Common Injuries in CrossFit Training

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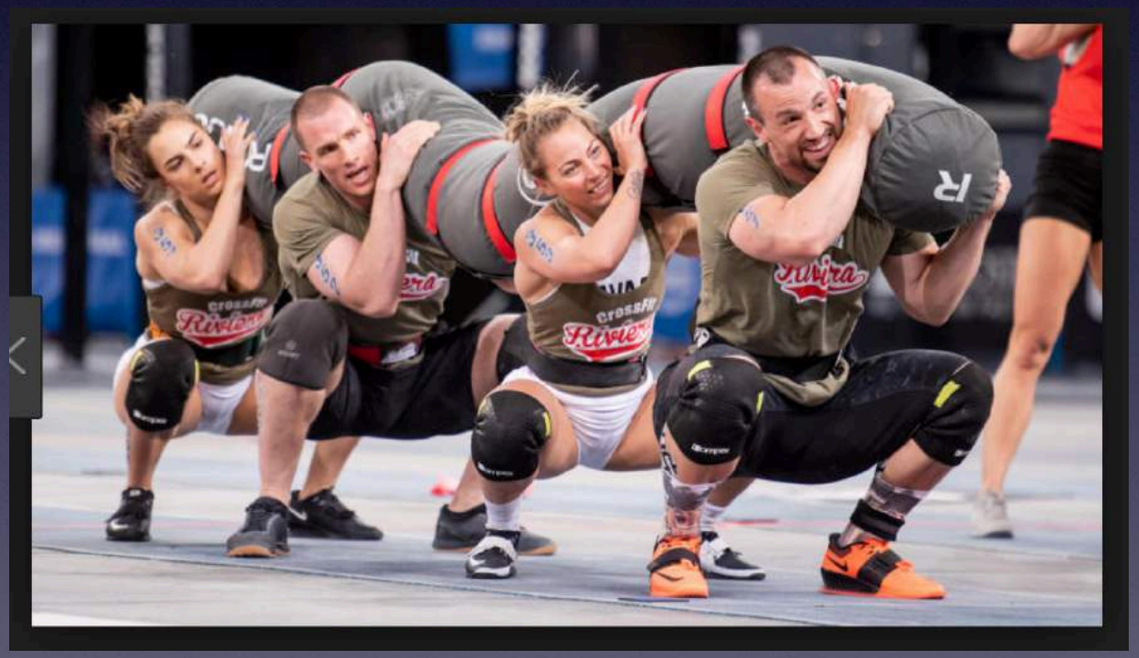
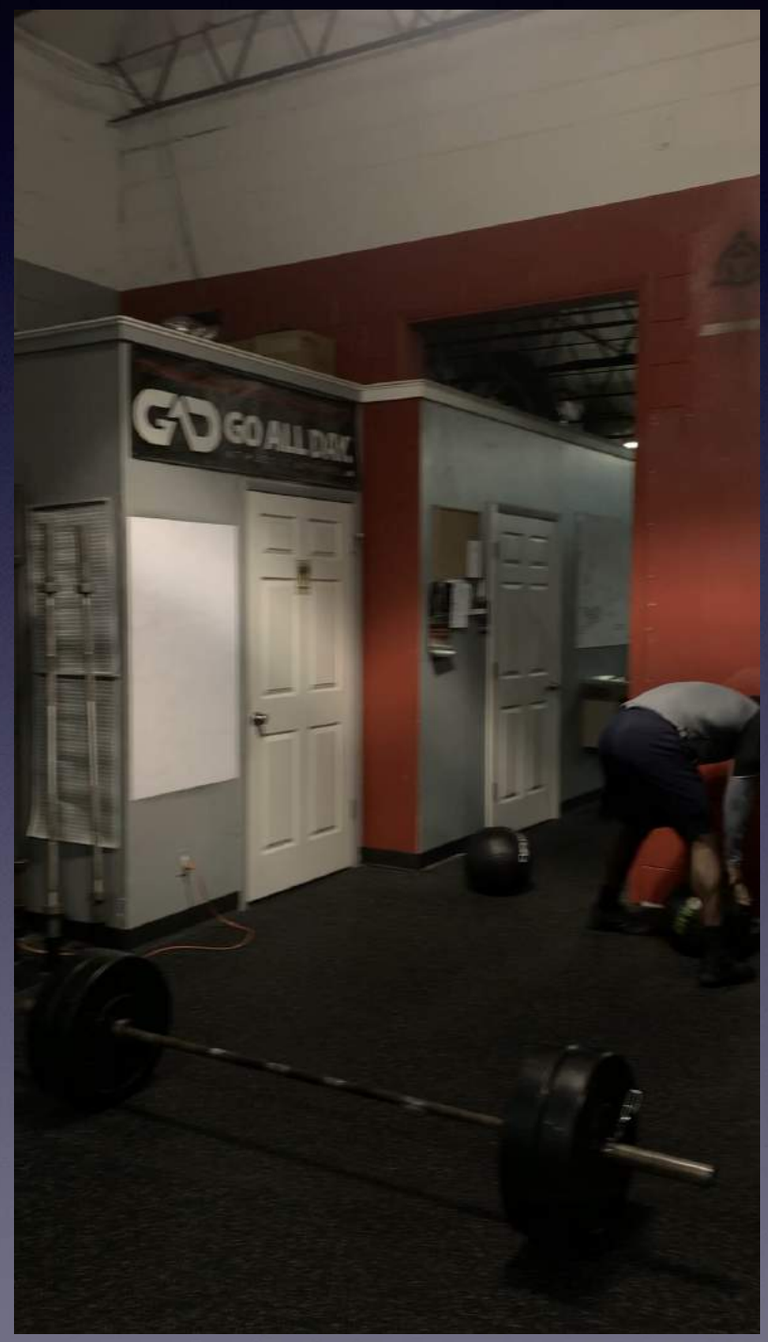
Overview

