Clinical Examination of the Shoulder Joint Complex

Kevin E. Wilk, PT, DPT, FAPTA(1)
Mike M. Reinold, DPT, ATC, CSCS(2)
Brian Cole, MD, MBA(3)

(1) Champion Sports Medicine
American Sports Medicine Institute
Birmingham, AL

(2) Champion Physical Therapy & Performance
Waltham, MA

(3) Midwest Orthopaedics
Chicago, IL

I. Introduction

A. Clinical Examination

1. Vital to successful treatment of shoulder patients
2. Must be thorough and systematic
3. Establish chief complaint & contributing factors

   a. Rule out & rule in

4. Main purpose is to establish underlying cause of symptoms
5. Also determines where to start with patient

   a. Tolerance level ↔ aggressiveness of program

B. Components of clinical exam

1. Subjective history
2. Inspection / observation
3. Clearing the cervical spine
4. Active range of motion
5. Passive range of motion
6. Manual muscle testing
7. Accessory motion assessment
II. Subjective Examination

A. Most important part of the clinical exam
B. Will direct the approach to the objective examination
C. History of symptoms

1. What brings you here today?
   a. Pain, weakness, instability, sensations, etc.

2. When did the symptoms begin?
   a. Acute traumatic incident
   b. Insidious onset

3. Where, when, & how?

4. What alleviates symptoms?

5. What reproduces symptoms?

6. Chief complaint (establish chief complaint)
   “What is the problem you are having with your shoulder?”
   a. Limitations in functional activities
   b. Limitations in work activities
   c. Limitations in recreational/athletic activities

Looking for “pattern recognition” of symptoms

III. Observation

A. Symmetry
B. Posture
1. Head position
2. Shoulder position
3. Pectoralis position
4. Scapular position
5. Spine position

C. Atrophy of muscle tissue
D. Visible defects

1. Ecchymosis, edema, inflammation, deformities

IV. Clearing the cervical spine

A. Dermatomes, myotomes, reflexes

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>MOTOR</th>
<th>SENSORY</th>
<th>REFLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5</td>
<td>Deltoid</td>
<td>Lateral deltoid</td>
<td>Biceps</td>
</tr>
<tr>
<td></td>
<td>Biceps (partial)</td>
<td></td>
<td>Biceps</td>
</tr>
<tr>
<td>C6</td>
<td>Biceps</td>
<td>Thumb</td>
<td>Brachioradialis Biceps</td>
</tr>
<tr>
<td></td>
<td>ECRL and ECRB</td>
<td></td>
<td>Biceps</td>
</tr>
<tr>
<td>C7</td>
<td>Triceps</td>
<td>Middle finger</td>
<td>Triceps</td>
</tr>
<tr>
<td></td>
<td>Wrist flexors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Finger flexors extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td>Finger flexors</td>
<td>Ulnar border</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Little finger</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Intrinsic</td>
<td>Medial side</td>
<td>Proximal arm</td>
</tr>
</tbody>
</table>

ECRL: extensor carpi radialis longus; ECRB: extensor carpi radialis brevis.

B. Active ROM (w/ overpressure), quadrant test, compression/distraction
V. Range of motion

A. Active range of motion

1. Ability to raise arm, willingness to raise arm
2. Functional ER/IR
3. Assess several factors
   a. Painful arc
   b. Quality of motion
   c. Quantity of motion

Active Motions I assess:
- Elevation in scapular plane
- Functional ER
- Functional IR
- Horizontal abd/adduction

4. Scapulohumeral rhythm & Scapula Dyskinesis (Kibler)
   a. 0-30° = setting phase; mostly GH movement
   b. 30-90° = 2.0-2.75:1 ratio of GH:ST movement
   c. 90-160° = 1:1 ratio of scapulohumeral movement

