the involved segment, thus, placing the involved facet capsule and its associated segmental myofascia at end range
Elicit contraction of the left sidebenders and/or left extensors – relax – take up slack – repeat
Use a soft and “flat” manual contact to avoid painful pressure with the right hand
Utilize “traction” with the left hand to enhance the sidebending stretch to the left facet joints and myofascia

The following references provides additional information regarding this procedure:
John Bourdillon FRCS, EA Day MD, and Mark Bookhout MS, PT: Spinal Manipulation, p. 260, 1992
Philip Greenman DO, FAAO: Principles of Manual Medicine, p. 191, 1996

Impairment: Limited Cervical Segmental Flexion, Right Sidebending, and Right Rotation



Cervical Right Sidebending/Rotation in Flexion

Cues: At the end range of both posterior and lateral translation barriers - apply low amplitude mobilizations or a low amplitude manipulation into the barrier

The direction of the mobilization force is laterally (“to open the joint on the opposite side”)

Comfort and effectiveness is increased if: 1) the right hand maintains a broad surface contact, and 2) the left hand applies a “traction” force to maintain the stretch to the left cervical facets and segmental myofascia

The following reference provides additional information regarding this procedure:

Philip Greenman DO, FAAO: Principles of Manual Medicine, p. 197, 199

Impairment: Limited Cervical Segmental Extension, Right Sidebending, and Right Rotation



Cervical Spine Contract/Relax
(of segmental flexors and left sidebenders)

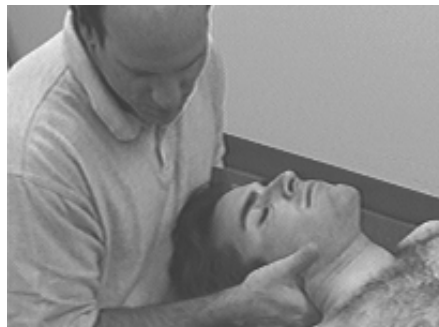
Cues: Use the index finger of the right hand to anterior glide, then, left laterally translate the involved segment

Elicit contraction of the left sidebenders and/or flexors of the involved segment - relax – take up slack in both “barriers” – repeat

The following references provides additional information regarding this procedure:

John Bourdillon FRCS, EA Day MD, and Mark Bookhout MS, PT: Spinal Manipulation, p. 257-259, 1992

Philip Greenman DO, FAAO: Principles on Manual Medicine, p. 189-190, 1996



Cervical Sidebending/Rotation in Extension

Cues: At the end range of both anterior and lateral translation barriers - apply low amplitude mobilizations or a low amplitude manipulation into the barrier

The direction of the mobilizing is primarily inferiorly (“to close the joint on the same side”)

The following references provides additional information regarding this procedure:

John Bourdillon FRCS, EA Day MD, and Mark Bookhout MS, PT: Spinal Manipulation, p.261, 1992

Philip Greenman DO, FAAO: Principles on Manual Medicine, p. 196, 1996

Impairment: Limited C1/C2 Right Rotation



C1/C2 Contract/Relax

Cues: Fully flex C2 through C7

Adding flexion at the occiput/C1/C2 areas assists in preventing rotation past C2 (i.e., it helps create a “firm” C1/C2 rotation barrier)

Rotate occiput and C1 to the right until the first “barrier” - be sure to 1) maintain the cervical flexion, and 2) prevent cervical sidebending

“Look with your eyes to the left” – Relax – Take up the now available right rotation slack passively (or “gently look to the right”) - relax - repeat contract/relax procedures 3 to 5 times

The following references provides additional information regarding this procedure:

John Bourdillon FRCS, EA Day MD, and Mark Bookhout MS, PT: Spinal Manipulation, p. 263-264, 1992

Philip Greenman DO, FAAO: Principles on Manual Medicine, p. 192, 1996

Impairment: Limited C1/C2 Right Rotation



C1/C2 Rotation

Cues: Stabilize the right lamina of C2 with your left thumb
Comfortably hug the patient's head and rotate it (with C1) to the right
Tilt the head to the left to allow some slack in the left alar ligament
Apply a passive stretch (or, a contract/relax stretch)
Be especially tuned into the patient with regards to VBI symptoms or signs while performing this technique

The following reference provides additional information regarding a similar procedure:
Freddy Kaltenborn PT: The Spine: Basic Evaluation and Mobilization Techniques, p. 279, 1995

Impairment: Limited Occiput/C1 flexion
Limited Occipital Posterior Glide (or C1 Anterior Glide) on the Left