- What is CrossFit?
- Injuries
- Treatment
- Prevention



CrossFit

- Unlike other types of workouts, CrossFit focuses on high intensity movements that are not typically performed by the average person
- Workouts (WODs=workout of the day) can include and combine in any order: running, rowing, jumping, power lifting, Olympic lifting, rope climbing, handstand pushups, etc
- There is a significant learning curve for these advanced movements



CrossFit

- The CrossFit official website states that: “CrossFit is a lifestyle characterized by safe, effective exercise and sound nutrition.”
- It can be used to “accomplish any goal, from improved health to weight loss to better performance”

CrossFit

- Considered a high intensity interval training (HIIT)
- This type of program is perceived by participants to lead to marked physical gains and positive changes in body composition
- Unfortunately, there are several studies that show a high rate of injury

Pros

- There are varied reasons that CrossFit has become as popular as it is today
- CrossFit “boxes” are located in 142 countries with 10,000 affiliates
- The CrossFit Games has become an annual event that is broadcast live
- Some of the perceived attributes include
  - Sense of community
  - Group motivation
  - Satisfaction

- Several studies have touted the physical benefits of high intensity exercise with minimal time investment
- Participation in CrossFit can improve metabolic capacity and increase maximal oxygen uptake
- The US Army concluded in a 2013 study that programs like CrossFit led to significant improvements in fitness in both men and women (measured body fat, VO2 max, etc)

Cons

- “The number one rule of CrossFit is to always talk about CrossFit”
- Risk of injury

Video

Risk of Injury

- ***Any sport or exercise program has inherent risk of injury!***

- CrossFit, because of the extreme nature of the movements and the intensity, may have a higher risk of injury

- However, Olympic lifting, power lifting, and gymnastic movements alone have a risk of injury

- Many of the movements are difficult to perform slowly, let alone as fast as possible!

Risk of Injury

- Hak, et al used an electronic questionnaire to query 132 CrossFit participants
- 74% had been injured during CrossFit
- Shoulder was most common, followed by the low back, then arm and elbow
- 3.1 injuries per 1000h of training
- 186 reported injuries over 18 months, 9 required surgery
- *Hak, et al J Strength Con Res 2013*

Risk of Injury

- Another study revealed an injury prevalence of 31% (Sprey et al 2016)
- Surprisingly, the rates of injury in those participants with more than 6 months of experience were higher than those with less experience (35% to 23%)
- Those with more than 2 years had a 45% prevalence of injury

Risk of Injury

- Summit, et al 2016 evaluated the prevalence of shoulder injuries by questionnaire in 187 CrossFit athletes

- 24% had a shoulder injury in the previous 6 months; 1.9 injuries per 1000h

Risk of Injury

- A study of 381 athletes via questionnaire revealed a 19% rate of injury
- Shoulder most common, followed by lower back and then knee
- Men more than women ($p = 0.03$)
- Shoulder injured with gymnastics movements, lower back with power lifting

Risk of Injury

- Claudino et al performed a meta analysis and systemic review
- Concluded that:
  - “The number of injuries that affect CrossFit participants varies between 19 and 74% with 1.9-3.1 injuries per 1000 training hours.”

Injury

- Injury occurs when the load and the subsequent force applied exceeds the capacity of the biological tissue involved

- There is a decreased rate of injury when coaches are more involved

- In most locations, the coach or owner of the “box” is the person who “programs” the movements. This leads to a wide variety of experiences.

- Consortium for Health and Military Performance (CHAMP) and the American College of Sports Medicine (ACSM) Consensus Paper on Extreme Conditioning Programs in Military Personnel. Bergeron et al

- Concern regarding the emergence of what they consider extreme conditioning programs (ECPs), of which CrossFit is one

- Injury may lead to increased time away from duty

CHAMP/ACSM

- Recognized there were positives to this type of workout program
- Increased cardiovascular fitness
- Functional fitness is perceived to transition well to real life wartime situations
- Group training may enhance camaraderie

Negatives

- CHAMP/ACSM noted distinctive negatives
- Repeated maximal time exercise without rest fails to adhere to accepted safe practices
    - Earlier fatigue
    - Additional oxidative stress
    - Less resistance to subsequent strain
    - Greater perception of effort
    - Unsafe movement execution leading to acute injury (especially multijoint movements like power cleans, or skill movements like muscle ups or hand stand push ups)
    - Overuse, overreaching, overtraining are all concerns

EGO!