5. Scapula movement & winging

6. Scapular Dyskinesis
   
   Kibler & Sciascia BJSM ‘10

7. Scapular Dyskinesis Test (SDT)
B. Passive range of motion

<table>
<thead>
<tr>
<th>Motion</th>
<th>AAOS</th>
<th>AMA</th>
<th>Boone JBJS 79</th>
<th>End Feel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>180</td>
<td>150</td>
<td>166.7</td>
<td>Firm</td>
</tr>
<tr>
<td>Extension</td>
<td>60</td>
<td>50</td>
<td>62.3</td>
<td></td>
</tr>
<tr>
<td>IR</td>
<td>70</td>
<td>90</td>
<td>68.8</td>
<td>Firm-hard</td>
</tr>
<tr>
<td>ER</td>
<td>90</td>
<td>90</td>
<td>103.7</td>
<td>Capsular</td>
</tr>
<tr>
<td>Abduction</td>
<td>180</td>
<td>180</td>
<td>184.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motion</th>
<th>10-20 years</th>
<th>20-40 years</th>
<th>40-54 years</th>
<th>60-85 years</th>
<th>61-93 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>167.4</td>
<td>165</td>
<td>165.1</td>
<td>160</td>
<td>165</td>
</tr>
<tr>
<td>Extension</td>
<td>64</td>
<td>58</td>
<td>56.1</td>
<td>38</td>
<td>-</td>
</tr>
<tr>
<td>IR</td>
<td>70.3</td>
<td>66.5</td>
<td>68.3</td>
<td>59</td>
<td>65</td>
</tr>
<tr>
<td>ER</td>
<td>106.3</td>
<td>101</td>
<td>97.5</td>
<td>76</td>
<td>80.6</td>
</tr>
<tr>
<td>Abduction</td>
<td>185.1</td>
<td>182.7</td>
<td>182.6</td>
<td>155</td>
<td>157.9</td>
</tr>
</tbody>
</table>

C. PROM in the athletic population

<table>
<thead>
<tr>
<th>Motion</th>
<th>Baseball Players PROM</th>
<th>Baseball Players AROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER</td>
<td>125.6</td>
<td>103.2</td>
</tr>
<tr>
<td>IR</td>
<td>59.7</td>
<td>42.4</td>
</tr>
<tr>
<td>TROM</td>
<td>184.5</td>
<td>145.3</td>
</tr>
</tbody>
</table>

