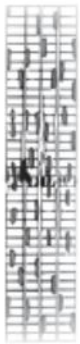


Orthopedic Conditions 2- Neck

Cervical Strain/Sprain

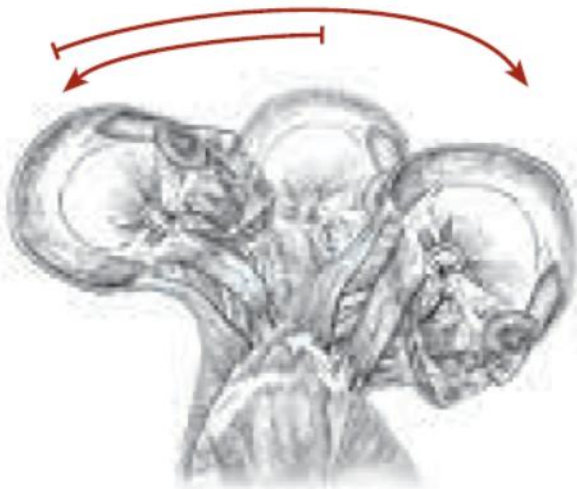
Definition: soft tissue damage (stretch, tearing or rupture) to the ligaments, muscles, intervertebral discs & other tissues surrounding the cervical spine that can lead to a variety of clinical symptoms

Grade 1 - mild sprain/strain -----



- Mild swelling & point tenderness over ligament, no bruising
- Estimated > 10% fiber damage
- Mild stretch, no instability
- (-) stress tests, mild pain at extreme end ROM
- Functional recovery in 2-14 days (structural healing 6-30 days)

Hyperextension & hyperflexion injury



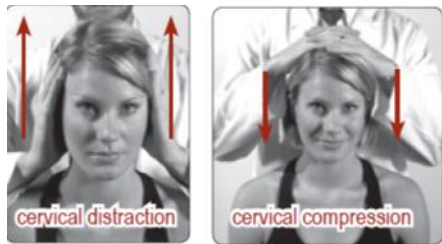
Hyperextension damages anterior neck tissue (anterior longitudinal ligament, longus colli, SCM, scalenes, TMJ) by stretching & tearing

Hyperflexion damages posterior neck tissue (nuchal lig, interspinous lig. trapezius, levator scap., sub-occipitals TMJ) by stretching & tearing

Diagnosis

History

- Examiner needs to get accurate information on the specific mechanism of injury & forces involved
 - patient position at time of impact, height of head rest, speed & size of other vehicle, history of prior injuries
- Pain (cervical spine & upper shoulders)
 - Patient may experience immediate pain or shortly after injury
 - Minor injuries may have delayed onset muscle soreness (24-48 hours after) – theorized to be caused by disruption of muscle proteins & resulting inflammation
 - Pain may radiate into occiput or down to shoulder/arm in a non-dermatomal pattern



- (+) Spurling's test (Foraminal compression test)



Action	Strain (muscle)	Sprain (ligament)
PROM	Mild/No Pain	Pain
AROM	Pain	Pain
Isometric	Pain	No Pain

Treatment

Red Flags indicating a more serious pathology

- No indication of improvement after 1 week
- Getting progressively worse after 1 or 2 weeks
- Symptoms or signs of symptom magnification
- Non-compliance with recommendations
- Seeks rest, not involved in usual daily responsibilities
- Seeks more drugs, or drugs are not having an effect (watch for addiction)

- Cannot return or makes no attempt to return to work
- Appearance of secondary gains related to illness behavior (social, vocational, financial)
- Becomes progressively dysfunctional
- Shows signs & symptoms of depression

General Measures

- Acute pain & inflammation control (PRICE)
- Acute immobilization (patient will most likely be doing this instinctively) - consider a cervical collar for short term use
- Consider cervical pillow while sleeping
- Pain free ROM (PFROM) & pain free isometrics

Massage Therapy

- Myofascial release, swedish massage focus on scalenes, SCM & posterior neck musculature
- Post acute incorporate cervical distraction techniques to prevent contracture & decrease tension
- Neck & shoulder muscle stretching are often helpful to improve local biomechanical function
- C-spine sprain classifications (based on Quebec Task-force):
 - 0 - No neck pain complaints, no physical signs
 - 1 - Neck pain complaints, only stiffness or tenderness, no other physical signs
 - 2 - Neck complaints & musculoskeletal signs (↓ ROM & point tenderness)
 - 3 - Neck complaints & neurologic signs (weakness, sensory & reflex changes)
 - 4 - Neck complaints with fracture and/or dislocation

