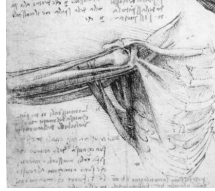


## Movement Impairment Syndromes - Humeral

Presented by:  
Witaya Mathiyakom, PT, PhD

Based upon:  
Diagnosis and Treatment of Movement  
Impairment Syndromes

Shirley A. Sahrman, PT, PhD



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## Movement Impairment Diagnoses - Humeral

### ■ Criteria:

- The primary problem is faulty movement of the humeral head in the GH joint
- Correction of faulty movement reduces the symptoms
- The correction of faulty movement reduces symptoms
- The diagnosis is named for the direction of faulty movement
- Relationships between alignment and movement

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## Relationships between alignment and movement

- Faulty alignment, normal range of movement but not correct/compensate for faulty alignment
- Correct humeral alignment, but faulty movement

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## Normal Alignment of the Humerus

- Less than 1/3 of humeral head protruding in front of the acromion
- Neutral rotation should be present
  - antecubital crease faces anteriorly
  - Olecranon faces posteriorly
- Proximal and distal ends are in the same vertical line



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## Movement of the Humeral Head

- Humeral external rotation is required for:
  - clearance of the greater tuberosity & soft tissues as it passes under the coracoacromial arch
  - Relaxation of the capsular constraints to allow full elevation

*Browne et al., 1990  
An et al., 1991*

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## Movement of the Humeral Head

- Superior translation 1-3 mm during the first 30-60° scaption<sup>1,2,3</sup> due to deltoid activation<sup>4</sup>
- After the initial phase, humeral head stays within the center<sup>1,2,3,5,6</sup>

*1 Poppen & Walket, 1976  
2 Chen et al., 1999  
3 Ludewig & Cook, 2002  
4 Kronberg et al., 1990  
5 Yamaguchi et al., 2000  
6 Graichen et al., 2000*

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	<b>Movement of the Humeral Head</b>
	<ul style="list-style-type: none"> <li>■ Anterior translation ~0.7 – 2.7 mm during the first 30-60° scaption</li> <li>■ Posterior translation ~ 1.5 mm 60-90° scaption</li> <li>■ Posterior translation ~ 4.5 mm 90-120° scaption</li> </ul> <p style="text-align: right; font-size: small;"> <i>Ludewig &amp; Cook, 2002</i>  <i>Eisenhart-Rothe et al., 2002</i>  <i>Graichen et al., 2000</i> </p>

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	<b>Abnormal Translation of the Humeral Head</b>
	<ul style="list-style-type: none"> <li>■ Pts with subacromion impingement: <ul style="list-style-type: none"> <li>– Increased superior translation (~1-1.5 mm)<sup>1,2</sup></li> <li>– Increased anterior translation (~3 mm)<sup>3</sup></li> </ul> </li> <li>■ Excessive superior translation also demonstrated in induced fatigue of deltoid and rotator cuff<sup>4,5</sup></li> </ul> <p style="text-align: right; font-size: small;"> <i>1 Poppen &amp; Walker, 1976</i>  <i>2 Deutsch et al., 1996</i>  <i>3 Ludewig &amp; Cook, 2002</i>  <i>4 Chen et al., 1999</i>  <i>5 Sharkey &amp; Marder, 1995</i> </p>

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	<b>Humeral Diagnoses</b>
	<ul style="list-style-type: none"> <li>■ Humeral Anterior Glide</li> <li>■ Humeral Superior Glide</li> <li>■ Shoulder Medial Rotation</li> <li>■ Glenohumeral Hypomobility</li> </ul>

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## Humeral Anterior Glide



- **Movement Impairment:**
  - Excessive or abnormal anterior movement of the humeral head during shoulder motions

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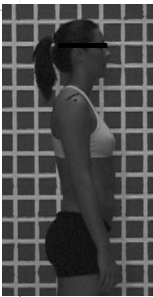
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## Humeral Anterior Glide



- **Alignment Faults:**
  - Forward shoulder
  - Greater than 1/3 of the humeral head anterior to acromion
  - Humeral head anterior to the elbow
  - Indentation below the acromion

