Movement System Impairment Syndromes of the Extremities, Cervical and Thoracic Spines

Chapter III: Movement System Syndromes of the Cervical Spine

Figure 3-1. **A**, Forward head. **B**, Correction.

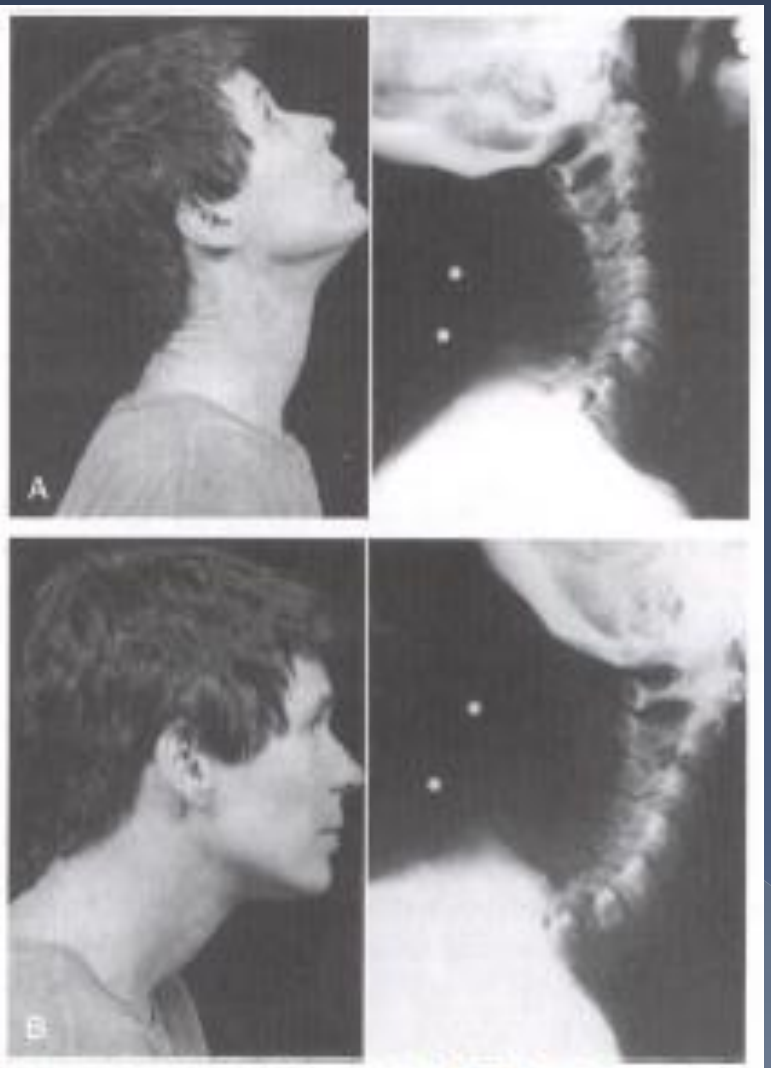

Figure 3-2. **A,** Cervical extension. **B,** Slumping to increase thoracic flexion. Forward head with cervical extension. (From Kendall FP, McCreary EK, Provance PG: *Muscles: testing and function*, ed 4, Philadelphia, 1993, Lippincott Williams & Wilkins.)

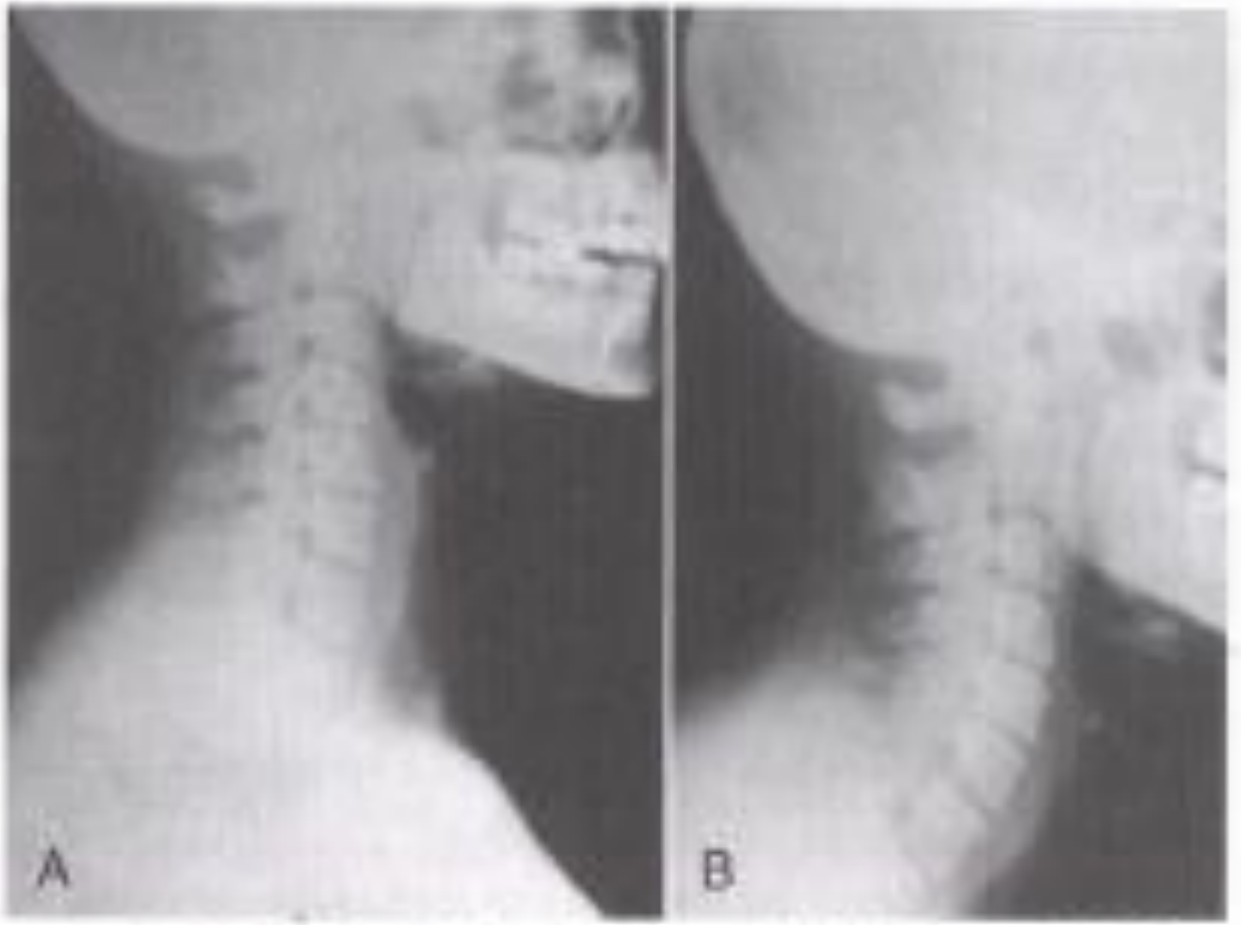

Figure 3-3. **A,** Erect sitting. Good cervical alignment. **B,** Same subject slumping with thoracic flexion. Forward head with cervical extension. (From Kendall FP, McCreary EK, Provance PG: *Muscles testing and function*, ed 4, Philadelphia, 1993, Lippincott Williams & Wilkins.)

