Movement System Impairment Syndromes of the Cervical Spine
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Human Movement System
- Physical Therapy Identity
- Diagnosis made by PTs are of the movement system
- Movement System Impairment (MSI) Syndromes
  - Subset of Movement System Diagnoses

MSI Syndromes
- Named for the alignment and/or movement direction that most consistently causes pain and is impaired
- When the impaired movement is corrected the symptoms decrease or are eliminated

Movement System Impairment Diagnoses of Cervical Spine
- Extension
- Rotation*
- Flexion
- Rotation-extension
- Rotation-flexion
- * most common component

Manual Skills
- Hands on for
- Assessing the cervical rotation
  - Where the motion is occurring
  - The resistance of shoulders and shoulder musculature
- Correction of cervical muscle effects and the effect on mobility
- Treatment:
  - Guide patient in correct motion
  - Alleviating symptoms with correction of cervical alignment,
  - Cervical motion
  - Shoulder girdle muscular effects
- Manual assistance for correction in several positions

Contributing Factors
- The musculature of the shoulder girdle affects
  - alignment, movement, stress on the cervical spine
  - alignment of the shoulder girdle is a key to cervical pain
- The alignment of the thorax affects the alignment of the cervical spine
  - Both kyphosis and flat
- Alteration of intrinsic cervical muscle performance
  - usually related to head position in relation to gravity
- Compensations between upper and lower cervical spine motion

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Common Impairments

- **Intrinsic** neck muscles become weak or long - compromise fine control of vertebral motion
- **Extrinsic** muscles become dominant adding to compressive, rotational, & shear forces exerted on the cervical spine

![Upper Cervical Range of Motion](image)

**Head and Neck Extensors**

- **Intrinsic muscles**
  - semispinalis capitis
  - semispinalis cervicis
  - **pure sagittal rotation**

![Lower Cervical Range of Motion](image)

**Head & Neck Rotators/extensors**

- **Intrinsic muscles**
- semispinalis cervicis
- superior oblique
  - inferior oblique
- rectus capitis cervicis

**Attached to C2**

![Attachment of Cervicoscapular Muscles Extension with Translation](image)

- Trapezius - Levator Scapulae
CERVICAL EXTENSION SYNDROME

- Signs and Contributing Factors: Altered upper and lower cervical participation; overdeveloped extensors, inadequate deep neck flexors

Cervical extension with shoulder flexion.

CERVICAL ROTATION SYNDROME

- Signs and Contributing Factors: Asymmetrical upper and lower cervical rotation, imprecise rotation, altered action of cervico-scapular muscles

Upper trapezius rotates head & neck to opposite side

Kendall 1993
Cervical rotation to the right during left shoulder flexion

Right shoulder flexion

Left shoulder flexion

Spinous processes to left

Asymmetrical Rotation

Cervical rotation limited by trapezius and levator scapulae muscles

Maximum rotation

Shoulders passively elevated

Upper and lower shifted to left

Cervical rotation limited by upper trapezius & levator scapulae muscles

Maximum rotation

Rotation with shoulders elevated

Upper cervical rotation not lower

Tennis instructor

Cervical Rotation: Impaired - Affected by Cervico-Scapular Muscles

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Impaired Flexion

Forward head with increase upper thoracic flexion

Flexion – lower spine remains extended

Neck Flexors

- Intrinsic muscles
- Longus capitis
- Longus colli
- Pure sagittal rotation

Dominant Extrinsic Neck Flexors

- Sternocleidomastoid
  - Sternal & clavicular head > Mastoid
  - significant influence on cervical spine motion but does not directly
  - attach to Cspine
- Function:
  - bilateral - flexion
  - unilateral - rotate to one
  - side & laterally flex to
  - opposite side

Sternocleidomastoid Multiple Actions

- Rotation
  - Extend upper C-spine
- Flexion lower C-spine
  - Forward translation with anterior shear
  - Particularly with weak intrinsics

Lengthen Intrinsic Neck Flexors

- Longus capitis
  - TP’s C3-6 > Occiput
- Longus colli
  - TP’s C3-C5 > C1 arch
  - Bodies of T1,2,3 > TP’s C5,6
  - Bodies of C5-7, T1-3 > Bodies
  - of C2,3,4

Deep Neck Flexor Muscle Weakness
Weak Deep Neck Flexor Muscles
Unable to Maintain Flexion

Impaired Positioning – Cervical Extension with Rocking

Upper Cervical Extension

Shoulder Elevation and Kyphosis Contributing to Cervical Extension

Improved Alignment – Decreased Pain

Contribution factors: long trunk, short arms, large breasts with bras straps adding to downward pull on neck

Poor sitting alignment
Corrected sitting alignment
Dominant Extrinsic Neck Flexors

Scaleni:
Anterior - TP's C3-6 > 1st rib
Middle - TP's C2-7 > 1st rib
Posterior - TP's C5-7 > 1st rib

Function:
Flexion with anterior shear
Depressed chest affects cervical alignment

CERVICAL FLEXION SYNDROME

Cervical Flexion and Flat Thoracic Spine

Kendal 1993

Cervical Lordosis with thoracic kyphosis

Kendal 1993

Another form of Flexion Syndrome: Swayback

SCALENE MUSCLE RESTRICTION

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Without arm support

Passive elevation of rib cage

With arm support

Shoulder Depression – Cervical Compression

Initial Visit

Two Months later

Cervical surgery twice still in constant pain

Shoulder Depression – Cervical Extension

Initial Visit

Two Months Later

Improved Shoulder Motion – Decreased Compression

Initial Visit

Two Months Later