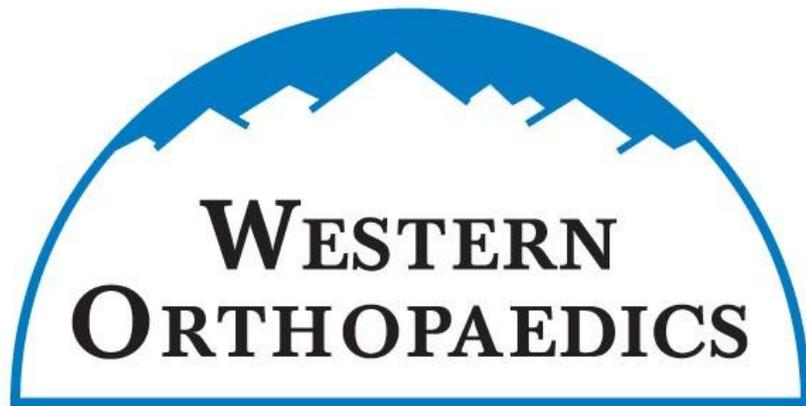


Part I: Understanding Rotator Cuff Disease and Treatment Options for the Patient

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Rotator Cuff Injuries

- Comprise the majority of shoulder complaints in patients over 50 years of age
- Account for approximately 2 million physician visits annually for rotator cuff problems
- 35,000-70,000 rotator cuff repairs are performed annually in the US

Rotator cuff tear on an MRI



What is the rotator cuff?

- The rotator cuff consists of 4 muscles that originate on the scapula (shoulder blade) and attach to the humeral head (ball). These muscles are called:

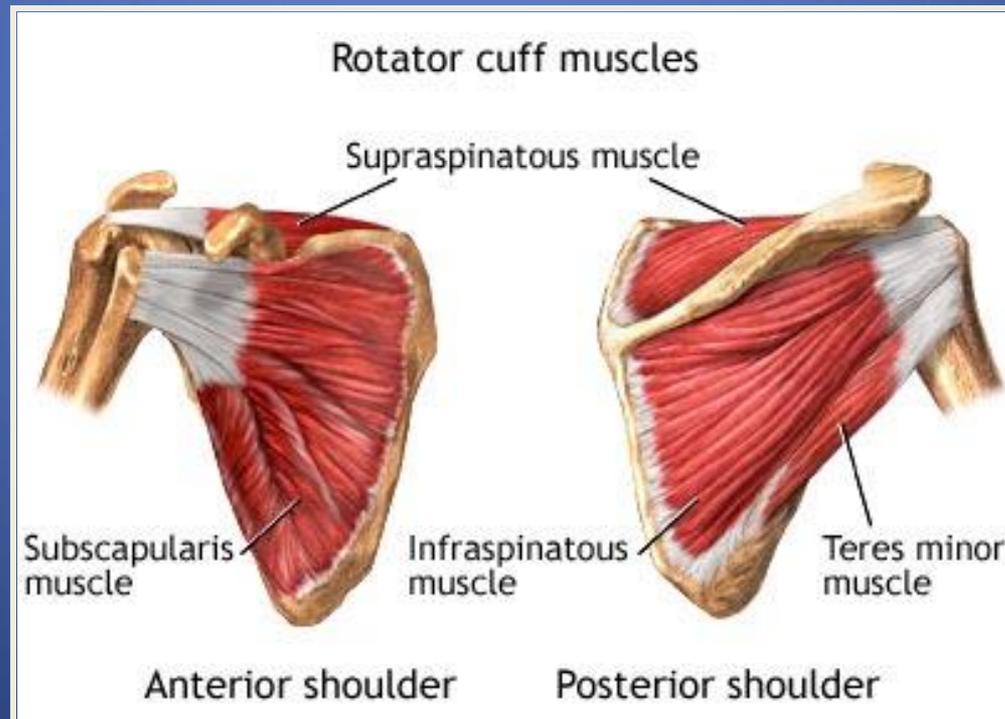
- 1) *Supraspinatus*
- 2) *Infraspinatus*
- 3) *Teres minor*
- 4) *Subscapularis*



