DISORDERS OF
THE CERVICAL SPINE

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I hereby certify that, to the best of my knowledge, no aspect of my current personal or professional situation might reasonably be expected to affect significantly my views on the subject on which I am presenting.
OBJECTIVES

- Identify anatomical structures of cervical spine
- Describe components of conservative care
- List mechanical contributors to cervical spine disorders
- Discuss differential diagnoses for non-radiating neck pain
- Identify appropriate referral for inter-disciplinary care
DISORDERS OF THE CERVICAL SPINE

- Anatomy
- Mechanical contributors
- Physical assessment
- Diagnosis & treatment
- Inter-disciplinary care
- Case studies/Q&A

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Cervical Spine Anatomy Videos

http://www.youtube.com/watch?v=mwfuXcee_GY  3:10

http://www.youtube.com/watch?v=aDvbAvB1QuM  1:54

https://www.youtube.com/watch?v=RNUpMNd_u1U  7:12

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Cervical Spine: Anatomic Review

The Spinal Curves

- Forward Cervical Curve
- Backward Thoracic Curve
- Forward Lumbar Curve
- Forward Sacral Curve

Kyphosis
Lordosis

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Functions of the Cervical Spine

- Protect the brain stem & spinal cord
- Support the skull
- Allow for wide range of head movement
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Cervical Spine: Anatomic Review

7 CERVICAL VERTEBRAE

C1 body (atlas)

C2 body (axis)

Spinous process of C7

Body of C7

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Lumbar Vertebrae
- Spinous Process
- Lamina
- Pedicle
- Transverse Process

Axial (Overhead View)
- Vertebral Body
- Spinal Process

Lateral (Side View)
- Intervertebral disk
- Vertebral body
- Transverse costal facet

Superior articular process
Transverse process
Spinous process
Spinal cord

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- Intervertebral Disc
- Vertebral Body
- Facet Joints
- Pedicle

Facet Joints in Motion:
- Flexion (Bending Forward)
- Extension (Bending Backward)

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BONE, SOFT TISSUE, NERVES

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Intervertebral Discs

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Nerves
Cervical Spine: Anatomic Review

Discs

Facet Joint
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Vertebral body
Neural Foramen

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Muscles and Tendons

1. Semispinalis Capitus (head rotation/pulls backward)
2. Iliocostalis Cervicis (extends cervical vertebrae)
3. Longissimus Cervicis (extends cervical vertebrae)
4. Longissimus Capitus (head rotation/pulls backward)
5. Longissimus Thoracis (extension/lateral flexion vertebral column, rib rotation)
6. Iliocostalis Thoracis (extension/lateral flexion vertebral column, rib rotation)
7. Semispinalis Thoracis (extends/rotates vertebral column)
Neck & Arm Pain

* May be due to cervical disk

* Sometimes hard to separate causes:
  – shoulder
  – arm
  – carpal tunnel

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Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Cervical Nerve Compression

- Acute onset of pain starting in the medial shoulder blade area, upper arm culminating in numbness and tingling in fingers

- Causes: woke up funny, MVA, “bench heavy at the gym”

- Easily confused with intrinsic shoulder pain and peripheral nerve lesions.

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C6 Neurology

C6 Neurologic Level

Motor
- Wrist Extensors: Ext. Carpi Rad. Longus and Brevis
- Biceps

Reflex

Sensation
- C8
- C3
- T1
- T2
C8 Neurology

C8 Neurologic Level

Motor
- Interossei Muscles
- Finger Flexors

Reflex
- None

Sensation
- C6
- C7
- T1
- T2
T1 Neurology
Case Study #1

- 61 y/o male orthopedic surgeon
- Healthy appearing; slender
- Chronic cervical spine pain; bilateral shoulder pain; daily headaches X 1 mo.
- No history of previous trauma/injuries
- Well-controlled HTN/HLD; on beta blocker, statin, and 81 mg ASA daily.
Interview and examine the patient before any diagnostics are performed!
History & Physical Exam

