THE CERVICAL SPINE
An Osteopathic Approach

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FOMA 2019
DISCLOSURES

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

• Participate in the Osteopathic Workshop
Cervical Region Anatomy Review
VERTEBRAE

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)
OCCIPITO-ATLANTO (OA) JOINT

Occiput 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”
The Osteopathic Workshop
Vertebral Artery
Vertebral Artery

- Normal vertebral arteries can narrow as much as 90% of their luminal size on the contralateral side to cervical rotation.
  - This is exacerbated in extension (backward-bending)!
Occipito-Atlantal (C₀-C₁) Test in Flexion & Extension

Sidebend Left/Rotate Right  Sidebend Right/Rotate Left
Atlanto-Axial ($C_1$-$C_2$)
Sidebending Right - Translation Left  C2/3-7

Index Finger over articular pillar
Sidebending Left-Translation Right C2-7

Index Finger over articular pillar
Sidebend and Rotation Left
Translation Left/Sidebending Right
Rotation Left @ C1 on C2
DIAGNOSIS OF SOMATIC DYSFUNCTION

• 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)
<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>
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<tr>
<td>Sidebending/rotation opposite</td>
<td>Sidebending/rotation to the same side</td>
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<tr>
<td>Rotation into the convexity</td>
<td>Rotation into the concavity</td>
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<tr>
<td>Postural</td>
<td>Traumatic</td>
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Freyette’s Laws of Physiologic Motion
FREYETTE’S LAWS OF PHYSIOLOGIC MOTION

3rd Law

Inducing motion in one plane reduces or modifies the motion in the other two planes
# Osteopathic Manipulative Treatment (OMT)

<table>
<thead>
<tr>
<th>Direct</th>
<th>Indirect</th>
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<tbody>
<tr>
<td>• Myofascial Release</td>
<td>• Myofascial Release</td>
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<tr>
<td>• Cranial (children)</td>
<td>• Cranial (adult)</td>
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<tr>
<td>• Still</td>
<td>• Still</td>
</tr>
<tr>
<td>• HVLA</td>
<td>• Counterstrain</td>
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<tr>
<td>• Muscle Energy</td>
<td>• FPR</td>
</tr>
<tr>
<td>• Soft Tissue</td>
<td>• LAS/BLT</td>
</tr>
<tr>
<td>• LVMA/Articulatory</td>
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<td>• Springing</td>
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# OMT CONTRAINDICATIONS

<table>
<thead>
<tr>
<th>Muscle Energy</th>
<th>HVLA</th>
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<tbody>
<tr>
<td>Muscle Tear</td>
<td>Absolute</td>
</tr>
<tr>
<td>Fracture</td>
<td></td>
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<tr>
<td>Severely Ill</td>
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<td>Relative</td>
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OSTEOPATHIC MANIPULATIVE TREATMENT (OMT)

- Myofascial Techniques • Longitudinal stretch • Perpendicular stretch • Mobilization (figure eight, traction) • Suboccipital tension release
- Soft Tissue Techniques • OA Suboccipital Release • Longitudinal Stretching • Perpendicular Stretching
- Counterstrain
- Muscle Energy
  - MET for OA • Same set up as HVLA into all three planes of motion. • 3-5 seconds of isometric contraction. • Post isometric relaxation stretching. • Repeat. • Final stretch
  - for AA • AA is rotational only • Flatten AP curve. • Rotate to barrier. • Patient rotates into ease (dysfunction.)
- HVLA
  - Glide head on condyles into Flexion or Extension barrier. • Sidebend to barrier. • Rotate to barrier. • Short rotational thrust though barrier in direction of ipsilateral eye
  - for AA • Flatten AP curve ( DO NOT Flex.) • Rotate to barrier. • Short Thrust through rotational barrier
COUNTERSTRAIN

- Find tenderpoint
- Position of comfort (70-100%)
- Hold for 90 secs (120 secs for ribs)
- Slow, passive return to neutral
- Recheck tenderpoint
  - Anterior points usually treated with flexion
  - Posterior points usually treated with extension
COUNTERSTRAIN

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- Hold for 90 secs (120 secs for ribs)
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ATLANTO-OCCIPITAL (OA) JOINT
FLEXION/EXTENSION
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
MUSCLE ENERGY FOR EXTENDED OA

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
AA DIAGNOSIS

**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 OCULOCEPHALOLOGYRIC REFLEX

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

Diagnosis:
OA FRLSR or FRRSL
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
Regional Testing (Clinical Pearls)

- If flexion-extension limitation with less sidebending/rotation loss, think
  - OA

- If a patient presents with neck pain and on physical exam demonstrates only rotational limitation, think
  - A-A dysfunction

- If mostly sidebending limitation with some limitation of rotation, think
  - C2-7
REFERENCES

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