TABLE 3-1
Distribution of Motion in the Cervical Spine

Motion	Total Motion (Degrees)	Majority of Region Contributing to Motion	Regional Motion (Degrees)
Flexion	45-50	Lower cervical region	35
Extension	85	Lower cervical region	70
Axial rotation	90	Upper cervical region	40-45
		Lower cervical region	45
Lateral flexion	40	Lower cervical region	35

Adapted from Neumann DA: *Kinesiology of musculoskeletal system: foundations for physical rehabilitation*, St Louis, 2002, Mosby.

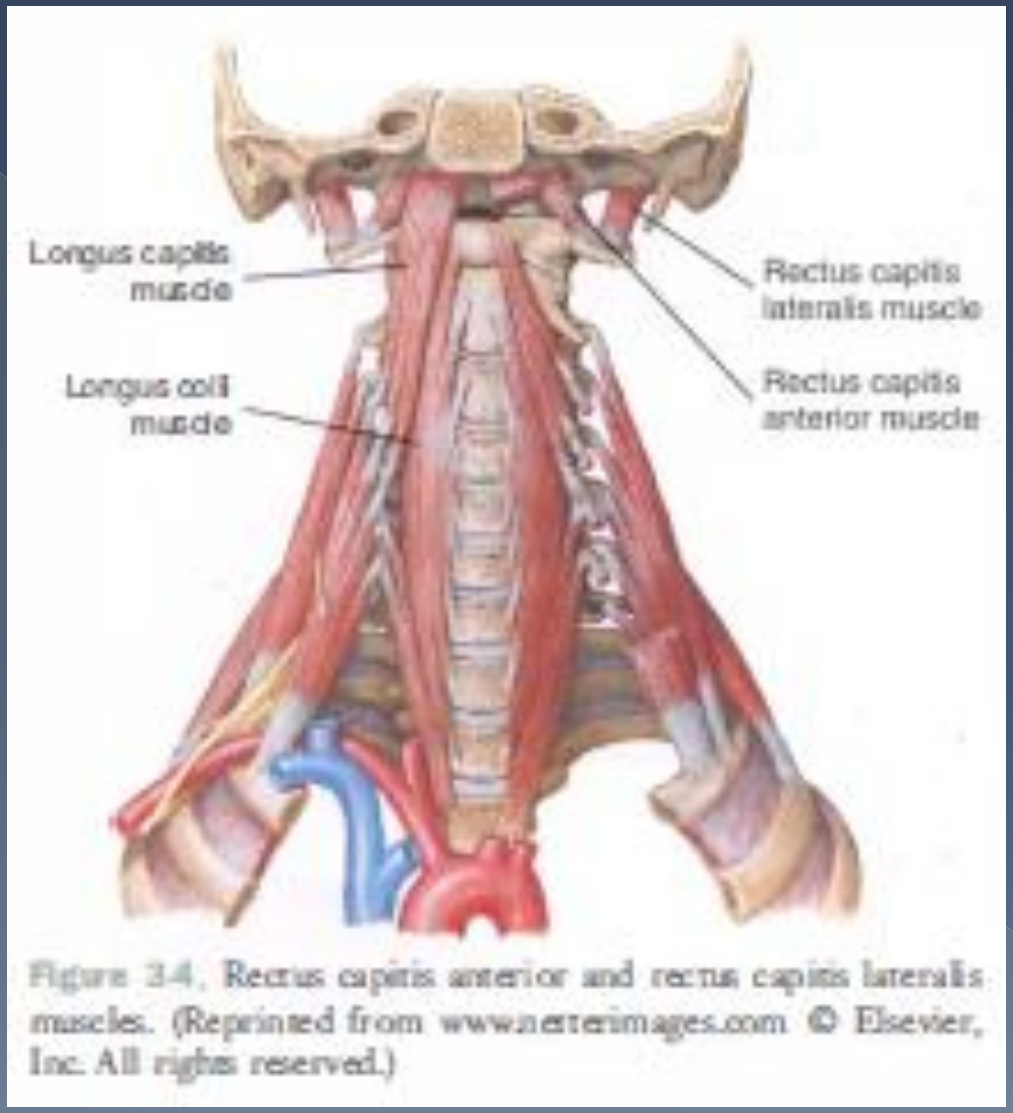

Figure 3-4. Rectus capitis anterior and rectus capitis lateralis muscles. (Reprinted from www.netterimages.com © Elsevier, Inc. All rights reserved.)