Shoulder anatomy (side view)

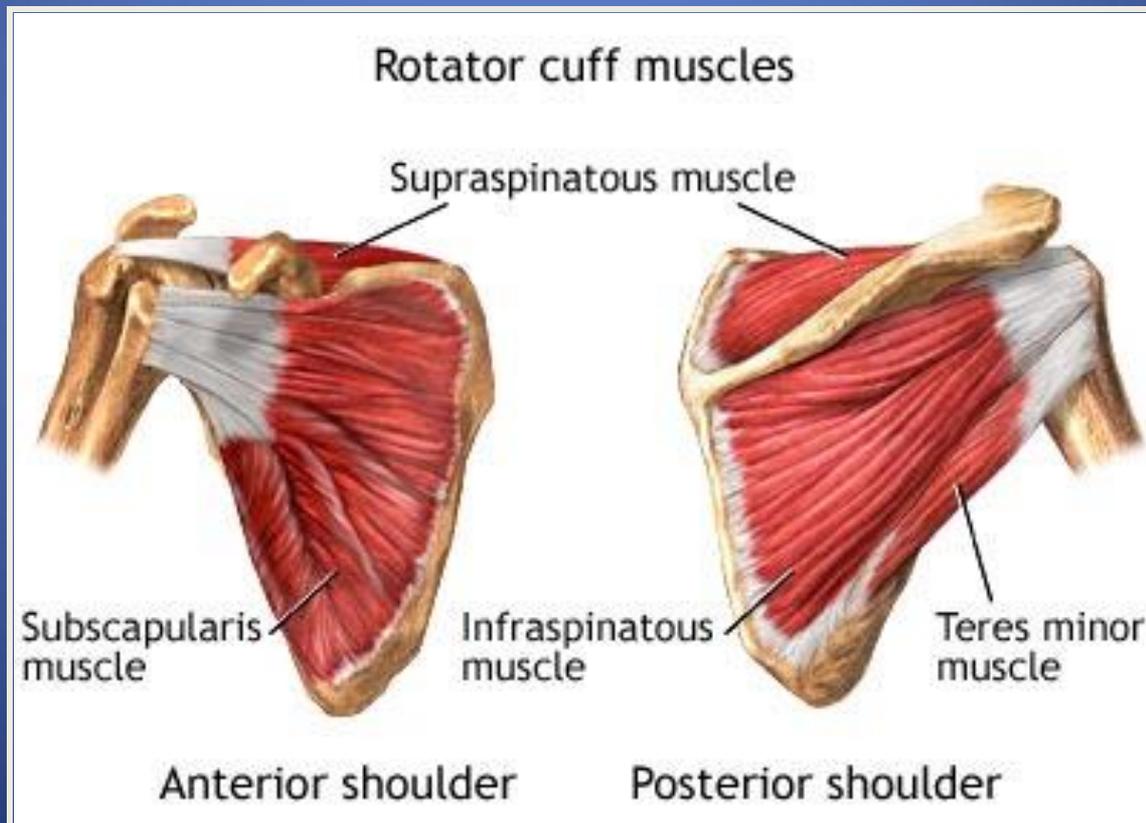
Rotator Cuff Anatomy

- The *supraspinatous*, *infraspinatous*, and *teres minor* arise from the back of the shoulder blade and attach to a part of the humerus called the **greater tuberosity**