- Essentials of Musculoskeletal Care
- Guide to Physical Examination and History Taking
<table>
<thead>
<tr>
<th>Onset</th>
<th>When did it start?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Where is it?</td>
</tr>
<tr>
<td>Duration</td>
<td>How long does it last?</td>
</tr>
<tr>
<td>Character</td>
<td>What does it feel like?</td>
</tr>
<tr>
<td>Aggravates/Alleviates</td>
<td>? makes worse/better</td>
</tr>
<tr>
<td>Radiation</td>
<td>Where does it go?</td>
</tr>
<tr>
<td>Timing</td>
<td>When does it happen?</td>
</tr>
<tr>
<td>Severity</td>
<td>Scale of 1-10</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>HPI: Case Study #1</th>
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</thead>
<tbody>
<tr>
<td>• Onset</td>
</tr>
<tr>
<td>• Location</td>
</tr>
<tr>
<td>• Duration</td>
</tr>
<tr>
<td>• Character</td>
</tr>
<tr>
<td>• Aggravates/Alleviates</td>
</tr>
<tr>
<td>• Radiation</td>
</tr>
<tr>
<td>• Timing</td>
</tr>
<tr>
<td>• Severity</td>
</tr>
<tr>
<td>• “H/As began 1 mo ago; neck pain for sev. yrs.”</td>
</tr>
<tr>
<td>• “neck &amp; shoulders”</td>
</tr>
<tr>
<td>• “intermittent”</td>
</tr>
<tr>
<td>• “aching; grinding; stiff”</td>
</tr>
<tr>
<td>• “performing surgery/ibuprofen”</td>
</tr>
<tr>
<td>• “B trapezius; shoulders”</td>
</tr>
<tr>
<td>• “H/As after work daily”</td>
</tr>
<tr>
<td>• “8/10”</td>
</tr>
</tbody>
</table>
Physical Examination

- Inspection
- Palpation
- Percussion
- Range of Motion (ROM)
- Sensation
- Circulation
- Muscle Testing
- Special Tests

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Physical Examination: Cervical Spine

Inspection

- **skin**: rashes, abrasions, scars, color, swelling, masses
- **Posture, alignment, curves**: kyphosis; lordosis; scoliosis; torticollis; “military” spine

Palpation

- **skin**: temperature, swelling, tenderness
- **paraspinal muscles**: tenderness, spasm
- **spinous processes**: tenderness, step off
- **muscle strength**: graded 0 - 5
Physical Examination

Percussion

Reflexes - Biceps (C5,C6); Triceps (C6,C7); Brachioradialis (C5,C6)

*Graded 0 – 4+ ( 2+ = Normal/Average)

* Use reinforcement or distraction if reflexes absent or diminished; i.e., clench teeth

Range of Motion (ROM)

• Flexion/Hyperextension
• Lateral bend
• Rotation
Range of Motion (ROM)

Extension
- Up to 55°

Flexion
- 45°

Right
- 40°

Left
- 40°

Left rotation
- 0°

Right rotation
- 0°

70°
P.E.: Case Study #1

- Inspection
- Palpation
- Reflexes
- Range of Motion
- Strength
- Sensation
- Circulation

- Skin w/o scars; cervical spine curve nl lordotic
- TTP bilateral trapezius
- 2+ (average; normal)
- Full, but stiff & painful
- WNL
- WNL
- WNL

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Diagnosis: Case Study #1

- Probable
- Possible
- Rule Out
- Unlikely
Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- HNP
DISORDERS OF THE CERVICAL SPINE

Cervical spondylosis = Arthritis of the neck

More than 85% of people >60 are affected
Cervical Spondylosis

**Definition:** arthritis of the neck caused by slow degeneration.

Degeneration of the spinal column, especially that resulting in abnormal fusion and immobilization of the vertebral bones.
Cervical Spondylosis

- Normal spine
- Disk
- Nerve
- Vertebra

- Osteoarthritic spine
- Bone spur
- Narrowed disk

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Cervical Spondylosis

Risk factors

• Age
• Occupation
• Neck injuries
• Genetic factors
Cervical Spondylosis

Symptoms

- Neck pain & stiffness
- Numbness & weakness in arms, hands, & fingers
- Trouble walking, loss of balance, or weakness in hands or legs
Cervical Spondylosis

Symptoms (cont.)

- Muscle spasms in neck and shoulders
- Headaches
- Grinding & popping sound/feeling in neck w/movement
Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- HNP
Definition: narrowing of the spine
Spinal Stenosis

* Etiology: congenital vs. acquired (degenerative)

* Lumbar region most common

* Also called neurogenic claudication
Spinal Stenosis

SYMPTOMS

• Stiffness, pain, numbness, or weakness in the neck, shoulders, arms, hands, or legs.