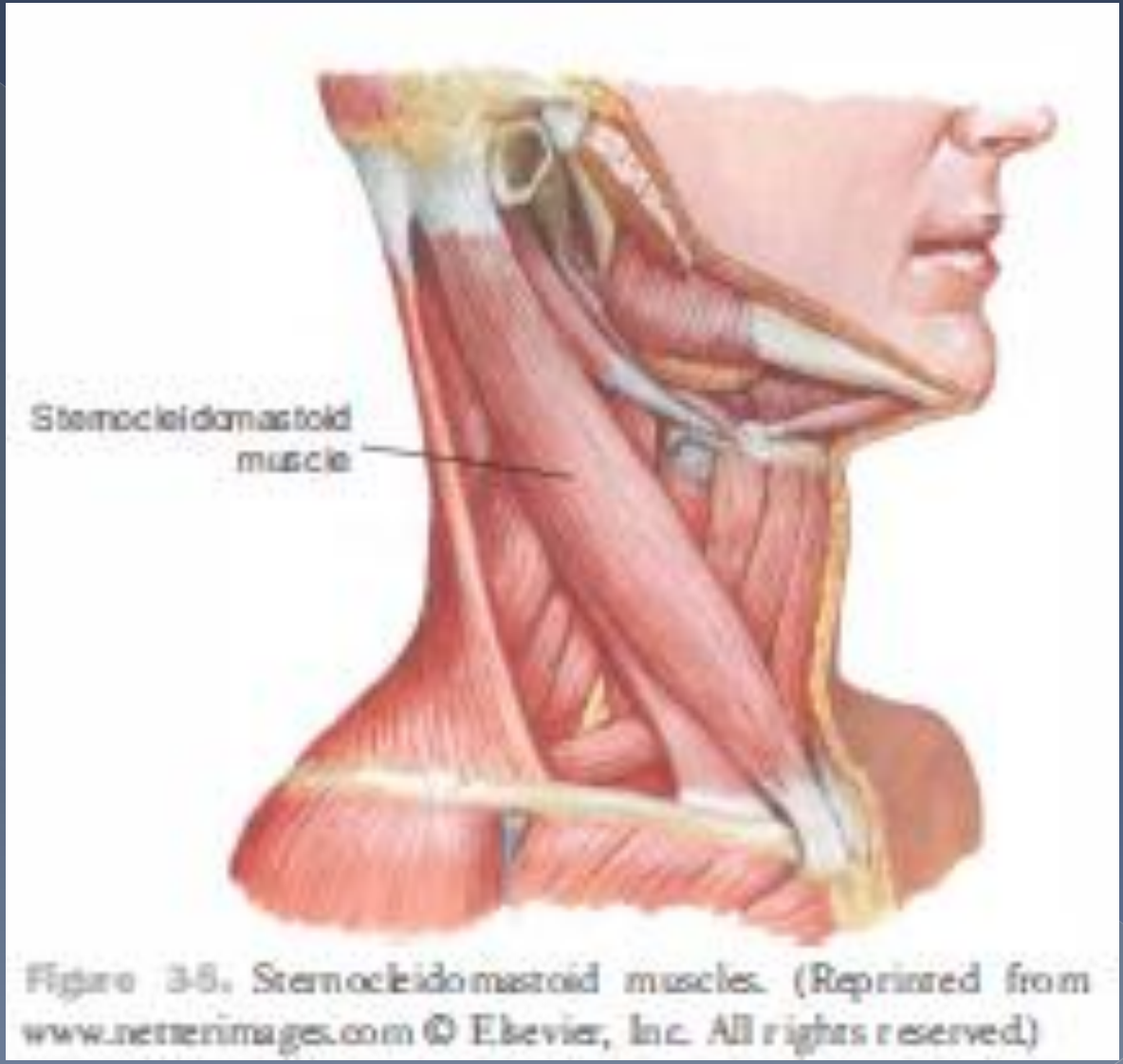

Figure 38. Sternocleidomastoid muscles. (Reprinted from www.netterimages.com © Elsevier, Inc. All rights reserved)

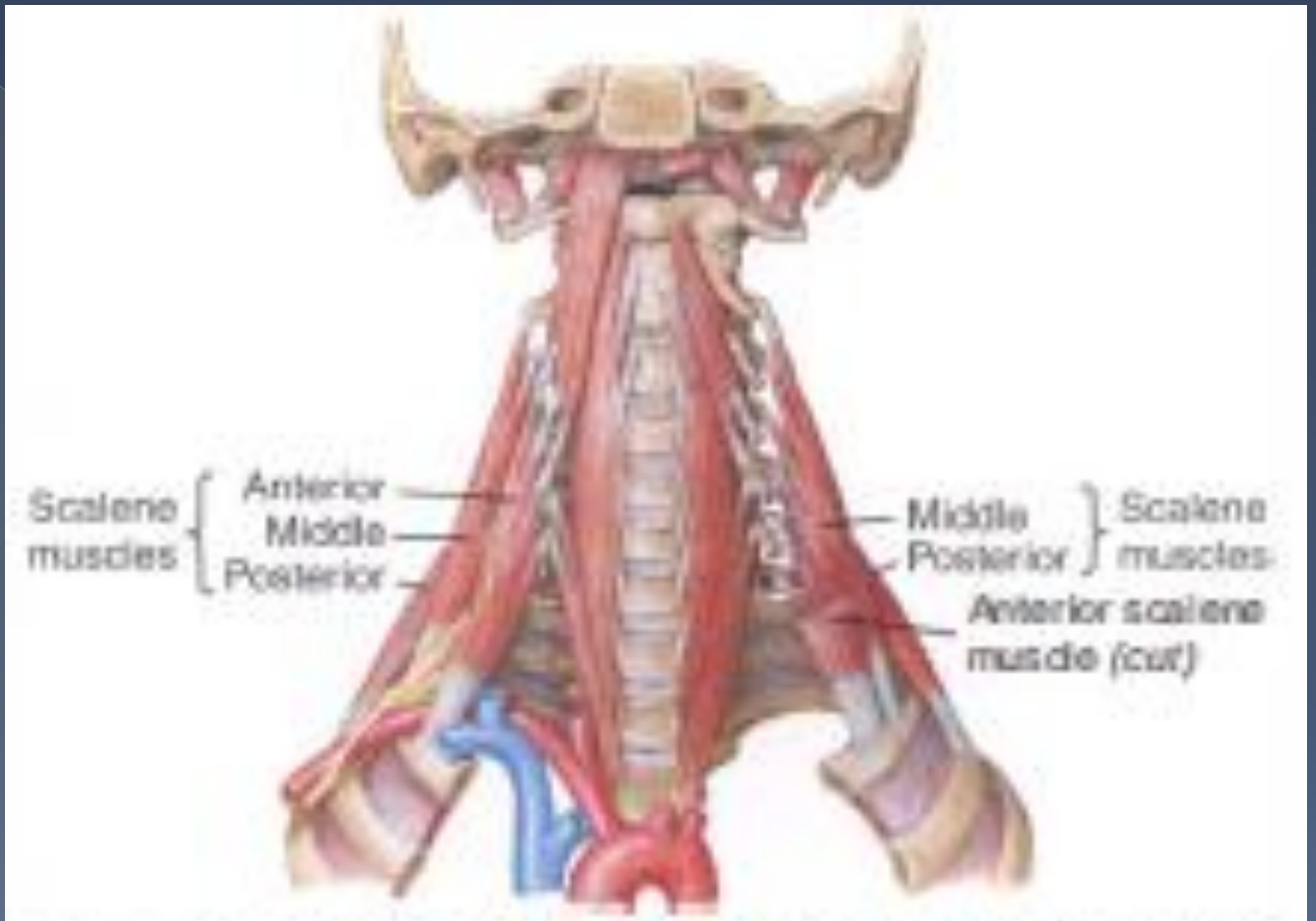

Figure 3-6. Anterior and medial scalenes muscles. (Reprinted from www.netterimages.com © Elsevier, Inc. All rights reserved.)