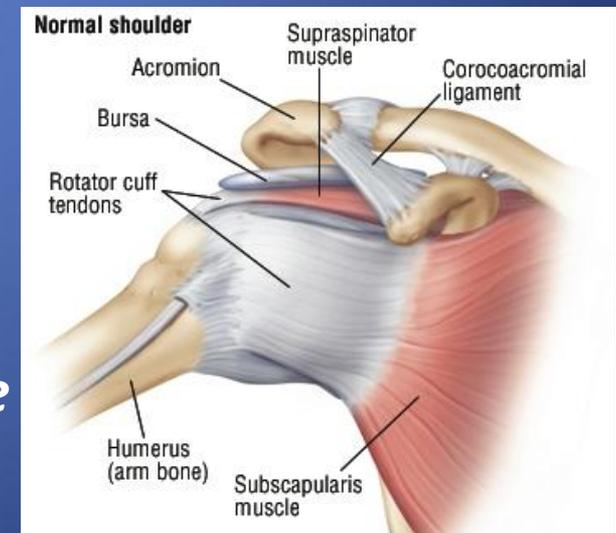
Rotator Cuff Anatomy

- The *subscapularis* arises from the front of the shoulder blade and attaches to a part of the humerus called the **lesser tuberosity**

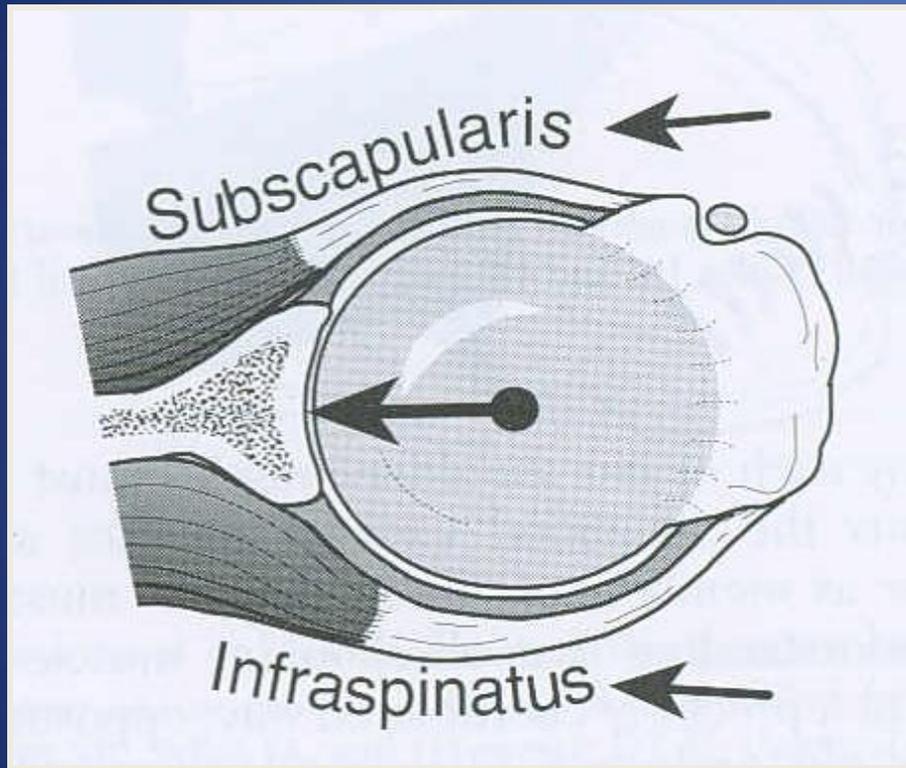


Rotator Cuff Anatomy

- Rotator cuff muscle
 - The muscle is the motor portion of the cuff. It originates on the scapula and contracts to move the humerus
- Rotator cuff tendon
 - The tendon is a structurally tough portion of the cuff. The muscle becomes tendon in order to directly attach to the bone it is moving (the humerus)
 - *The tendon is what tears from the bone with rotator cuff injuries*



