THE OSTEOPATHIC WORKSHOP: NECK PAIN

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Family Medicine | Neuromusculoskeletal Medicine | PGY-3

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DISCLOSURES

There are no actual or potential personal, financial or legal conflict of interest in relation to this program or presentation.
LEARNING OBJECTIVES

• Reflect on the Background to Neck Pain
• Review Cervical Region Anatomy
• Discuss the Evaluation of Patients with Neck Pain
• Participate in the Osteopathic Workshop

“A student of life must take in each part of the body and study its uses and relations to other parts and systems”

Andrew Taylor Still
Background to Neck Pain
“Neck pain is one of the most common complaints of patients seeking a primary care physician... it is 1st for MVA victims and only 2nd to low back pain for patient’s seeking manual treatment”

“Accurate, gentle diagnosis & treatment of the cervical spine is an important aspect of patient care”

BACKGROUND TO NECK PAIN

Neck pain can be due to many factors:

- Cervical Somatic Dysfunction [M99.01]
- Cervical Muscle Strain [S16.1]
- Cervical Ligament Sprain [S13.4]
- Cervical Spondylosis [M47.812]
- Cervical Spondylotic Myelopathy [47.12]
- Cervical Radiculopathy [M54.12]
BACKGROUND TO NECK PAIN

Text Neck Syndrome
Not Just a Neck Problem

Assessment of stresses in the cervical spine caused by posture and position of the head. An increase in forward head position increases the weight on the cervical spine.

<table>
<thead>
<tr>
<th>Head Position</th>
<th>0°</th>
<th>15°</th>
<th>30°</th>
<th>45°</th>
<th>60°</th>
</tr>
</thead>
<tbody>
<tr>
<td>12s</td>
<td>27s</td>
<td>40s</td>
<td>49s</td>
<td>60s</td>
<td></td>
</tr>
</tbody>
</table>

When the head is brought forward and the neck bends, the weight on the cervical spine increases.

Anterior Head Position can cause permanent damage and result in:

- Headaches
- Neck Pain
- Muscle Damage
- Nerve Damage
- Spinal Disc Herniation
- Spinal Disc Compression
- Bladder and Bowel Problems
- Loss of Lung Volume Capacity
- Gastrointestinal Problems
- Onset of Early Arthritis

Inflammation, disc injury, or a pinched nerve in the neck can cause pain in the head, shoulders, and down one or both arms.

Neck pain is reported more frequently in women than in men.

15% of the American population reports that neck pain is their most common medical complaint.

Prevalence of Selected Types of Pain, by Gender
Cervical Region Anatomy
Vertebral motion of the superior vertebrae on inferior vertebrae: Rotation (R)
Ex: C2 refers to C2 in relation to C3

Anatomic Position: Neutral (N)
Forward bending: Flexion (F)
Backward bending: Extension (E)
Lateral Flexion: Sidebending (S)
7 Cervical Vertebrae

Atypical Cervical Spine
• C1, C2, C7

Typical Cervical Spine
• C3-C6
Occipit on C1 “Atlas”
Sidebending and rotation occur to opposite sides
“Type-1-like”
ATLANTO-AXIAL (AA) JOINT

Articulation of C1 on C2
- C1 - “Atlas”
- C2 - “Axis”

Primary motion: Rotation

C1 “Atlas” articulates with Dens of C2 “Axis”
C2 - C7 CERVICAL VERTEBRAE

Articulations of C2 on C3, C3 on C4...
C7 on T1

Obeys Fryette’s 2nd Law:
- Sidebending and rotation occur to same sides
**POSTERIOR NECK MUSCLES**

**Trapezius**

**Origin:** External occipital protuberance, nuchal ligament, spinous processes of C7-T12, occipital bone

**Insertion:** Lat 1/3 of clavicle, spine of scapula, acromion, nucal ligament

**Function:**
- Elevate shoulder, depress & retract scapula
- Steadies scapula on thorax
- Extend, laterally flex & contralaterally rotate head
**Levator scapulae**

**Origin:** Transverse processes of C1-C4

**Insertion:** Superior border of scapula

**Function:** Elevates scapula
**Spleniøs Capitis**

**Origin:** Nuchal ligament and spinous processes of C7-T3

**Insertion:** Occipital and mastoid process of temporal bone

**Function:**
- Extend head
- Laterally flex and rotate head to same side
Sternocleidomastoid

**Origin:** Manubrium and medial clavicle

**Insertion:** Mastoid process of the temporal bone, superior nucial line

**Function:**
- Tilt head to ipsilateral shoulder
- Rotates head to opposite shoulder
- Cervical flexion
ANTEROLATERAL NECK MUSCLES