Figure 3-7. Active cervical flexion demonstrating greater translation motion than sagittal rotation.

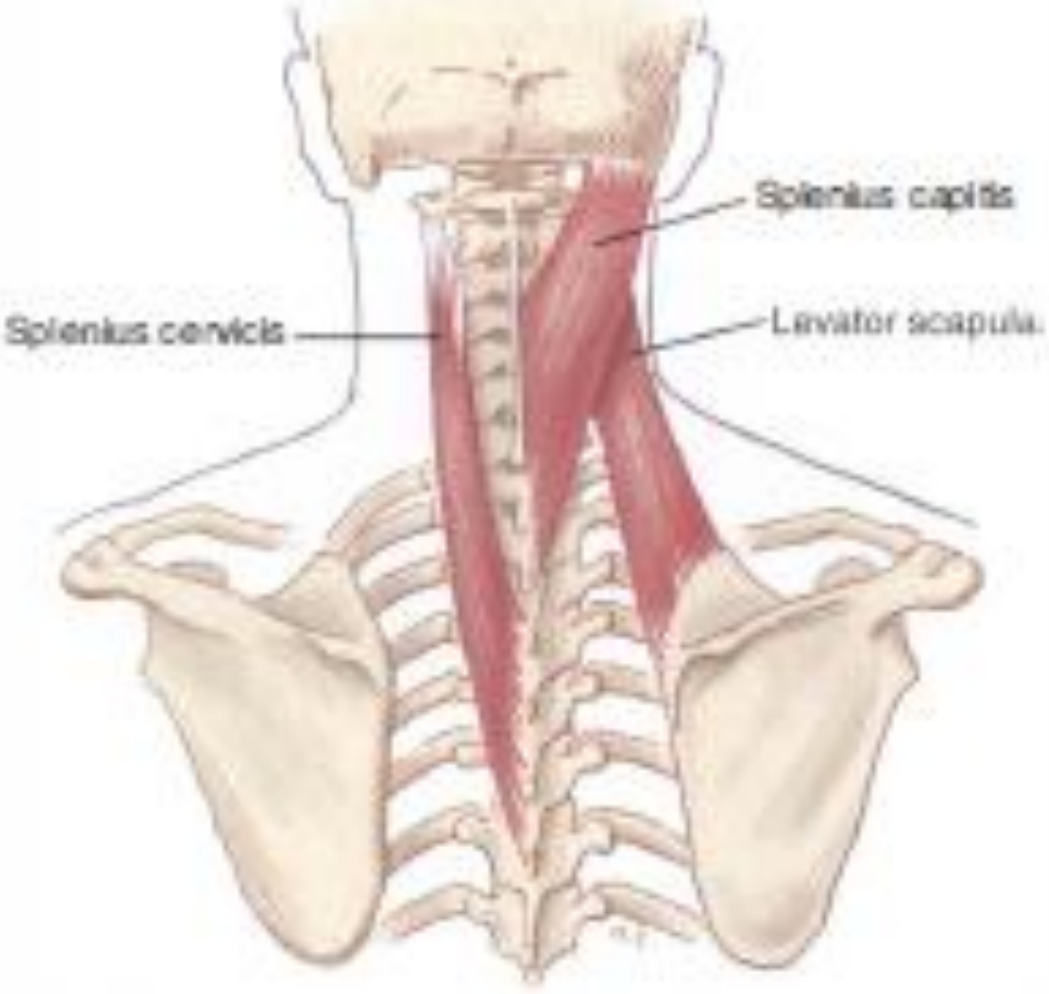

Figure 3-8. Intrinsic cervical extensors. (From Neumann, DA: *Kinesiology of the musculoskeletal system: foundations for rehabilitation*, ed 2, St Louis, 2010, Mosby.)

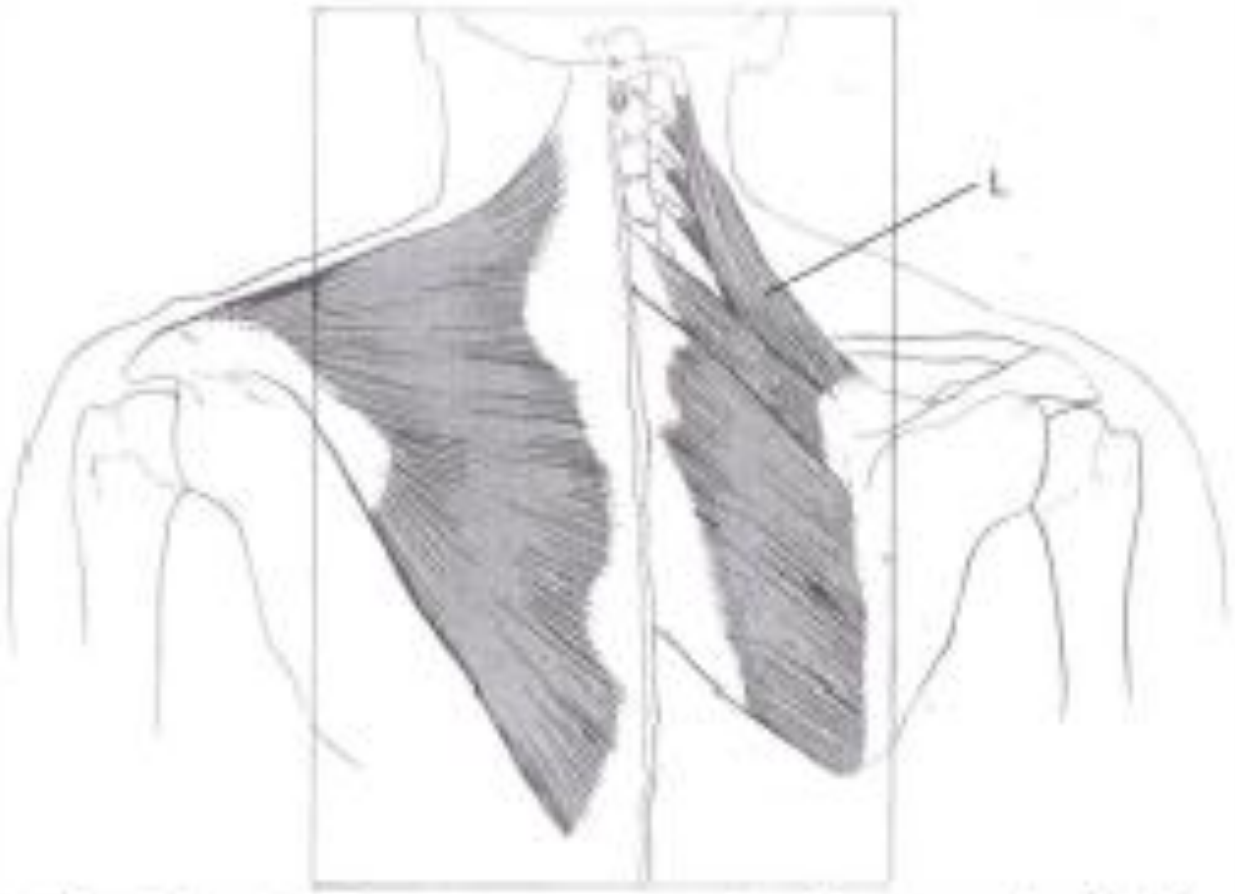

Figure 3-9. Extrinsic cervical extensors—upper trapezius, levator scapulae (*L*). (From Porterfield JA, DeRosa C. *Mechanical neck pain: perspective in functional anatomy*. Philadelphia, 1995, Saunders.)