Rotator Cuff Function

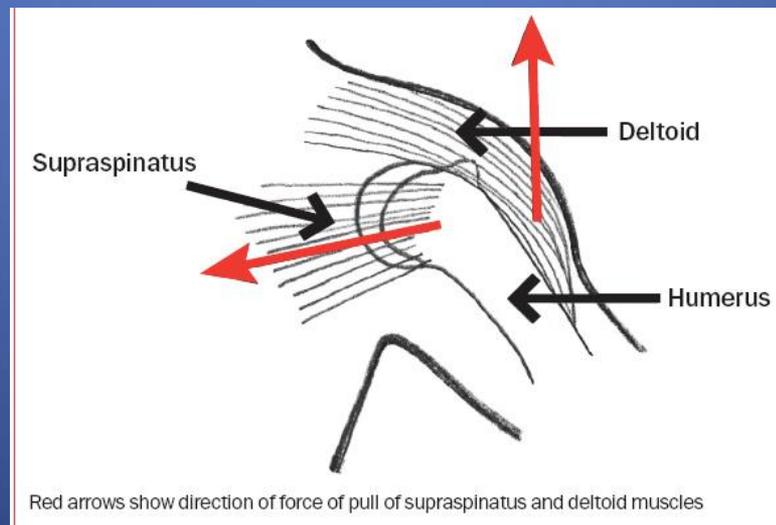


The rotator cuff is important for normal shoulder function. It acts to:

- 1) Provide shoulder stability
- 2) Position the ball of the humerus in the socket
- 3) Actively move the shoulder

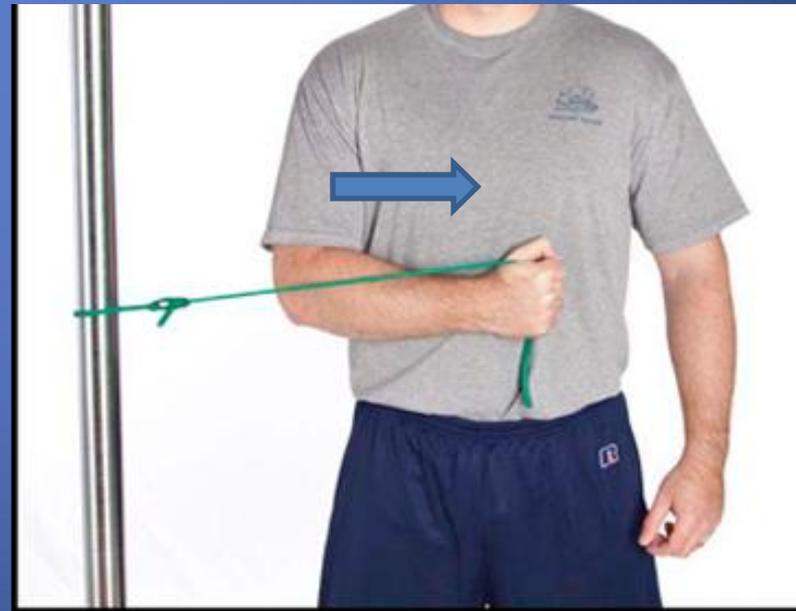
Rotator Cuff Function

- The *supraspinatus*, *infraspinatus*, and *teres minor* function to:
 - 1) rotate the forearm/hand away from the body (external rotation)
 - 2) elevate the shoulder
 - 3) balance the ball in the socket so the larger deltoid muscle can power shoulder motion



Rotator Cuff Function

- The *subscapularis* functions to rotate the hand towards the body (internal rotation), and is also critical to balance of the ball in the socket



Rotator Cuff Disease and Injury

- Injury to rotator cuff tendons

- 1) Can occur from **trauma**

- auto accident
- fall
- sporting injury

- 2) Can be damaged from **long standing wear and tear**

- repetitive overhead activity and lifting
- smoking

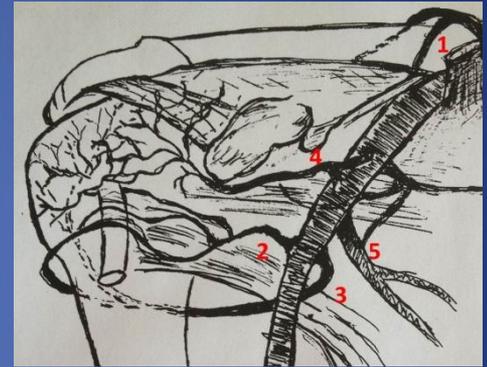
- 3) Or may be torn **without** any known specific reason