Benign Positional Vertigo

Definition: abnormal sensation of motion caused by certain provocative positions of the head resulting in nystagmus

Diagnosis

History

- Prior history of head trauma, ear disease, inactivity or CNS disease
- Prior episodes that are caused when the head is in a certain position
- Vertigo may last for seconds up to several minutes
- Severity varies – some patients are aware of it but can function, others report nausea & vomiting with slight head movements
- Patient may wake up with vertigo, noticing the vertigo while trying to sit up suddenly or with neck into extension looking up ('top shelf vertigo')
- Dix-Hallpike Maneuver



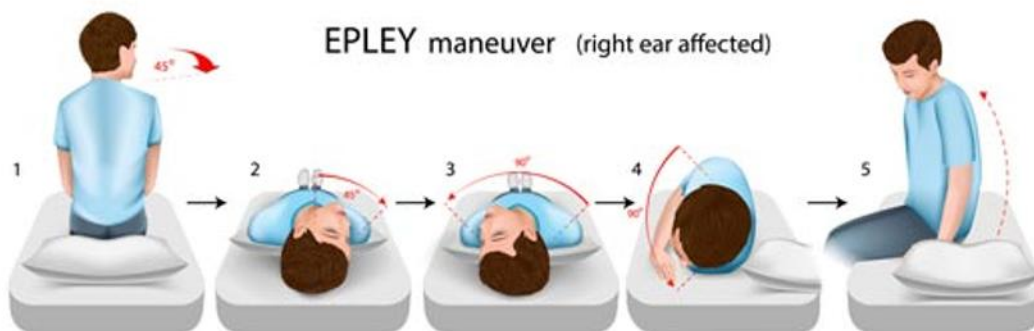
Treatment

General Measures

- Often self-limited condition, but can be chronic & relapsing
- Canalithiasis Repositioning Procedure (CRP) - next page
 - 66-92% effective, 5% 15% recurrence rate
 - Epley's maneuver, Semmont's maneuver
 - Specific instructions after completed
 - Wait 10 minutes before leaving office
 - Sleep in recumbent position for 2-3 days
 - Avoid rapid or oscillating head movements

Massage Therapy

- Apply techniques over upper cervical spine, shoulder & Mid-back (effleurage, petrissage, myofascial release, trigger point therapy)
- Suboccipital muscle release & distraction



C1-C2 Instability

Definition: excessive movement between atlas (C1) & axis (C2), secondary to either a bony or ligamentous abnormality; rarely can cause neurologic symptoms if the spinal cord is involved

Risk factors:

- **Trauma** - fracture of the dens or ligament rupture
- **Down syndrome** (asymptomatic in 10-20% of cases, symptomatic in 4-2%)
- **Rheumatoid arthritis** - may cause erosion of the transverse ligament of the dens
- **Ankylosing spondylitis, psoriatic arthritis, reactive arthritis & pharyngeal infection**

Diagnosis

History & Exam

- Usually it is asymptomatic - look for risk factors
- Patient may notice a 'clicking,' 'grinding' or 'crepitus' sensation in the neck with repeated cervical motion (sublux & reposition of vertebrae with motion secondary to instability)
- Neurologic signs of brain stem compression

Treatment

General Measures

- Treat patient for discomfort & protect patient from future c-spine injury
- If neurologic symptoms are present - initiate stable C-spine procedure & immediately refer to an ER
- Upper cervical mobilization, manipulation & ROM are contraindicated

Education

- Explain to parents/legal guardians or patient the potential problems that could occur & need for limitations of activity (no head/neck trauma)



Cervical Spondylosis

Definition: progressive loss of articular cartilage & reactive changes at the joint margins & subchondral bone (joint-space narrowing, subchondral sclerosis, osteophyte formation & ankylosis)

History

- Slowly developing dull achy neck pain or pain following joint use; chronic recurrent type pain
- Possible chronic suboccipital headache
- Morning stiffness & pain; aggravated by repetitive or heavy use
- Possible radiculopathy with nerve root compression (usually C6 or C7 nerve level)

Physical

- Palpation may show neck stiffness
- ROM may be decreased
 - Increased pain with flexion if anterior anatomy involved (herniation, disc damage)
 - Increased pain with extension if posterior anatomy involved (facets, IVF encroachment)
- Neurologic exam is usually WNL, unless there is vertebral canal or IVF stenosis