Figure 3-10. Hands and knee cervical extension with active levator scapulae.

Figure 3-11. Prone cervical extension with active levator scapulae.

Figure 312. Faulty rotation with extension.

Figure 3-13. Faulty rotation with flexion.

Figure 3-14. Passive support of the upper extremities can reduce the passive stretch of the upper trapezius and levator scapulae.

TABLE 3-2
Cervical Spine Syndromes in Order of Frequency of Observation

Syndrome	Key Findings
Cervical extension-rotation	Forward head with asymmetrical findings: Asymmetry in cervical spinal musculature and/or scapula alignment; pain with rotation-associated sidebending and extension; weak intrinsic cervical flexors; dominance of extrinsic cervical rotators
Cervical extension	Forward head; pain with extension; translation greater than sagittal rotation; weak intrinsic cervical flexors
Cervical flexion-rotation	Decreased cervical lordosis, flat thoracic spine; pain with rotation-associated flexion; excessive recruitment of extrinsic cervical rotators, anterior and middle scalenes
Cervical flexion	Decrease cervical lordosis, flat thoracic spine, pain with flexion; lower cervical flexion greater than upper thoracic flexion; excessive recruitment of extrinsic neck flexors; poor recruitment of intrinsic neck extensors during extension

Figure 3-15. **A,** Good alignment. **B,** Increased thoracic kyphosis is correlated with an increase in a forward head position.

Figure 3-16. Faulty active cervical extension; upper cervical motion is greater than lower cervical motion.

Figure 3-17. Cervical extension movement impairment: Greater upper cervical extension than lower cervical extension (the upper cervical spine is more extended than the lower cervical spine).

Figure 3-18. Associated limited cervical flexion.

Figure 3-19. Cervical flexion with anterior translation. Lower cervical remains extended.

Figure 3-20. Faulty supine neck flexion.

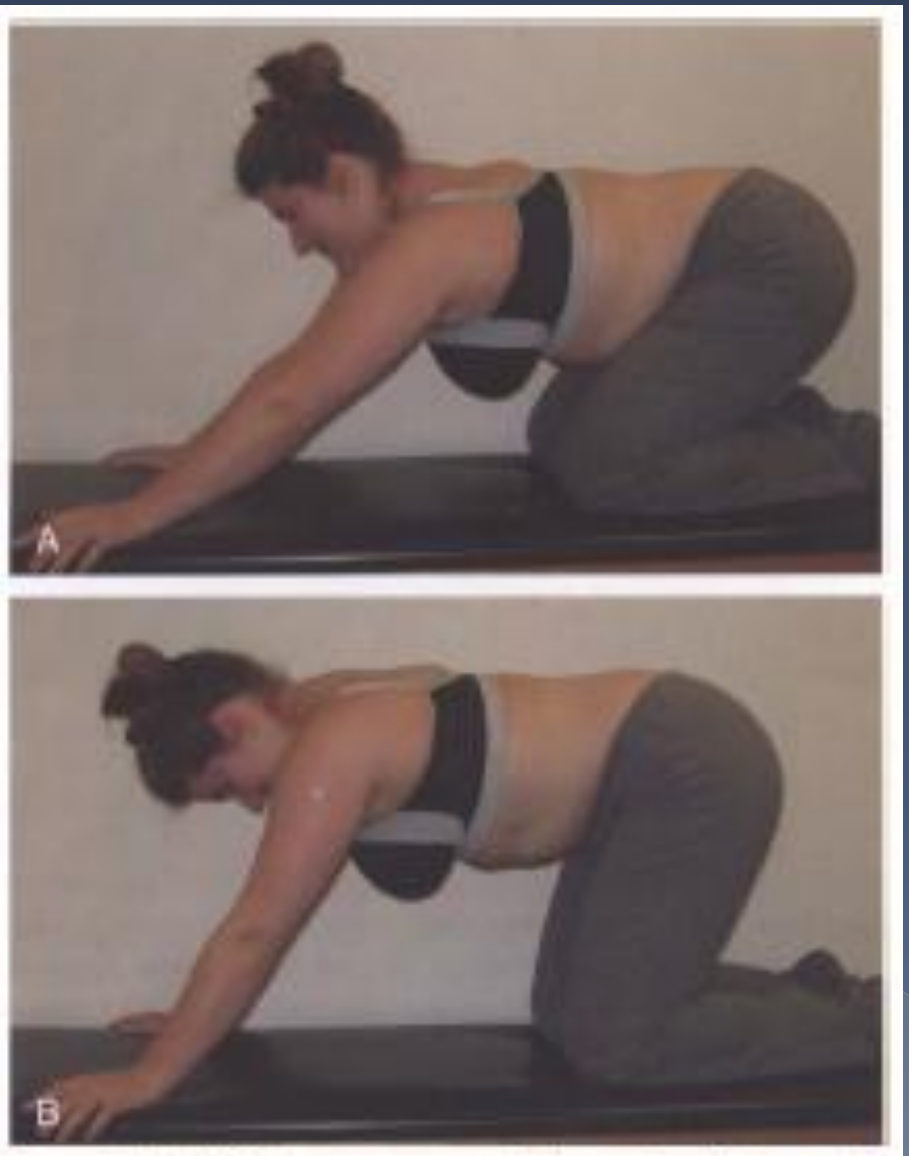

Figure 3-21. A, Compensatory cervical extension during quadruped rocking back. B, Correction of compensatory cervical extension.

Figure 3-22. A, Sitting against the wall, arms supported, correct scapular position. B, Performing capital flexion.

Figure 3-23. Supine: Strengthening of deep cervical flexors with assistance.

Figure 3-24. Prone cervical extension with emphasis of sagittal rotation.