- this may be a function of the patient's individual shoulder anatomy



Rotator Cuff Disease and Injury

- The native blood supply to the rotator cuff is generally limited
 - Blood supply continues to diminish further with aging
 - Smoking or diabetes will also cause diminished blood supply to the tendons
- This limited blood supply reduces the ability of the tendon to heal itself when injured and places the tendon at risk for tearing



Rotator Cuff Disease and Injury

- Tears of the rotator cuff may either be full-thickness or partial-thickness tears
 - 1) A full-thickness tear means the tendon has been completely torn off of its insertion on the humerus (greater tuberosity)
 - 2) A partial-thickness tear means the tendon is still attached to the humerus, but some fibers of the tendon have torn
 - This can include tearing in the middle portion of the tendon (mid substance)
 - Or, can include partial tearing of the tendon at its insertion

Diagnosis

- Patients with rotator cuff tears commonly report the following symptoms:
 - Pain along the outside (lateral) aspect of the shoulder
 - Pain with overhead motion and activities
 - Pain while lifting objects
 - Pain that may wake someone up from sleeping
 - Fatigue with holding the arm overhead



Diagnosis

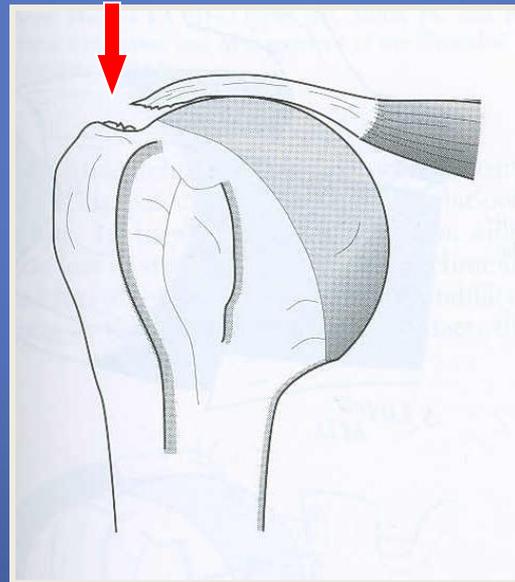


- In patients with concern for rotator cuff tear, a physician will typically order:
 - X-rays: obtained in clinic
 - Help to rule out other diagnoses (such as arthritis)
 - Examine the position of the ball in the socket
 - MRI
 - Best tool to evaluate the soft tissue structures of the shoulder, notably the rotator cuff
 - Can typically delineate between partial and full thickness tears, tear size, quality of tissue

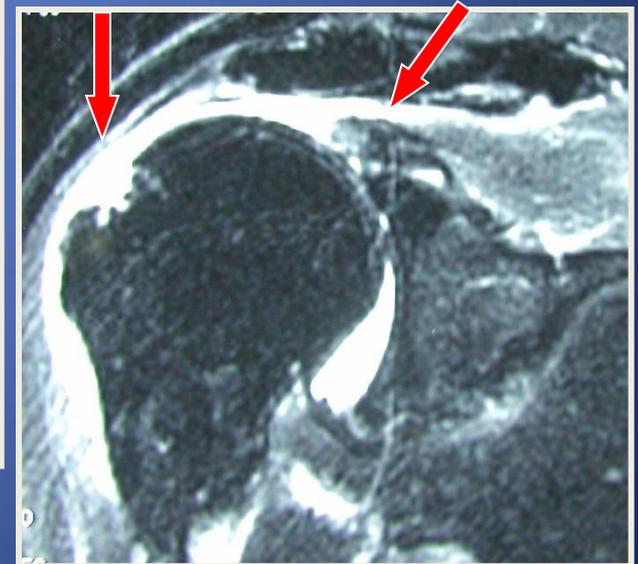
Magnetic Resonance Imaging (MRI)