• Balance/coordination problems; shuffling or tripping while walking

• Loss of bowel or bladder control
Imaging/Diagnostics

- **X-Rays** - show the bones
- **CT (CAT) scans** - 3D X-rays
- **MRI** - 3D scans of the soft tissue
- **EMG’s** - test for nerve or muscle damage
Cervical Spondylosis

Normal x-ray

Spondylosis on x-ray

Spondylosis on MRI
Rest, ice

Meds: NSAIDs, steroid burst, narcotic and non-narcotic analgesics, gabapentin, muscle relaxers

Physical therapy

Chiropractic

Manual traction

Epidural injection
Treatment: Case Study #1

- Physical Modalities
- DME
- PT
- Pharmacological
- Activity Modification
- Referrals
Case Study #2

- 40 y/o female yoga instructor
- Healthy appearing; fit
- Sudden onset acute cervical spine and left shoulder pain after “heavy exercising” with left arm weakness.
- History of previous MVA 20 yrs ago
- No significant co-morbidities; takes OCP
**HPI: Case Study #2**

<table>
<thead>
<tr>
<th>Onset</th>
<th>“yesterday after yoga”</th>
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</thead>
<tbody>
<tr>
<td>Location</td>
<td>“neck &amp; left shoulder”</td>
</tr>
<tr>
<td>Duration</td>
<td>“constant”</td>
</tr>
<tr>
<td>Character</td>
<td>“burning; stabbing”</td>
</tr>
<tr>
<td>Aggravates/Alleviates</td>
<td>“Arm use/rest”</td>
</tr>
<tr>
<td>Radiation</td>
<td>“down left arm”</td>
</tr>
<tr>
<td>Timing</td>
<td>“worse in evening”</td>
</tr>
<tr>
<td>Severity</td>
<td>“9/10”</td>
</tr>
</tbody>
</table>

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P.E.: Case Study #2

- Inspection
  - Skin w/o scars; cervical spine military (no curve)
- Palpation
  - TTP & spasms, bilateral trapezius; L > R
- Reflexes
  - L Brachioradialis 1+
  - limited; painful
- Range of Motion
  - Weak L wrist extension
- Strength
  - Numb left thumb
- Sensation
  - WNL
- Circulation
Spurling’s maneuver

Lhermitte’s sign

Hoffman’s reflex

Positive left

Negative

Negative

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Spurling’s Maneuver
Lhermitte’s Sign

Positive Test = production of electrical "type" response or pins and needles near endrange flexion

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Hoffmann's reflex
Diagnosis: Case Study #2

- Probable
- Possible
- Rule Out
- Unlikely
Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Degenerative Disc Disease

Symptoms

• Pain

• Stiffness

• Numbness/weakness in shoulder, arm, or hand
Degenerative Disc Disease
Imaging/Diagnostics: Case Study #2

- X-ray
- MRI
- C5-6 disc space narrowing
- L C5-6 disc herniation

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Cervical Degenerative Disc Disease/HNP

- Normal Disc
- Degenerated Disc
- Bulging Disc
- Herniated Disc
- Thinning Disc
- Disc Degeneration with Osteophyte Formation

Blackened discs at multiple levels - a sign of significant damage.
Treatment: Case Study #2

- Physical Modalities
- DME
- Pharmacologic
- Referral
- Activity Modification
- Other
Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)
Spondylolysis/Spondylolisthesis

Definitions:

- spondylo = vertebrae
- lysis = broken
- listhesis = slipped forward
Cervical Spondylolisthesis

Symptoms

- Neck pain that extends toward the shoulder
- Pain between the shoulder blades
- Pain in the back of the head
- Radicular symptoms w/ pain, numbness, or weakness extending into the arms or legs
- Loss of coordination
- Bowel or bladder incontinence
Cervical Spondylolisthesis
References


•Our Mission: To improve the lives of people with musculoskeletal conditions through education, research & service.

•Our Goal: To raise the profile and priority of non-surgical musculoskeletal health with local hospitals, schools and the general public, while encouraging a collaborative, multi-disciplinary care model in ortho community.

•We call this approach Orthopedic Primary Care.
About JOF

• We strive to remove barriers to innovation and improvement of care by embarking on efforts that build community among schools, hospitals, providers, & the industry.

• JOF’s vision is to be the Bay Area’s pre-eminent resource for information, collaboration and innovation affecting musculoskeletal health and common orthopedic conditions.
Thank You

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