Potential Causes/Risk factors:

Primary DJD (idiopathic)	Secondary DJD (usually follows trauma)
<ul style="list-style-type: none"> • Abnormal biomechanics • Genetic predisposition • Metabolic causes • Occupational 	<ul style="list-style-type: none"> • Childhood anatomic abnormalities • Joint trauma or Fx • Repetitive action or joint motion • Secondary to certain skeletal surgeries

Treatment

General Measures

- Rest & heat (hot pack, hot tub, sauna)
- Acute immobilization (short term cervical collar)
- Isometric cervical exercises while wearing collar
- Consider cervical pillow while sleeping
- Pain free ROM (PFROM) & pain free isometrics

Massage Therapy

- Relaxation massage, trigger point therapy
- Reduce muscle spasm & fascial adhesions

Osseous Mobs/Manipulation

- Long axis traction (widen foramen & ↓ pressure)
- Mobilizations & Manipulation focused on hypomobile segments may improve joint mobility & relieve some pain
- Avoid mobilization of hypermobile/unstable segments

Electrotherapy

- Deep heat (ultrasound, diathermy)
- Microcurrent, IFC TENS

Surgery (usually not required)

- Indicated if progressive neurologic deficits

Follow-up

Rehabilitation Program

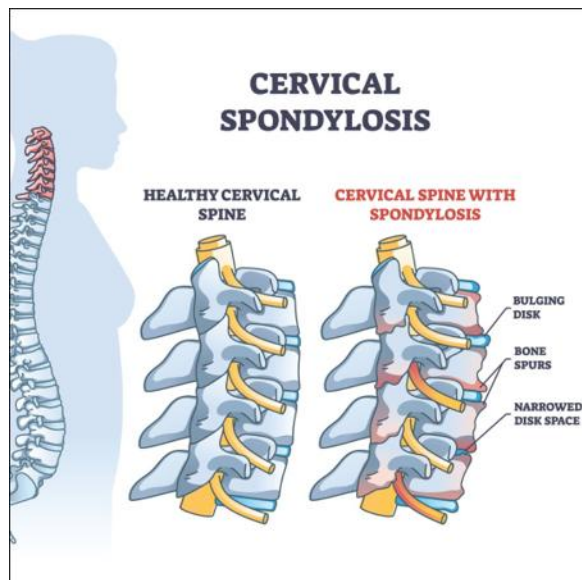
- Start with PFROM to increase mobility
- Gradually progress to improved aerobic & cardiovascular fitness
- Postural retraining, sleeping position evaluation
- Continued ROM & aerobic exercises, parascapular & rotator cuff exercises

Patient Monitoring

- Consider occupational therapy to evaluate workplace ergonomics, postural training, neck-school therapy (supervised, small-group therapy)

Prevention/Patient Education

- Educate on sleep & work position
- Avoid high-impact exercise (running, jumping)
- Maintain cervical ROM with daily ROM exercise
- Avoid holding head in 1 position for a long period (driving, computer screen or watching TV)
- Avoid aggravating activities



Cervical Facet Syndrome

Definition: cervical facet (zygapophyseal joint)
irritation or damage that may cause cranial, cervical
or upper shoulder & back pain referral; often difficult
to differentiate from other causes of neck pain

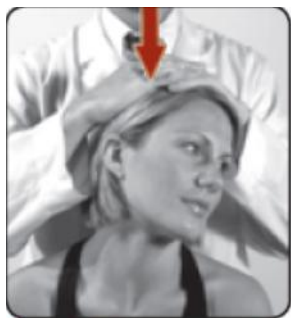
Risk factors/potential causes:

- Secondary to cervical injury
- Cervical disc injuries (disc pain at the same spinal level is associated with facet pain in 40% of cases)
- Whiplash, sprain/strain, osteoarthritis or RA
- Repetitive stress, poor posture (occupational)

Diagnosis

History

- Dull, achy pain although may be sharp during acute episodes, headaches & limited range of motion (ROM) - pain is localized, patient can often pinpoint pain
- Neck muscle spasm/torticollis
- Sometimes radiates to the shoulder or mid back regions, although does not often radiate beyond elbow or upper thoracic spine
- Patients may report a history of whiplash injury
- Pain relieved when supine



