



Examination and Evaluation

History

A 35-year-old, right-handed man complains of right shoulder pain. His occupation requires him to sit at a visual display terminal (VDT) 8 to 10 hours each day, 5 days each week. He also engages in cross-country skiing, climbing, and kayaking. He is unable to sleep on his right shoulder and has pain at night that awakens him briefly two to three times each week. He is unable to participate in any recreational activity using his right arm overhead. Work is not disrupted at this time, although he does experience a fatiguing discomfort between his shoulder blades while working at the computer about two-thirds into his workday.

Postural Alignment

Moderate forward head, moderate abducted, anterior tilted, and downwardly rotated scapulae, with the right scapula slightly depressed, bilateral humerus in moderate abduction ($R > L$), and moderate thoracic kyphosis

Cervical Clearing Examination

Slight stiffness in cervical rotation to the right, otherwise negative for shoulder girdle signs or symptoms

Passive Range of Motion

Elevation in the plane of the scapula (see Fig. 26-8)^{236,237}—150 degrees

Lateral rotation at 90 degrees of abduction—90 degrees

Medial rotation at 90 degrees of abduction—40 degrees

Elbow, forearm, wrist, hand—within normal limits (WNL)

Active Range of Motion

Active arm elevation in flexion and abduction—WNL

Total scapular upward rotation is 45 degrees.

Glenohumeral (GH) lateral rotation with the arm adducted to the side is 60 degrees, but it improves to 80 degrees when the scapula is positioned in neutral instead of the patient's abducted rest position.

Scapulohumeral Rhythm

Faulty scapulohumeral rhythm is present. The scapula is slow to elevate from the initial depressed position and is still depressed relative to the left at 90-degree flexion, but excessively elevates in the last half of flexion. In addition, the scapula fails to fully upwardly rotate and is only rotated upward to 10 degrees at 90 degrees of flexion. The patient experiences pain from 90 degrees to end range. Pain is reduced with assisted elevation and upward rotation of the scapula.

Muscle Length

Moderate shortness in the GH lateral rotators and rhomboids and lengthened right upper trapezius and middle trapezius.

Joint Mobility

Hypomobile GH posterior and inferior glide, scapulothoracic (ST) upward rotation, and acromioclavicular (AC) joint antero-posterior glide

Muscle Performance (tests performed on right only)

Glenohumeral lateral rotators: 3+/5 (pain)

Glenohumeral abductors: 4-/5 (pain)

Supraspinatus (full can test)²³³: 3+/5 (pain)

Subscapularis (lift-off position)^{74,75}: 3+/5

Upper trapezius: 3+/5

Middle trapezius: 3+/5

Lower trapezius: 3+/5

Serratus anterior: 3+/5

Rhomboids/levator scapula: 5/5

Biceps: 4-/5

Triceps: 5/5

Resisted Tests

General abduction, outer-range lateral rotation, and supraspinatus are weak and painful.

Motor Control

Surface EMG analysis demonstrates latent upper trapezius and serratus anterior activity, when compared to the uninjured side, during scaption.

Palpation

Tenderness was elicited over the tenoperiosteal and musculotendinous junction of the supraspinatus and AC joint.

Special Tests

Neer impingement sign¹³³ and Hawkins and Kennedy impingement tests²³⁸ are positive

Jobe apprehension test¹³⁴ is negative

Drop arm test²³⁹ is negative

Sulcus sign²⁴⁰ is negative

Assessment

This patient appears to have primary rotator cuff disorder. His impairments include:

- Altered mobility in periarticular soft tissues limiting posterior and inferior glide of the GH joint
- Reduced muscular extensibility in GH lateral rotators, further contributing to limited GH posterior glide
- Reduced muscular extensibility in scapular downward rotators, limiting scapular upward rotation
- Lengthened scapular elevator and upward rotator group, affecting length-tension properties of muscles participating in the upward rotator force couple
- Decreased muscle performance of the elevator or upward rotator, affecting the muscle's participation in the active force couples
- Altered motor control patterns in scapular rotators
- Positive signs of injury to subacromial tissue, particularly supraspinatus (i.e., positive impingement sign, weak and painful resisted tests, palpation).

Summary of Pathomechanics

This patient is vulnerable to developing impairments that contribute to impingement syndrome. The prolonged faulty posture he sustains during an 8- to 10-hour workday can lead to altered base, modulator, and biomechanical elements of the movement system. The faulty joint alignment (biomechanical), can contribute to GH impingement because of the altered relationship between the ST and GH joints. Prolonged faulty postures can lead to altered muscle length-tension properties (base), which can contribute to altered movement and recruitment patterns (biomechanical and modulator). For example, if the scapula is chronically abducted, downwardly rotated, depressed, and anteriorly tilted at rest, the axioscapular upward rotators could adaptively lengthen and the axioscapular downward rotators and scapulohumeral muscles could adaptively shorten. When he raises the arm overhead, as is required for rock climbing and kayaking, the patient's scapula may not sufficiently upwardly rotate and the humeral head may translate excessively superior in the glenoid fossa. This movement pattern results in impingement of subacromial structures against the AC ligament and possibly the acromion process.