D. Assess several factors during PROM

1. Quality & quantity of motion
2. Crepitus
3. End feel (overpressure)
4. Pain

E. Assess Total Rotational ROM (TROM)

1. ER + IR = TROM

Wilk et al: AJSM '02

F. Humeral Retroversion Assessment

1. imaging studies
2. Ultrasound assessment
3. Manual technique

VI. Accessory Motion Assessment

A. Assess glenohumeral joint play
1. Inferior glide
2. Posterior glide
3. Anterior glide
4. Lateral glide

VII. Neuromuscular system

A. Resisted manual muscle testing

<table>
<thead>
<tr>
<th>MUSCLE</th>
<th>INNERVATION</th>
<th>MYOTOMES</th>
<th>TECHNIQUE FOR TESTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropezius</td>
<td>Spinal accessory</td>
<td>C2-C4</td>
<td>Patient shrugs shoulders against resistance.</td>
</tr>
<tr>
<td>Sternopectoral</td>
<td>Spinal accessory</td>
<td>C2-C4</td>
<td>Patient turns head to one side with resistance over the opposite temporal area.</td>
</tr>
<tr>
<td>Serratus anterior</td>
<td>Long thoracic</td>
<td>C5-C7</td>
<td>Patient pushes against a wall with an outstretched arm. Scapular winging is observed.</td>
</tr>
<tr>
<td>Latissimus dorsi</td>
<td>Thoracodorsal</td>
<td>C7-C8</td>
<td>Downward/backward pressure of the arm against resistance. Muscle palpable at inferior angle of the scapula during cough.</td>
</tr>
<tr>
<td>Rhomboids</td>
<td>Dorsal</td>
<td>(C4) C5*</td>
<td>Hands on hips pushing elbows backward against resistance.</td>
</tr>
<tr>
<td>Levator scapulae</td>
<td>Scapular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subclavius</td>
<td>Nerve to subclavius</td>
<td>C5-C6</td>
<td>None</td>
</tr>
<tr>
<td>Teres major</td>
<td>Subscapular (lower)</td>
<td>C5-C6</td>
<td>Similar to lat. dorsi; muscle palpable at the lower border of the scapula.</td>
</tr>
<tr>
<td>Deltoid</td>
<td>Axillary</td>
<td>C5-C6 (C7)</td>
<td>With arm abducted 90 degrees, downward pressure is applied. Anterior and posterior fibers may be tested in slight flexion and extension.</td>
</tr>
<tr>
<td>Subscapularis</td>
<td>Subscapular (upper)</td>
<td>C5</td>
<td>Arm at side with elbow fixed to 90 degrees. Examiner resists internal rotation.</td>
</tr>
<tr>
<td>Supraspinatus</td>
<td>Suprascapular</td>
<td>C5 (C6)</td>
<td>Arm abducted against resistance (not isolated). With arm pronated and elevated 90 degrees in plane of scapula, downward pressure is applied.</td>
</tr>
<tr>
<td>Infraspinatus</td>
<td>Suprascapular</td>
<td>C5 (C6)</td>
<td>Arm at side with elbow flexed 90 degrees. The examiner resists external rotation.</td>
</tr>
<tr>
<td>Teres minor</td>
<td>Axillary</td>
<td>C5-C6 (C7)</td>
<td>Same as for the infraspinatus.</td>
</tr>
<tr>
<td>Pectoralis major</td>
<td>Medial and lateral pectoral</td>
<td>C5-T1</td>
<td>With arm flexed 30 degrees in front of the body, the patient adducts against resistance.</td>
</tr>
<tr>
<td>Pectoralis minor</td>
<td>Medial pectoral</td>
<td>C8, T1</td>
<td>None</td>
</tr>
<tr>
<td>Coracobrachialis</td>
<td>Musculocutaneous</td>
<td>(C4) C5-C6 (C7)</td>
<td>Flexion of the supinated forearm against resistance.</td>
</tr>
<tr>
<td>Biceps brachii</td>
<td>Musculocutaneous</td>
<td>(C4) C5-C6 (C7)</td>
<td>Resistance to extension of the elbow from varying positions of flexion.</td>
</tr>
<tr>
<td>Triceps</td>
<td>Radial</td>
<td>(C5) C6-C8</td>
<td></td>
</tr>
</tbody>
</table>

*Numbers in parentheses indicate a variable but not rare contribution.

1. ER
2. IR
3. Abduction
4. Flexion
5. Scapular retraction
6. Scapular protraction
7. Scapular depressors
8. Scapular elevators
B. Rotator cuff integrity (??)

1. Full can test
   *Kelly, AJSM '96*

2. Drop arm test

3. Lag Signs
   *Hertel: JSES '96*
   *Supraspinatus* *Infraspinitus/Supraspinatus*

4. Lift-off Sign & Belly Press
Gerber: JBJS ‘91

5. Internal impingement sign – Meister: AJSM ‘00

C. Impingement

1. Impingement sign
   Neer: Orthop Clin NA ‘77

2. Hawkins test
   Hawkins: AJSM ‘80

D. Biceps provocation
1. Static Speed's test

2. Dynamic Speed's test

3. Yergason’s test
   *Yergason: JBJS ‘31*

VIII. Laxity assessment

A. Grading of humeral head translation – What is normal?

<table>
<thead>
<tr>
<th>Grade</th>
<th>Diagrammatic</th>
<th>Clinical Feel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td><img src="image1" alt="Diagram" /></td>
<td>No translation</td>
</tr>
<tr>
<td>1 Mild</td>
<td><img src="image2" alt="Diagram" /></td>
<td>Humeral head moves slightly up face of glenoid (0-1 cm translation)</td>
</tr>
<tr>
<td>2 Moderate</td>
<td><img src="image3" alt="Diagram" /></td>
<td>Humeral head rides up glenoid face to but not over the rim (1-2 cm translation)</td>
</tr>
</tbody>
</table>
| 3 Severe| ![Diagram](image4) | Humeral head rides up and over the glenoid rim  
* Usually reduces when stress removed  
* May remain dislocated when stress removed (true)  
(>2 cm translation) |
B. Seated position