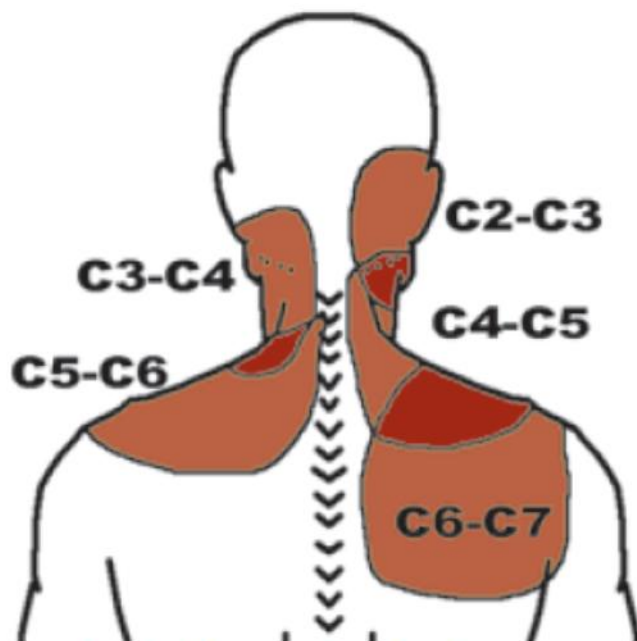
**Cervical compression
with lateral flexion**



Cervical distraction

Physical

- **Increased pain on extension & rotation** (due to facet approximation)
- Antalgia is typically away from facet in acute patients, resulting in a slight flexion & lateral flexion position (torticollis-like posture)
- Possible muscle splinting & guarded ROM
- Look for postural and/or activity induced predispositions to extension motions
- No neurological deficits (DTR's, motor, sensation)



Cervical facet pain referral patterns

(Adapted from Dwyer et al. Spine 15(6): 456, 1990)

Treatment

General Measures

- Acute phase consider ice to decrease blood flow, reduce local edema & muscle spasm
- Acute immobilization (short term cervical collar)
- Consider cervical pillow while sleeping
- Pain free ROM (PFROM) & pain free isometrics

Massage Therapy

- Myofascial release, swedish massage
- Neck & shoulder muscle stretching are often helpful to improve local biomechanical function
- Sherman et al performed a study 64 patients were randomized to receive up to 10 massages over 10 weeks or a self-care book. Measurement of Neck Disability Index (NDI) at 10 weeks demonstrated more participants randomized to massage experienced clinically significant improvement (39% compared with the participants in the self-care book group (14%) (95% confidence interval) - authors concluded that massage may provide short-term relief for chronic neck pain

Prevention/Patient Education

- Avoid heavy lifting & rapid neck movements
- Cervical bracing in the short-term may offer limited benefit (axial distraction), but should not be used for more than 2 days

Follow-up

Rehabilitation Program

- Reduce pain and inflammation & ↑ PFROM
- Ice is indicated during the acute phase (↓ blood flow & local edema; also reduce muscle spasm)
- Progress to heat (hot pack, hot tub, sauna) in non-acute stage
- PROM, then AROM exercises in a pain-free range should be initiated
- Strengthening should begin with isometric exercises and progress to isotonic as tolerated

Patient Monitoring

- During initial acute presentation a higher visit frequency is warranted (2 -3 x/week)
- As SSx subside visit frequency should be lowered
- Home care instructions: ice & heat application; proper pillow & mattress, neck roll

Cervical Radiculopathy

~70% of patients with cervical radiculopathy have shoulder pain
C5 or C6 nerve roots → suprascapular
C7 or C8 nerve roots → interscapular
C8 nerve root → scapular

T. Yasuhisa et al. Spine 31(17), August, 2006 -
prospective study of 50 patients

Definition: Neurocompressive disorder of the cervical nerve roots resulting in various neurologic findings (7 vertebrae & 8 nerve root; roots fill 2/3 of foraminal space). Pathogenesis of radiculopathy occurs from the inflammatory process initiated by nerve root compression.