Figure 3-25. Quadruped cervical extension with emphasis of sagittal rotation in midrange.

Figure 3-26. Sitting back to wall, shoulder abduction lateral rotation.

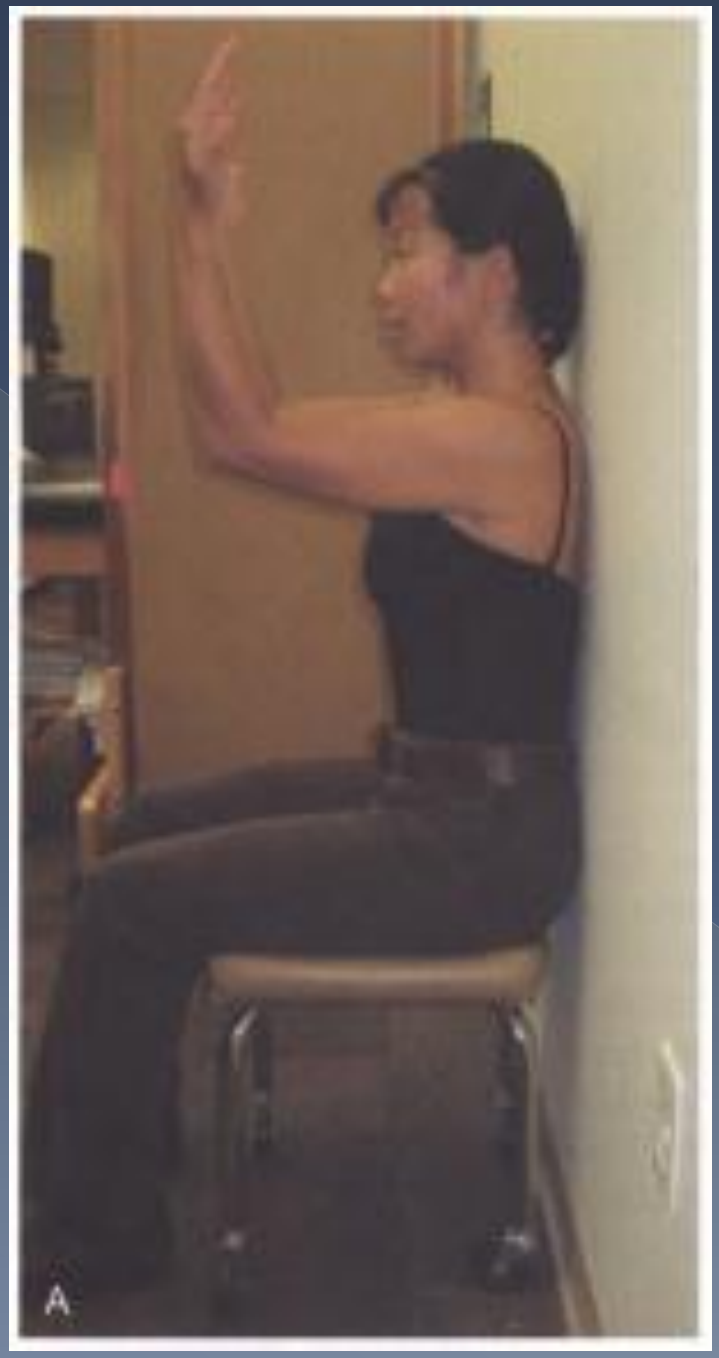
A

Figure 3-27. Back to wall sitting, shoulder flexion with lateral rotation. A, Start position. B, Shoulder flexion.

Figure 3-28. Progression of wall exercises with resistance bands and free weights.

Figure 3-21. Wall slide without resistance.

Figure 3-30. Progression of wall slide facing the wall exercise with scapula elevation adding resistance with elastic band. Patient instructed to look down and avoid any compensatory cervical extension.

Figure 3-31. Right scapula in a greater position of depression.

Figure 3-32. Right scapula in a position of greater downward rotation and depression than the left.

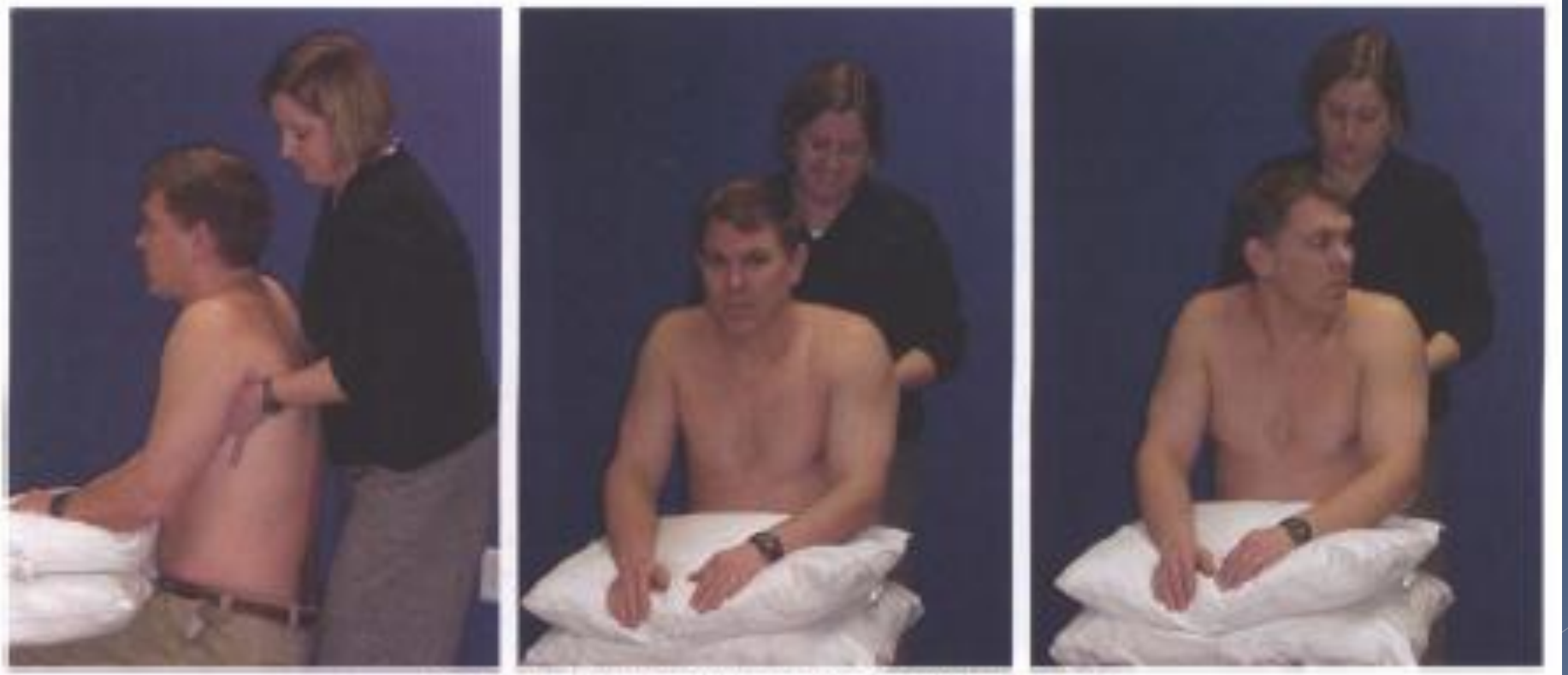

Figure 3-33. Passive elevation of the shoulder girdle test.

