Biomechanics of the Shoulder Complex

- Look at how the entire shoulder complex moves and start to get a feel for where the restrictions are and where they compensate.

- It is important to re-evaluate functional mechanics before and after each treatment intervention. Don’t wait until later to see if your treatment affected the athlete in a positive or negative way.

- The disruption in mechanics may change as the athlete gains motion, strength, and returns to skill acquisition.
Movement of the shoulder girdle involves complex interdependent motions at the glenohumeral, acromioclavicular, sternoclavicular, scapulothoracic, upper thoracic, costal, and sternomanubrial joints.
## Glenohumeral Joint

A synovial, simple, unmodified ovoid joint with 3 degrees of freedom.

### Osteokinematics

1. Flexion/Extension
2. Abduction/Adduction
3. Medial/Lateral Rotation

### Arthrokinematics

1. Spin (pure flexion/ext)
2. Inferior glide (Abduction)
3. Posterior glide (MR)
   Superior glide (Adduction)
   Anterior glide (LR)
Glenohumeral Joint

- **Closed Pack Position:** 90° ABD, full LR
- **Loose Pack Position:** 30° of ABD, Flexion, MR
- **Capsular Pattern:** LR>ABD>MR
- **Neurology:** C4,5,6,7
  - Suprascapular
  - Axillary
  - Subscapular
# Acromioclavicular Joint

A synovial, complex, modified ovoid joint with 3 degrees of freedom

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<tr>
<th>OSTEOKINEMATICS</th>
<th>ATHROKINEMATICS</th>
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<td>1. Posterior spin</td>
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<td>2. Abduction/Adduction</td>
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<td>3. Medial/Lateral Rotation</td>
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<td>4. Superior glide</td>
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<td>5. Anterior glide</td>
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<td>6. Posterior glide</td>
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Acromioclavicular Joint

- Closed Pack Position: Full elevation
- Loose Pack Position: Arm by the side
- Neurology: Supraclavicular
### Sternoclavicular Joint

A synovial, complex, unmodified sellar joint with arguably 3 degrees of freedom.

<table>
<thead>
<tr>
<th>Osteokinematics</th>
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<td>1. Posterior spin-posterior roll</td>
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<td>3. Superior glide-depression</td>
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<td>3. Initial posterior glide f/b</td>
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<td></td>
<td>anterior glide (protraction)</td>
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<td></td>
<td>Initial anterior glide f/b</td>
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<td>posterior glide (retraction)</td>
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Sternoclavicular Joint

- CP Position: Protraction & Elevation
- LP Position: Arm by the side
- Neurology: supraclavicular

The costochondrium of the first rib forms the floor of the joint.
Scapulothoracic Complex

**TERMINOLOGY**

- Elevation & Protraction = Anterior Elevation
- Elevation & Retraction = Posterior Elevation
- Depression & Protraction = Anterior Depression
- Depression & Retraction = Posterior Depression

*If protraction is restricted or excessive in BOTH elevation and depression, the rhomboids (C5) should be suspected.*
During right arm flexion:

The upper thoracic vertebrae right side flex, right rotate, and extend. The first and second ribs descend, while the 4-6th ascend and the 3rd acts as an axis.

Limitation of motion in any of these structures will adversely affect the biomechanics of the shoulder girdle and may produce or predispose the shoulder girdle to pathological changes.
First Rib

Must clear out of the way for the clavicle to have full motion and to allow full space for neurovascular bundle to clear the structures.

The first rib does not typically get stuck in a rotation, but rather a superior subluxation.