- Allows visual evaluation of soft tissue structures
- Reliability of diagnosing full-thickness RCT: 89-98%
 - Consistently able to predict cuff tear size
- Tear appears as a white spot where black tendon should exist

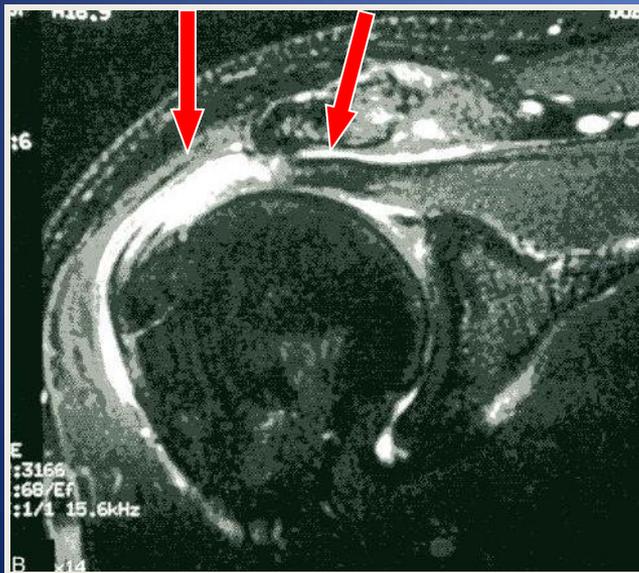
Rotator Cuff Tear



Rotator Cuff Tear Normal tendon



Rotator Cuff Tear Normal tendon



Treatment

- Overview: treatment modalities are designed to:
 - 1) Reduce inflammation
 - 2) Strengthen all remaining rotator cuff muscles
 - 3) Rebalance the shoulder to help with cuff function and healing
 - 4) Repair the tendon back to the bone if surgery is performed
- **End of treatment goal**: pain free and functional shoulder



Treatment

- For patients with partial-thickness rotator cuff tears that do not occur from a single traumatic injury, *non surgical* treatment is typically the first line of treatment
 - Modalities:
 - 1) Activity modification
 - 2) Anti-inflammatory medicine
 - 3) Physical therapy
 - 4) Steroid injections



Physical Therapy

- Often, patients can benefit from 6-8 weeks of treatment with a licensed physical therapist
- Goals of therapy include:
 - 1) Regaining any lost shoulder range of motion
 - 2) Strengthening the injured rotator cuff muscle and the supporting cuff muscles
 - 3) Balancing the shoulder and shoulder blade to position the ball of the humerus in a more optimal place to allow for healing
 - 4) Strengthening/balancing of the rest of the body

Steroid Injections



- Steroid injections may be considered in select patients to treat pain and inflammation
- Steroids are incredibly strong anti-inflammatory medications
- Using a needle, steroids are delivered directly to the area of inflammation without the risk of whole body side effects (systemic) that may occur if taken by mouth
- Too many steroid injections can actually injure the tendon over time

Acute Full-Thickness Rotator Cuff Tear

- Patients who have an injury and are found to have an acute full-thickness tear are often considered immediate surgical candidates
- Patients who sustain an acute full-thickness tear have been shown to have excellent outcomes when surgery is performed within 12 weeks of injury
 - Therefore, patients who injure their shoulder and have symptoms such as an inability to lift the arm should seek early evaluation by an orthopaedic surgeon

Chronic Full-Thickness Tear



- Patients with chronic full thickness tears may have had no traumatic injury, but report shoulder pain or a decrease in function that increases over time
- Depending on age, activity, and size of the tear these patients may try non-surgical treatment initially
- For patients who continue to have symptoms, surgery can be indicated