1. Sulcus sign – inferior laxity - *Neer & Foster JBJS ‘80*

2. Load & shift – gross instability
   *Sillman & Hawkins CORR ’93*

C. Supine Position - Anterior instability

1. Anterior drawer @ 45° - *Wilk: JOSPT ’97*

2. Anterior drawer @ 90° - *Wilk: JOSPT ’97*
3. Anterior fulcrum – *Andrews* ‘95

4. Andrew’s Lachman of the shoulder
*Andrews* ‘95

5. Relocation test
*Jobe Orthop Rev* ‘89

6. Apprehension test

D. Supine Position - Posterior instability

1. Posterior drawer @ 45° - *Wilk: JOSPT* ‘97
2. Posterior drawer @ 90° - Wilk: JOSPT ‘97

3. Posterior fulcrum
Wilk JOSPT ‘97

4. Push-pull test
Matsen: ‘90

IX. SLAP tests

A. Speed’s tests

B. Grind test
“Compression-Rotation”
Snyder: Arthroscopy ‘90
C. Clunk test
Andrews: *Inj. Baseball* '85

D. Crank test
*Liu: AJSM* '96

E. Anterior slide
*Kibler: Arthroscopy* '95

F. Active compression test – *O’Brien: AJSM* '98

G. Biceps Load I & II – *Kim: AJSM* '99 & *Arthroscopy* '01
H. Pain Provocation – Mimori: AJSM ’99 – *Increased pain in pronation*

I. Resisted Supination External Rotation Test (RSET)  
*Myers et al: AJSM ’03*

J. My favorite SLAP test (KW)  
1. max ER with pronation then resist elbow flexion

SLAP Tests – Many Tests Available to the Clinician  
What Type of Patient are you assessing, mechanism of injury, symptoms  
Overhead Athlete ↔ Contact Injury or Other Mechanism

X. Acromioclavicular joint

A. Spring sign

B. Shear test
C. Horizontal adduction

D. O’Brien’s test

O’Brien: AJSM ‘98

XI. Neurovascular

A. Neurological function

1. Upper limb tension test (ULTT) – Magee ‘97
2. Tinel's sign – Landi '79

3. Dermatomes & Reflexes

C. Thoracic outlet

1. Roos (EAST) test – Generalized compression  
   Roos: J Surg '76


3. Costoclavicular (Military) test – Compression between 1st rib & clavicle in costoclavicular space. Magee '97

XII. Palpation

A. Specific structures

1. Greater tuberosity – rotator cuff insertion
2. Biceps brachii (proximal)
3. Coracoid process
4. Subacromial bursa
5. Anterior deltoid
6. Infraspinatus – internal impingement location
7. Quadralateral space
8. 1st rib
9. Acromioclavicular joint
10. Scapular mobility (crepitus, etc) during AROM

XIII. Functional Assessment

A. Specific shoulder assessment forms

1. American Shoulder Elbow Surgeon Form
   *Richards et al: JSES ‘94*
2. KJOC Thrower’s Subjective Score
   *Alberta et al: AJSM ‘11*
3. UCLA Shoulder Form
4. Dash Form
   *Hudak et al: ‘96*
XIV. Summary

A. Key Points

1. Systemic approach to shoulder exam
2. Logical progression
3. Knowledge of anatomy & biomechanics
4. Establish chief complaints
5. Correlate clinical findings to history

*Establish Differential Diagnosis & Associated Lesions*

*Establish a Treatment Plan*

KEW/MMR: Shldr Exam ’11, ’14, ‘16