Occipital Posterior Glide

Cues: Rest the right middle finger on the left thenar eminence
Position the patient (and your hands) so that the left lateral mass of C1 is contacted by the “dummy” middle finger
Apply a posterior glide to the left occipital condyle via a posterior force on the patients left forehead (using flexion of your thorax – with your left anterior deltoid/clavipectoral area contacting the patient’s left forehead)



C1 Anterior Glide

Impairment: Limited Upper Cervical Right Sidebending
Limited C1 Right Lateral Translation



C1 Lateral Translation

Cue: Contact the left C1 lateral mass with 1) your left index or middle finger, or 2) the radial side of your left index finger MCP area
Stabilize the skull with your right hand
Apply right lateral translatory oscillations or stretching forces to C1
Be kind and gentle - but effective
Don't be in a hurry

The following reference provides additional information regarding similar procedures:
Freddy Kaltenborn PT: The Spine: Basic Evaluation and Mobilization Techniques, p. 243, 277, 1993

Impairment: Limited Occipital Flexion and Right Sidebending



Occiput/C1 Contract/Relax
(of segmental extensors and left sidebenders)

Cue: Nod the occiput to take up the flexion barrier
Translate the noded occiput to the left to first upper cervical barrier – not mid cervical barrier
Keep the eyebrows parallel to the transverse plane when translating the occiput (to avoid inadvertent left sidebending)
Elicited contraction of the segmental extensors (“look to the left”)
Manually cue either the anterior aspect of the chin or the left zygoma (with your left forearm) when providing the verbal commands
Maintain both the flexion and the left translation barriers during the contraction
Relax
Take up available slack in both barriers
Repeat

The following references provides additional information regarding this procedure:
John Bourdillon FRCS, EA Day MD, and Mark Bookhout MS, PT: Spinal Manipulation, p. 267-268, 1992
Philip Greenman DO, FAAO: Principles of Manual Medicine, p. 194, 1996

Impairment: Limited Occipital Flexion and Right Sidebending



Occipital Distraction in Flexion and Sidebending

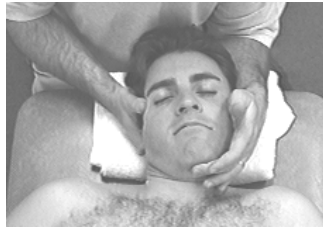
- Cues: Contact the right occipital condyle with the anterior surface of the index finger
metacarpal of the right hand
As best as possible, align your right forearm parallel to the distraction force direction
“Hug” the right side of patient’s head with your left forearm
Position the patient at the barriers of both flexion and left translation - as he/she exhales
The distraction mobilization or manipulation force primarily comes from your index
finger metacarpal – using a weight shift from your trunk
If you are not moving the patient’s feet (“positive toe sign”) you are probably not
providing enough traction force to distract the patient’s occiput from C1

The following references provides additional information regarding this procedure:

John Bourdillon FRCS, EA Day MD, and Mark Bookhout MS, PT: Spinal Manipulation, p. 268-269, 1992

Philip Greenman DO, FAAO: Principles of Manual Medicine, p. 202, 1996

Impairment: Limited Occipital Extension and Right Sidebending



Occiput /C1 Contract/Relax
(of segmental flexors and left sidebenders)

Cues: Extend the head (not the cervical spine) to take up the extension barrier
Translate the extended head to the left to the first (upper cervical - not mid cervical) barrier
Translate left - not sidebend left
Elicit contraction of the segmental flexors (“look down toward your feet”) or sidebenders (“look to the left”)
Manually cue either under the chin or the left zygoma when providing the verbal commands
Maintain both barriers during the contraction
Relax - take up slack – repeat

The following references provides additional information regarding this procedure:
John Bourdillon FRCS, EA Day MD, M Bookhout MS, PT: Spinal Manipulation, p. 266, 1992
Philip Greenman DO, FAAO: Principles on Manual Medicine, p. 193-194, 1996



Occipital Distraction in Extension and Sidebending

Cues: Contacts and force application is similar to the occipital distraction in flexion
Position the patient at the barriers of occipital extension (not cervical extension) and left translation - as he/she exhales
Maintain these barriers – apply the distraction mobilizations or manipulation

The following references provides additional information regarding this procedure:
John Bourdillon FRCS, EA Day MD, M Bookhout MS, PT: Spinal Manipulation, p.268, 1992
Philip Greenman DO, FAAO: Principles of Manual Medicine, p. 201, 1996