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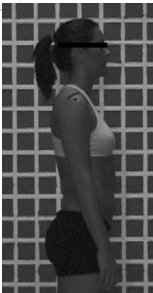
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## Humeral Anterior Glide



- **Impairment of Muscle Length and Recruitment:**
  - Dominant posterior deltoid over infraspinatus and teres minor during external rotation
  - Dominant pectoral major over rotator cuff
  - Long/weak of subscapularis and teres major
  - Short of scapulohumeral lateral rotators and posterior capsule

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	<b>Humeral Anterior Glide</b>
	<ul style="list-style-type: none"> <li>■ <b>Confirmation Tests:</b> <ul style="list-style-type: none"> <li>– Supine medial rotation – faulty PICR</li> <li>– Prone medial rotation – Weak in shortened range</li> <li>– Prone lateral rotation – anterior glide of humerus</li> <li>– Standing shoulder abduction – anterior glide of humerus</li> <li>– Elbow extension – anterior glide of humerus</li> </ul> </li> </ul>

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	<b>Humeral Anterior Glide</b>
	<ul style="list-style-type: none"> <li>■ <b>Pain Problems:</b> <ul style="list-style-type: none"> <li>– Biceps Tendinitis</li> <li>– Anterior GH Impingement</li> <li>– Anterior Subluxation/dislocation</li> </ul> </li> </ul>

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	<b>Humeral Anterior Glide</b>
	<ul style="list-style-type: none"> <li>■ <b>Emphasis of Treatment:</b> <ul style="list-style-type: none"> <li>– Lengthen lateral rotators &amp; posterior capsule</li> <li>– <b>Shorter, stronger, stiffer</b> – Subscapularis</li> <li>– Minimize recruitment of posterior deltoid</li> <li>– Correct insufficient upward rotation of the scapula</li> </ul> </li> </ul>

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	<b>Humeral Anterior Glide</b>
	<p>■ <b>Treatment Ideas:</b></p> <ul style="list-style-type: none"> <li>- Supine medial rotation – lengthen lateral rotators &amp; posterior capsule</li> <li>- <b>Prone medial rotation - Shorten, strengthen Subscapularis to control PICR</b></li> <li>- Against the wall or supine – humeral adduction to stretch posterior capsule</li> <li>- Avoid compensatory movement of the scapula</li> <li>- Avoid “leading with your shoulder”</li> <li>- Patient education : humeral position relative to elbow</li> </ul>

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	<b>Humeral Superior Glide</b>
	<p>■ <b>Movement Impairment:</b></p> <ul style="list-style-type: none"> <li>- Insufficient inferior glide of humeral head during GH flexion/abduction</li> </ul>

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	<b>Humeral Superior Glide</b>
	<p>■ <b>Alignment Faults:</b></p> <ul style="list-style-type: none"> <li>- Decreased subacromion space</li> <li>- Humerus may be in abduction</li> <li>- Scapula is depressed or downward rotated</li> </ul>

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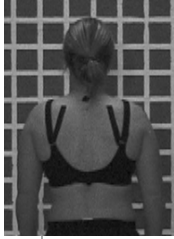
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## Humeral Superior Glide



### ■ Impairment in muscle lengths and recruitment:

- Dominant/short deltoid
- Dominant pectoralis major/latissimus dorsi over subscapularis
- Short /or weak infraspinatus, teres minor, and subscapularis

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## Humeral Superior Glide

### ■ Confirming Tests:

- Shoulder flexion/abduction in standing
- Humeral rotation in prone & supine
  - Weakness or shortness
- Lower and Middle Trapezius Strength
- Supine Pect Major and Latissimus Length Test
  - Short

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## Humeral Superior Glide

### ■ Pain Problems:

- GH impingement
- Rotator cuff tear
- Tendinitis, bursitis
- DJD of GH
- AC joint pain
- Frozen shoulder

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	<b>Humeral Superior Glide</b>
	<ul style="list-style-type: none"> <li>■ <b>Emphasis of Treatment:</b> <ul style="list-style-type: none"> <li>- Correcting strength and length of the rotator cuff muscles</li>   <li>- Decreasing recruitment of the deltoid muscle</li> </ul> </li> </ul>

