The upper extremity of the throwing athlete can be subjected to tremendous forces which ultimately have terminal impact in the hand, wrist, elbow or shoulder. Decreasing the load of somatic dysfunction on the body can improve performance and decrease the rate and severity of injuries.
Many aspects of throwing will be both sport and player specific. Examples include preference for pronation in baseball pitching ("P" in Pronation goes with "P" in Pitchers) compared to supination of football passing.

**Physiologic Motion: Radioulnar Joint (Radial Head)**

- Rotates with pronation-supination
  - Palpate between thumb & index
  - Palpate with thumb only (alt)

- Teeter-Tooter effect (like fibula)
  - Pronation: RH glides posteriorly
  - Supination: RH glides anteriorly

**Pronation & Supination**

- Radial head anterior SD restricts ability to pronate
- Radial head posterior SD restricts ability to supinate

Always consider distal radius direction in radial head OMT.
Over supination can predispose to anterior radial head dysfunction with subsequent antebrachial pain and an increased incidence of radial head subluxation after FOOSH.

Over pronation can predispose to posterior radial head dysfunction with more stress put on the medial elbow (in particular the collateral ligaments).

**Direct Method OMT**

**SD=“Radial Head Posterior”**

**Treatment (ME or HVLA)**
- Thumb behind radial head; other index on anterior distal radius
- Supinate to barrier starting from some flexion
- ME: Have patient try to pronate against restriction then take up slack 3-5 times
- HVLA: Thrust = Supinate & extend at barrier with thumb & index pressures

**Diagnosis**: Radial head won’t glide posteriorly to gentle spring at end of supination

**Direct Method OMT**

**SD=“Radial Head Anterior”**

**Treatment (ME or HVLA)**
- Hypothenar eminence or thumb in front of radial head; other hand grasps posterior distal radius to move it anteriorly
- Pronate to barrier with full flexion
- ME: Have patient try to supinate against restriction then take up slack 3-5 times
- HVLA: Thrust = Pronate & flex into antecubital hand

**Diagnosis**: Radial head won’t glide anteriorly to gentle spring at end of pronation
Proximal Displacement
- Ulna glides proximally
- Can’t fully extend
- Extension: Olecranon fossa non-palpable

Treatment
- Thumbs antecubital
- Full flex; minor parallelogram to barrier
- Traction + more flexion
- Redirect pressure towards shoulder (ant glide as extend fully)

Distal Displacement
- Ulna glides distally
- Can’t fully extend
- Extension: Olecranon fossa still palpable

Treatment
- Thumbs antecubital
- Full flex; minor parallelogram to barrier
- Traction + more flexion
- Pressure down (post glide) as extend fully

Osteopathic evaluation of the throwing elbow
Somatic dysfunction can travel from the elbow to the wrist and vice versa because of what is known as the parallelogram effect. This is because of the continuous anatomic connection provided by the interosseous membrane, it should be addressed any time there is a wrist or elbow dysfunction in order to prevent propagation.

Elbow somatic dysfunction may cause wrist somatic dysfunction or “pseudodysfunction”. Therefore treat elbow before wrist. In set-up for OMT of elbow, position wrist to help in parallelogram correction.

Abduction of elbow (medial glide) = Adduction of hand (lateral glide)
Wrist Combined Techniques: HVLA with Traction Gapping

Position Indirectly (Away From Barrier)
Add Traction; Thrust Directly; Maintain Traction

Flexion
Adduction
Extension
Abduction

Scapulothoracic motion is also an important factor in throwing motion.
Proper scapular glide, decrease of cog-wheeling and relative muscle balance will all help performance and prevent injury.
You probably won’t miss overt scapular dyskinesia! But the key to preventing it is recognizing periscapular pain as the beginning of abnormal mechanics and interceding before the problem progresses.

The scapulothoracic joint is formed by the anterior border of the scapula and the posterior thorax. Although capable of elevation, depression, protraction, and retraction, its most important functional movement is rotation about a transverse axis. For every 3 degrees of abduction measured at the glenohumeral joint, 1 degree is from the scapulothoracic joint.

Tonic Muscles:
- Upper Trapezius
- Pectoralis major (minor via fascial sheath attachment)
- Biceps Brachii

(Nota that 2 of the tonic muscles have attachments at the coracoid facilitating scapular protraction)

Phasic Muscles:
- Rhomboids
- Lower trapezius
- Triceps brachii
These intrinsic characteristics of the muscle can also be worsened by reciprocal inhibition and abnormal firing patterns, changing the posture and function of the entire shoulder girdle.

Protraction of the scapula can substantially decrease the subacromial space leading to an increase in Impingement and rotator cuff tears. It also decreases the efficiency of throwing leading to an increase in performance (velocity and accuracy).

Manual scapulothoracic release allows the glenohumeral joint to move through a full arc of motion, decreases the incidence of shoulder impingement and provides subjective relief for most patients.
Don’t forget the basic concepts of the kinetic chain. Looking for other somatic dysfunction throughout the body, particularly the lower extremities and pelvis can prevent injury and improve performance.

References:
2. Greenman Phillip, Principles of manual medicine, Pg 452-453, Williams and Wilkins, 1996
3. Brukner, Khan, et al, Clinical Sports Medicine, Pg 254, Mcgraw-Hill, 2005

Thanks for your time and attention

Questions ????????