Risk factors/Potential causes:

- Heavy manual labor requiring lifting more than 25 pounds (especially repetitive activity)
- Driving or operating vibrating equipment
- Collision sports (e.g. football, hockey)
- Prior injuries (MVA, whiplash), degenerative joint disease/osteoarthritis

Diagnosis

History

- Patient may describe deep aching to burning neck pain & radicular arm pain ("numbness, tingling, sharp, shooting, electrical") that may follow a neck injury or be of insidious onset
- May be history of multiple episodes of previous neck pain
- Possible muscle weakness in the arm/hand or sensory changes along involved nerve root
- Patient may state symptom relief occurs when shoulder is abducted with hand held behind head (shoulder abduction test)

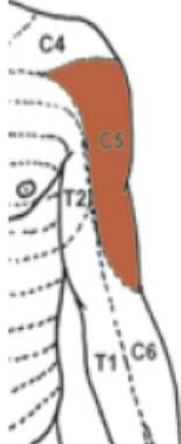
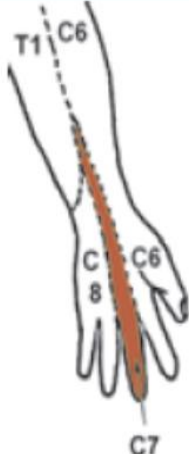
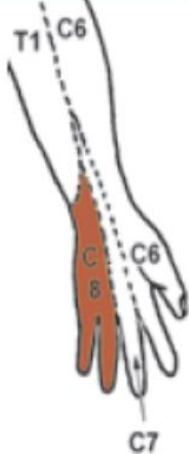
Physical

- Active ROM
 - Limited particularly in extension, rotation & lateral bending either toward or away from affected nerve root
 - Increased pain with lateral bending away from the affected side → increased displacement of disc herniation upon nerve root
 - Ipsilateral pain suggests an impingement of nerve root at site of IVF
- Possible pain referral patterns (often very similar to other cervical conditions)
 - Central anterior herniation may cause contralateral interscapular pain
 - Anterior lateral herniations may cause scapular vertebral border pain
 - Posterolateral herniations may cause scapular axillary pain
 - Bilateral symptoms in the upper or lower extremity may indicate spinal cord compression

Physical continued

- *Palpation*
 - Tenderness along cervical paraspinals & usually more pronounced along ipsilateral side of affected nerve root
 - Muscle tenderness along muscles where symptoms are referred (eg. medial scapula, proximal arm, lateral elbow)
 - Associated hypertonicity/spasm
- *Motor weakness* - dynamometer (grip or pinch) may be used to measure hand & finger strength
- *Sensory changes* - decreased sensation to light touch & sharp/dull (dermatome distribution)
- *Deep tendon reflexes* - hyporeflexia indicates peripheral pathology, hyper reflexia indicates CNS lesion
 - Biceps (C5-C6) - musculocutaneous nerve
 - Brachioradialis (C5-C6) - radial nerve
 - Triceps (C7-C8) - radial nerve
- Lower extremity DTR's & pathologic reflexes may be tested in patients with suspected myelopathy (Hoffman & Babinski reflexes)

Summary of upper extremity spinal nerve levels

Level	C5	C6	C7	C8
DTR	Biceps 	Brachioradialis 	Triceps 	-
Motor	Shoulder abduction	Elbow flexion/Wrist extension	Elbow extension/Wrist flexion	Thumb extension/Wrist ulnar flexion
Atrophy	Shoulder	Lateral forearm	Minor	Hypothenar
Dermatome				

Diagnosis

Special Tests

- *Orthopedic tests*
 - (✚) Dejerine's triad - may increase intrathecal pressure (Valsalva) (see pictures below)



- (+) Cervical compression (Spurling's test) → for neck or radicular pain
- (✚) Cervical distraction (for decreased radicular symptoms)
- (✚) Shoulder abduction test (pain relief)



- (✚) Brachial stretch tests (upper limb tension test - ULTT) - for dermatomal pain referral
- (+) Soto-Hall/L'hermitte's sign

Treatment

General Measures

- Reduction & centralize pain, decrease inflammation (PRICE)
- Prevent further neurologic loss, decompress nerve root & attempt to reduce herniation
- Cervical collar or bracing (short term); cervical distraction in office or at home
- Pain free active non-resisted ROM
- Consider cervical pillow while sleeping

Massage Therapy

- During acute phase use mild techniques
- Myofascial release, Swedish, relaxation techniques

Follow-up

Rehabilitation Program

- Once pain & inflammation are controlled, patient's therapy should progress to restoration of full ROM & flexibility of neck & shoulder (PFROM & isometrics)
- As ability improves muscle stretching, strengthening & proprioceptive retraining should be added to treatment protocol as tolerated
- All exercises should be performed without pain, some post-exercise soreness is expected