Scalenes

Anterior
Origin: TP of C3-C6, Insertion: 1st rib
Function: Flex and SB ipsilaterally, rotate to opposite side

Middle
Origin: TP of C2-C6, Insertion: 1st rib
Function: SB ipsilaterally, elevates 1st rib

Posterior
Origin: TP of C4-C6, Insertion: 2nd rib
Function: SB ipsilaterally, elevates 2nd rib
Evaluation of Neck Pain
EVALUATION OF NECK PAIN

• Obtain a good HPI
• Visually inspect patient from different angles
• Use passive/active range of motion and orthopedic tests to determine restricted motion
• Palpate all accessible portions of the muscles involved
• Correlate findings with knowledge of anatomy and palpatory exam
• Obtain appropriate imaging
EVALUATION OF NECK PAIN
OSTEOPATHIC STRUCTURAL EXAM

With a focus on... Cervical Spine

1st SCREENING

Is there a problem?

“BIG PICTURE”

2nd SCANNING

Where is the problem?

“REGIONAL”
BIG PICTURE - “Is there a problem?”

**Look** for anatomical asymmetry:
- Gait
- Eye/Ear Lobe Levels
- Position of the Head in Relation to the Shoulders
- Cervical Lordotic Curve
- Overall Posture
- Skin Color
- Active Range of Motion
CERVICAL SCREENING
ACTIVE RANGE OF MOTION ASSESSMENT

BIG PICTURE - “Is there a problem?”

Motions:
- Flexion/Extension
- Sidebending
- Rotation

Where should you stand to observe the motions?
- To the side of the patient for flexion & extension
- Behind the patient for sidebending & rotation
CERVICAL SCREENING
“LISTEN” THROUGH YOUR HANDS

BIG PICTURE - “Is there a problem?”

Palpate
- Tissue Texture Changes
- Temperature
- Tenderness
- Paravertebral Fullness
- Quality of Motion Assessment (Passive ROM)
CERVICAL SCREENING
PASSIVE RANGE OF MOTION ASSESSMENT

REGIONAL- “Where is the problem?”

Motions:
• Flexion/Extension
• Sidebending
• Rotation

Where should you stand to observe the motions?
• Maintain light touch
• Use the head as a lever
CERVICAL SCREENING
PEARLS

Important to place patient in proper position for control
  • Remember operator ergonomics

Active Motion
  • Important to observe movement from correct point of view

Passive Motion
  • Essential to palpate region during range of motion
X-ray of the C-spine help rule out fracture or dislocation as well as diagnose osteoarthritis

CT scan for occult fractures, some soft tissues

MRI to diagnose soft tissue injuries and herniated discs
The Osteopathic Workshop
T.A.R.T. is used in diagnosing somatic dysfunction. The following signs are assessed during the osteopathic examination:

- **T** – Tenderness
- **A** – Asymmetry (static finding)
- **R** – Restricted range of motion (dynamic finding)
- **T** – Tissue texture changes
BARRIERS TO MOTION

Anatomic Barrier
- The limit of motion imposed by anatomic structure (limit of passive motion)

Physiologic Barrier
- The limit of active motion

Restrictive Barrier
- The functional limit within the anatomic and physiologic range of motion which abnormally diminishes the normal physiologic range of motion

Pathologic Barrier
- Permanent restriction of joint motion associated with pathologic changes of tissues (i.e. Osteophyte)
### Freyette’s Laws of Physiologic Motion

<table>
<thead>
<tr>
<th>1st Law: Type I</th>
<th>2nd Law: Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>Hyperflexion/hyperextension</td>
</tr>
<tr>
<td>Several Segments (3 or more)</td>
<td>1-2 Segments</td>
</tr>
<tr>
<td>Sidebending/rotation opposite</td>
<td>Sidebending/rotation to the same side</td>
</tr>
<tr>
<td>Rotation into the convexity</td>
<td>Rotation into the concavity</td>
</tr>
<tr>
<td>Postural</td>
<td>Traumatic</td>
</tr>
</tbody>
</table>
FREYETTE’S LAWS OF PHYSIOLOGIC MOTION

3rd Law

Inducing motion in one plane reduces or modifies the motion in the other two planes.
OA DIAGNOSIS

**Positioning:** grasp the patient’s head with both hands, with the fingertips of the index and middle fingers over the occipital articulations

- The OA joint will be assessed in the **neutral**, **flexed** and **extended** positions
- Perform **translation**
  - Right translation = Left sidebending
  - Left translation = Right sidebending
- Diagnosis = position of ease (e.g., OA FRLSR)
MUSCLE ENERGY FOR OA