Full-Thickness Rotator Cuff Tear

- What we don't know about full-thickness rotator cuff tears is how they change with time if they are not surgically repaired
- A major concern with full-thickness tears is if the tear will become larger and larger over time
 - With time, if the tear becomes too large or diseased, it may get to the point that it cannot be fixed
 - It is unclear at this time which patients are at risk for this

Outcomes – Rotator Cuff Repair

- Rotator cuff tears are difficult to heal due to the limited natural blood supply and tension on the tendon
- The surgical failure rate has been reported as high as **20-40%**
 - Outcomes reportedly are *worse* in patients:
 - 1) Over 65 years of age
 - 2) Large or old tears (chronic)
 - 3) Patients with a history of smoking or diabetes
 - Outcomes for repair of acute tears within 12 weeks of injury are much better and more predictable than chronic tears
- The recovery timeline is lengthy. A conservative postoperative regimen helps reduce the risk of the tendon not healing

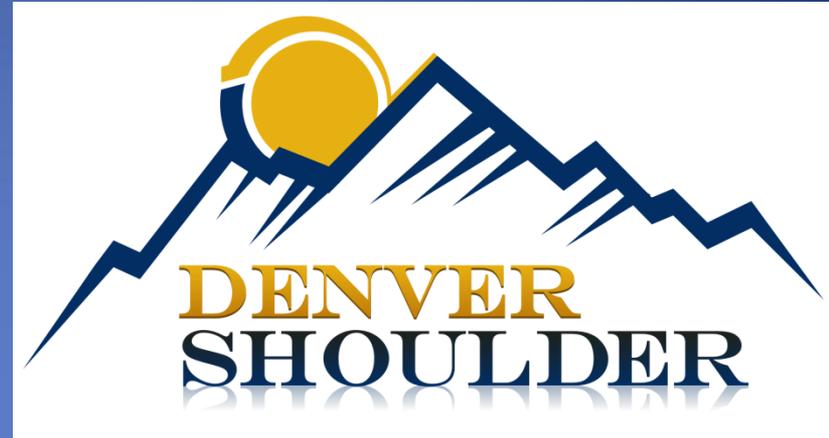
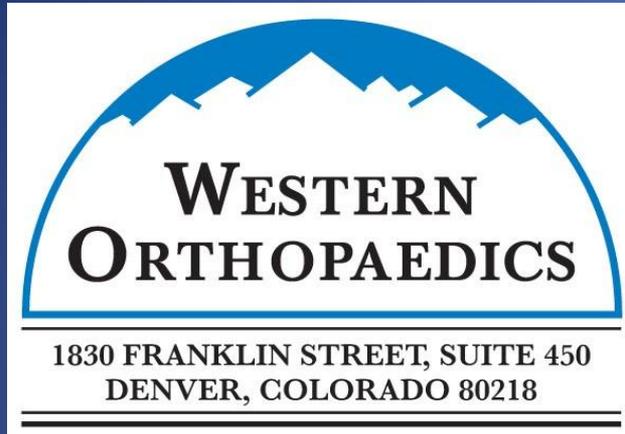
Web Based Resources

- Ortho AAOS info -
<http://orthoinfo.aaos.org/topic.cfm?topic=A00064>
- AAOS guidelines -
<http://www.aaos.org/news/aaosnow/jan11/cover1.asp>
 - <http://www.aaos.org/research/guidelines/RCPGuideline.asp>

Youtube: Cuff Stretch/Strengthening

- <https://www.youtube.com/watch?v=WfyN1F0HCBk>
- <https://www.youtube.com/watch?v=JrbU5luCMs>
- <https://www.youtube.com/watch?v=0OSiw5wGlsc>
- <https://www.youtube.com/watch?v=IJIB6TmXDfM>

Thank You!



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