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	<b>Humeral Superior Glide</b>
	<ul style="list-style-type: none"> <li>■ <b>Treatment Ideas:</b> <ul style="list-style-type: none"> <li>- Lengthen rotator cuff – towel roll</li> <li>- Strengthen rotator cuff - prone internal / external rotation</li> <li>- Correct scapular position</li> <li>- Wall slide - Minimize activation of the deltoid</li> <li>- Minimize abduction movement</li> <li>- GH flexion with elbow flexed</li> <li>- Don't lean on the shoulders</li> </ul> </li> </ul>

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	<b>Humeral Medial Rotation</b>
	<ul style="list-style-type: none"> <li>■ <b>Movement Impairment:</b> <ul style="list-style-type: none"> <li>- Insufficient lateral humeral rotation during GH flexion/abduction</li> </ul> </li> </ul>

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## Humeral Medial Rotation



### ■ Alignment Faults:

- Medial rotation of humerus in resting position
- Forward shoulders

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## Humeral Medial Rotation

### ■ Impairment of muscle lengths and recruitment:

- Dominance of shortness of medial rotators
- Long/weak of lateral rotators

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## Humeral Medial Rotation

### ■ Confirmation tests:

- Shoulder flexion in standing – reduced external rotation
- Supine shoulder flexion with full external rotation – limited, short lats, pect major, teres major
- Supine and prone external rotation – weak lateral rotators

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	<b>Humeral Medial Rotation</b>
	<ul style="list-style-type: none"> <li>■ <b>Pain Problems:</b> <ul style="list-style-type: none"> <li>- GH impingement</li> <li>- Tendinitis</li> <li>- Bursitis</li> </ul> </li> </ul>

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	<b>Humeral Medial Rotation</b>
	<ul style="list-style-type: none"> <li>■ <b>Emphasis of treatment:</b> <ul style="list-style-type: none"> <li>- Lengthen lats, pectoralis major, teres major</li> <li>- Strengthen infraspinatus &amp; teres minor</li> <li>- Minimize GH internal rotation during GH flexion</li> </ul> </li> </ul>

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	<b>Humeral Medial Rotation</b>
	<ul style="list-style-type: none"> <li>■ <b>Treatment Ideas:</b> <ul style="list-style-type: none"> <li>- Standing shoulder flexion with external rotation</li> <li>- Prone external rotation</li> <li>- Supine shoulder flexion with fixed scapula to stretch Lats, Pects, Teres Major</li> </ul> </li> </ul>

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	<b>Glenohumeral Hypomobility</b>
	<ul style="list-style-type: none"> <li>■ <b>Movement Impairment:</b> <ul style="list-style-type: none"> <li>– Limited glenohumeral movement in all directions</li> </ul> </li> </ul>

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	<b>Glenohumeral Hypomobility</b>
	<ul style="list-style-type: none"> <li>■ <b>Impairment of muscle length, strength, and recruitment:</b> <ul style="list-style-type: none"> <li>– Dominant Deltoid over rotator cuff</li> <li>– Dominant Scapulohumeral over axiohumeral muscles</li> <li>– Compensatory UT for lack of GH motion</li> </ul> </li> </ul>

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	<b>Glenohumeral Hypomobility</b>
	<ul style="list-style-type: none"> <li>■ <b>Confirming Tests:</b> <ul style="list-style-type: none"> <li>– Capsular pattern of restriction</li> <li>– Short scapulohumeral muscles</li> <li>– Weak/long Middle &amp; Lower Trapezius</li> <li>– Weak Serratus anterior</li> <li>– Weak rotators</li> </ul> </li> </ul>

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	<b>Glenohumeral Hypomobility</b>
	<ul style="list-style-type: none"> <li>■ <b>Pain problems</b> <ul style="list-style-type: none"> <li>- Frozen shoulder</li> <li>- GH impingement</li> <li>- Tendinitis/bursitis</li> </ul> </li> </ul>

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	<b>Glenohumeral Hypomobility</b>
	<ul style="list-style-type: none"> <li>■ <b>Emphasis of treatment</b> <ul style="list-style-type: none"> <li>- Increase GH mobility</li> <li>- Promote ideal PICR within available range</li> <li>- Minimize scapulothoracic motion before glenohumeral motion has improved</li> <li>- Strengthening as range increases</li> <li>- BE PATIENT!!!</li> </ul> </li> </ul>

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