Figure 3-34. Patient in supine, arms supported on pillows, and head on folded towel.

Figure 3-35. Facing wall, arms overhead and supported on the wall.

Figure 3-36. Corrected quadruped (A) and quadruped cervical rotation (B).

Figure 3-37. Alignment side view.

Movement Analysis and Active Range of Motion Findings

	ROM (Degrees)	Movement Analysis	Symptoms
Flexion	49	Lower cervical spine remains extended	
Extension	80		Pain in the upper cervical region
Rotation R	49	Compensatory cervical extension	Painful in right lower cervical, correction of extension > decrease pain
Rotation L	60		
Lateral flexion R	40		
Lateral flexion L	55		
PASSIVE ELEVATED SHOULDER GIRDLE			
Flexion	60	Decrease cervical extension at end-range	
Extension	80		No complaint of pain
Rotation R	80		No complaint of pain
Rotation L	80		

ROM, Range of motion; R, right; L, left.

Figure 3-38. Standing shoulder flexion.

Figure 3-39. **A,** Supine shoulder flexion with rib cage elevation. **B,** Supine shoulder flexion with correction.

Diagnosis	Key Tests
Cervical extension-rotation	Alignment of cervical spine: Forward head with upper cervical extension. AROM: Painful limited cervical rotation with compensatory extension, correction of compensatory extension movement diminishes symptoms. Passive elevation of the scapulae increases ROM and decreases pain. Compensatory movements of the neck in the direction of extension with movements of the upper extremities and during muscle length testing.
Scapular abduction	Alignment: Scapula position is 4 inches from spine. AROM: Excessive abduction and decreased upward rotation with shoulder flexion.

AROM, Active range of motion; *ROM*, range of motion.

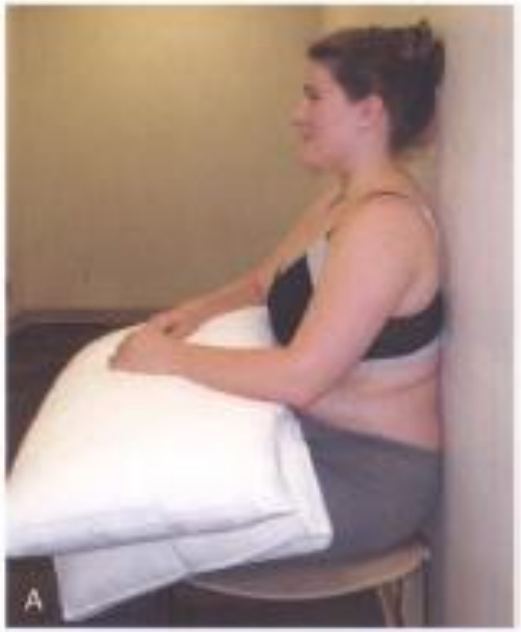

Figure 3-40. **A** and **B**, Sitting capital flexion arms supported.

Figure 3-41. **A,** Sitting-shoulder abduction with lateral rotation. **B,** Sitting-shoulder flexion with lateral rotation.

Figure 3-42. Assisted neck flexion.

Figure 3-43. **A** Starting position for trapezius exercises. **B**, Final position.

Figure 3-44. Arms supported on wall; capital flexion and rotation.

Figure 3-45 **A,** Rocking back with compensatory extension. **B,** Correctional exercise—rocking back without associated extension.

Figure 3-46. Decreased cervical inward curve. (A from Kendall FP, McCreary EK, Provance PG: *Muscles testing and function*, ed 4, Philadelphia, 1993, Lippincott Williams & Wilkins.)

