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 repairs 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) Supraspinatous
  2) Infraspinatous
  3) Teres minor
  4) Subscapularis
Rotator Cuff Anatomy

• The *supraspinatus*, *infraspinatus*, 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*
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 deltid 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
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 -
Youtube: Cuff Stretch/Strengthening

- https://www.youtube.com/watch?v=WfyN1F0HCBk
- https://www.youtube.com/watch?v=_JrbU5luCMs
- https://www.youtube.com/watch?v=0OSiw5wGIsc
- https://www.youtube.com/watch?v=lJlB6TmXDfM
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