Diagnosis: OA XRLSR or XRRSL (where X = flexed or extended)

- Position patient against the restrictive barrier
- Support the patient’s head the same hand positioning as diagnosis
- Have the patient sidebend their head away from the direction you are sidebending them for 3-5 seconds
  - Complete relaxation
- Establish new barrier
- Repeat 3-5 times
  - Final stretch then retest
MUSCLE ENERGY FOR FLEXED OA

Diagnosis: OA FRLSR or FRRSL

• Position patient against the restrictive barrier
• Support the patient’s head with one hand and position the other’s fingers beneath their chin
• Have the patient nod their chin into your fingers for 3-5 seconds
  • Complete relaxation
• Establish new barrier
• Repeat 3-5 times
  • Final stretch then retest
Diagnosis: OA ERLSR or ERRSL

• Position patient against the restrictive barrier
• Support the patient’s head with one hand and position the other’s fingers on the front of their chin
• Have the patient nod their chin into your fingers for 3-5 seconds
  • Complete relaxation
• Establish new barrier
• Repeat 3-5 times
  • Final stretch then retest
Positioning: markedly flex patient’s head forward to reduce rotation in lower vertebrae

- Passively rotate patient’s head to the motion barrier on each side
- Compare degree of restriction in rotation to right and left
- Diagnosis = position of ease (e.g., AA RL or RR)
MUSCLE ENERGY FOR AA

Diagnosis: AA RL or RR

- Position patient against the restrictive barrier
- Support the patient’s head using the same hand positioning as diagnosis
- Have the patient rotate their head away from the direction you are rotating them for 3-5 seconds
  - Complete relaxation
- Establish new barrier
- Repeat 3-5 times
  - Final stretch then retest
MUSCLE ENERGY AND THE Oculocephalognic Reflex

Eye movements reflexively affect the cervical musculature as the body attempts to follow the lead provided by eye motion.

**Diagnosis:**

OA **FRLSR** or **FRRLS**
AA **RL** or **RR**

- Position patient against the restrictive barrier
- Have the patient look to the opposite of the barrier for 3-5 secs
  - Complete relaxation
- Establish new barrier
- Repeat 3-5 times
  - Final stretch then retest
MUSCLE ENERGY FOR C2-C7

Diagnosis:  C2  FR RSR

• Position patient against the restrictive barrier
• Have the patient rotate their head away from the direction you are rotating them for 3-5 seconds
  • Complete relaxation
• Establish new barrier
• Repeat 3-5 times
  • Final stretch, retest
Counterstrain

**Demo**

- Find **tenderpoint**
- Position of **comfort** (70-100%)
- Hold for **90 secs**
- Slow, passive **return to neutral**
- **Recheck** tenderpoint
  - **Anterior** points usually treated with **flexion**
  - **Posterior** points usually treated with **extension**
### COUNTERSTRAIN

#### Tender Points and Location

<table>
<thead>
<tr>
<th>Tender Point</th>
<th>Location</th>
<th>Treatment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1</td>
<td>Posterior surface of mid-ramus</td>
<td>RA</td>
</tr>
<tr>
<td>AC2 – AC6</td>
<td>Anterior transverse process</td>
<td>F SA RA</td>
</tr>
<tr>
<td>AC7</td>
<td>Clavicular attachment of SCM</td>
<td>F ST RA</td>
</tr>
<tr>
<td>AC 8</td>
<td>Sternal attachment of SCM</td>
<td>F SA RA</td>
</tr>
</tbody>
</table>

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<tr>
<th>Tender Point</th>
<th>Location</th>
<th>Treatment Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC1 Inion</td>
<td>On Inion</td>
<td>F</td>
</tr>
<tr>
<td>PC1 lateral</td>
<td>Midway between inion and mastoid</td>
<td>E SA RA</td>
</tr>
<tr>
<td>PC2 lateral</td>
<td>Within semispinalis capitis muscle</td>
<td>E SA RA</td>
</tr>
<tr>
<td>PC2 midline</td>
<td>Superior aspect of spinous process</td>
<td>E SA RA</td>
</tr>
<tr>
<td>PC3 midline</td>
<td>Infero-lateral to C2 spinous process</td>
<td>F SA RA or F ST RAw</td>
</tr>
<tr>
<td>PC4 – PC8 midline</td>
<td>Inferior aspect of spinous process</td>
<td>E SA RA</td>
</tr>
</tbody>
</table>
REFERENCES

• Greenspan, Adam, Orthopedic Imaging: A Practical Approach, LWW 1st edition 2011
• Hoppenfeld, Stanley, MD; Physical Exam of the Spine and Extremities; 1976. pp105-132