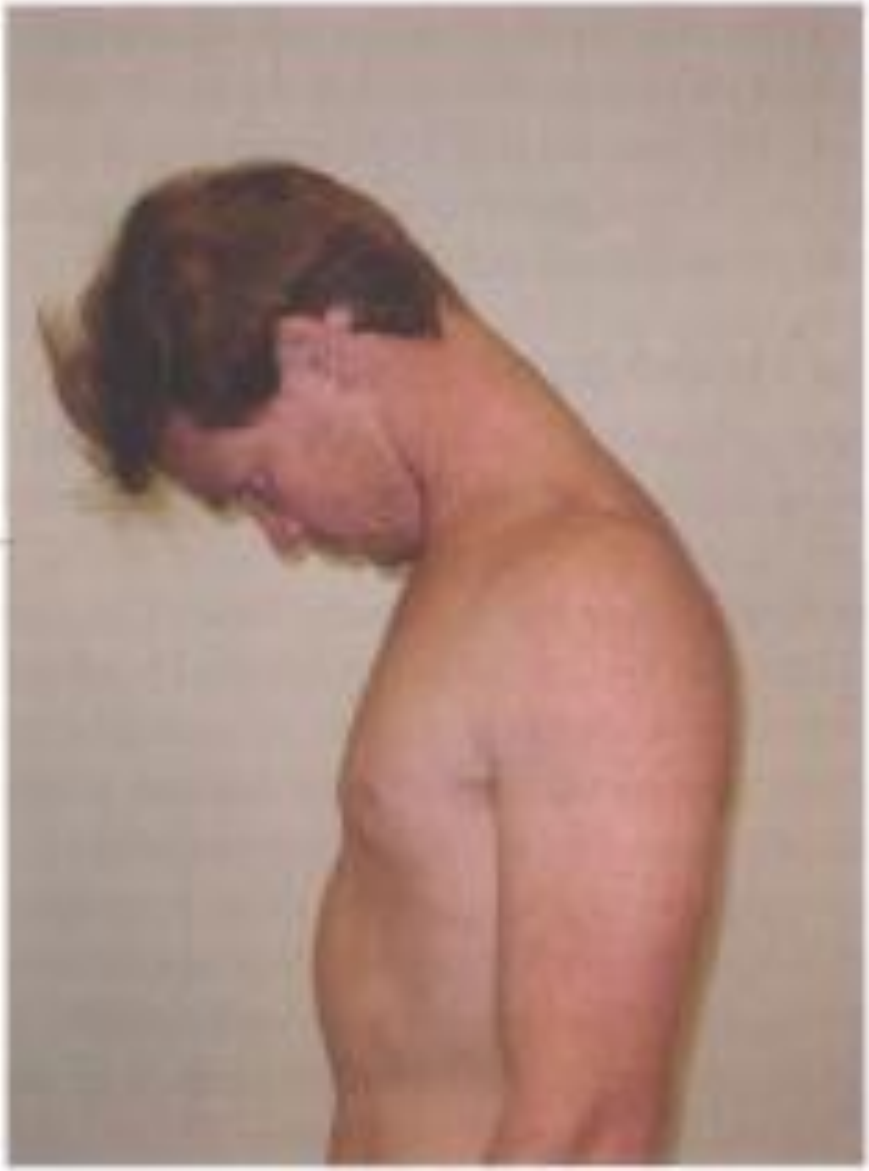

Figure 347. Movement impairment: Lower cervical flexion greater than upper thoracic flexion.

Figure 348. Prone position.

Figure 3-49. Quadruped position for cervical extension exercise.


A.

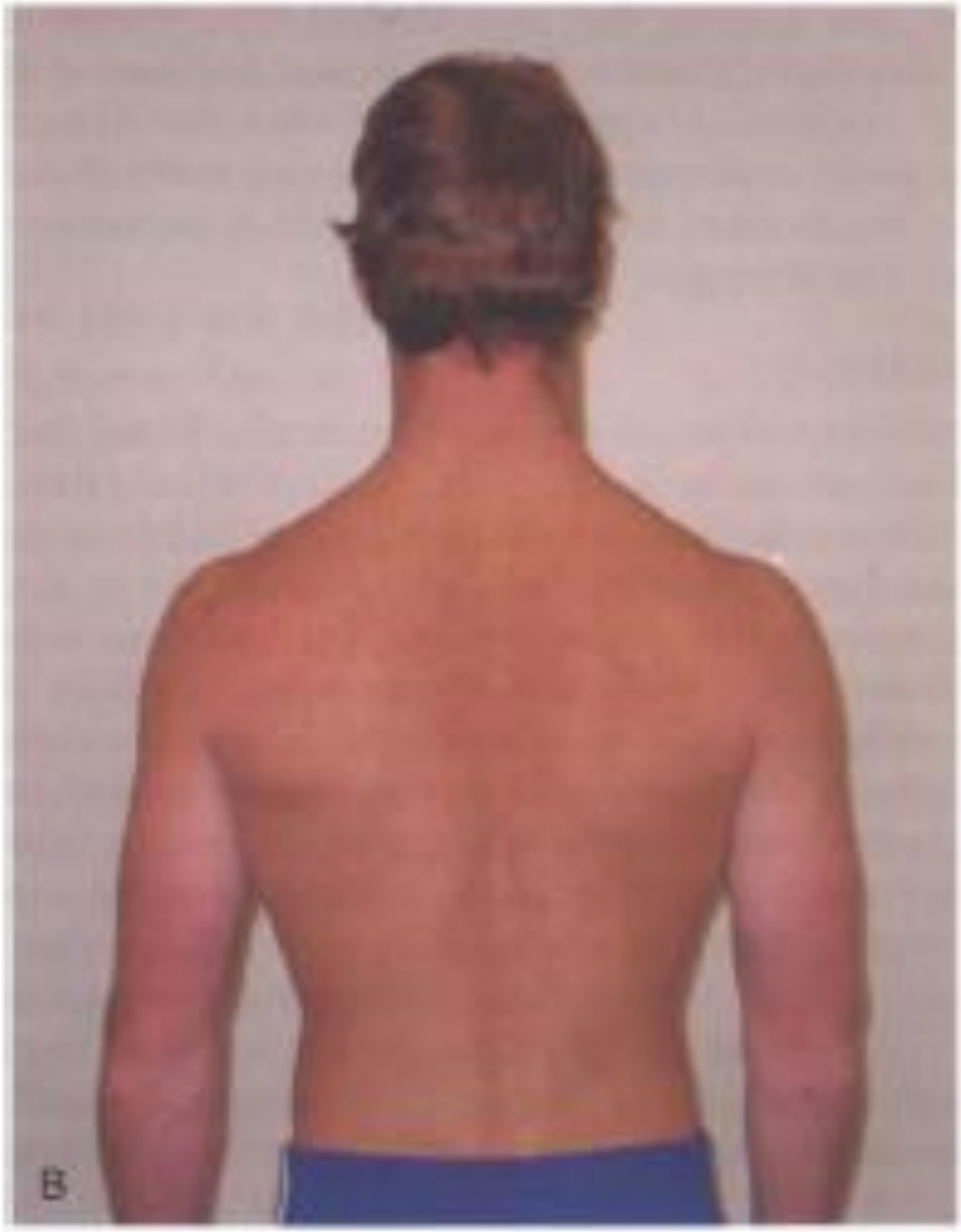

Figure 3-50, **A,** Reduced cervical curve from thoracic spine. **B,** Depressed shoulders.

	ROM (Degrees)	Movement Analysis	Symptoms
Flexion	70		Painful in the lower cervical region
Extension	70		
Rotation R	70		
Rotation L	60	Associated cervical flexion	Painful in the lower cervical region
Lateral flexion R	50		
Lateral flexion L	55		
PASSIVE ELEVATED SHOULDER GIRDLE			
Flexion	70		No complaint of pain
Extension	70		
Rotation R	80		
Rotation L	80	No associated cervical flexion	No complaint of pain

ROM, Range of motion; *R*, right; *L*, left.

Diagnosis	Key Tests
Cervical flexion rotation	Alignment of cervical spine Cervical flexion/flat cervical and thoracic spine alignment. AROM: Pain with flexion and rotation. Excessive flexion ROM. Compensatory flexion with rotation ROM. Compensatory movements of the neck in the direction of flexion with shoulder flexion movements. Compensatory lower cervical rotation with left arm movements.
Scapular depression	Alignment: Scapulae position in depression—superior angle of scapulae below T2. AROM: Decrease elevation of scapulae during shoulder flexion motion. Elevating scapulae results in decreased pain and improved range of cervical motions.

AROM, Active range of motion; ROM, range of motion.

Figure 3-51. Facing the wall, shoulder flexion with scapula elevation.