- Early participation is usually not gradual—people tend to “hit the ground running”—without proper guidance
- Desire to keep up with more developed or experienced participants
- Unwillingness to scale to avoid perceived weakness
- Injury can occur when this mindset is combined with fatigue, overload, etc

Recommendations

- Coaches should have appropriate certifications from recognized institutions
- Gradual introduction of movements and intensity
- Ensure suitable rest periods
- Avoid caffeine or stimulants that mask fatigue
- Monitor for overtraining

Lawsuit

- The NSCA and CrossFit are currently in litigation over a 2013 article that highlights injury in CrossFit

- A judge has sided with CrossFit and the study was redacted

> ***"It is taken as established that the NSCA had a commercial motivation for making the false statement in the Devor Study (...) that the NSCA made the false statement in the Devor Study with the intention of disparaging CrossFit and thereby driving consumers to the NSCA (...) (and) that a loss in CrossFit's certification revenue was the natural and probable result of the false injury data in the Devor Study."***

- So, does CrossFit itself cause injury?
- Or do we see more injury because more of more participation?
- As sports medicine providers, what do we tell our patients?

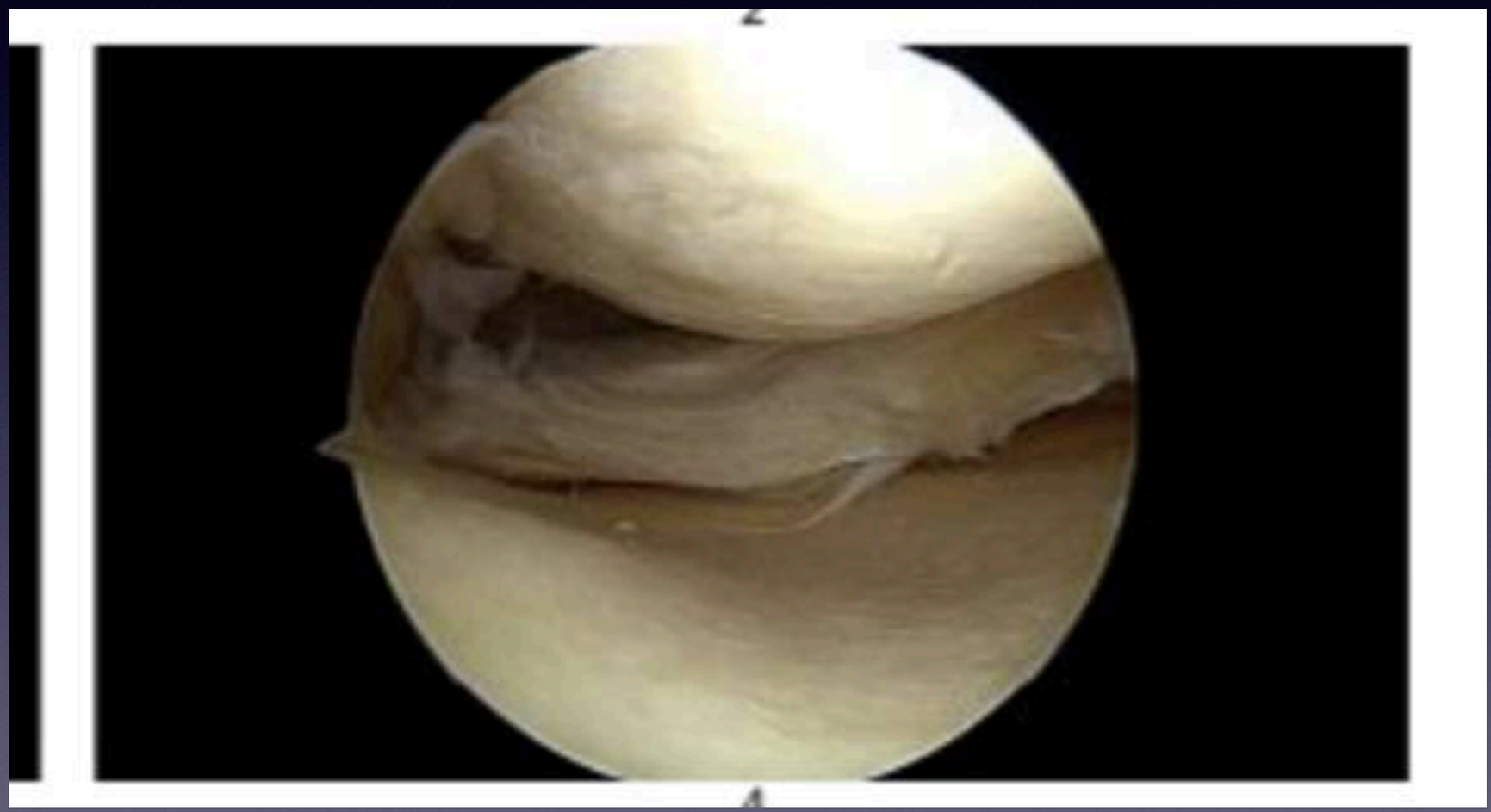
Injuries

- As noted, any injury can occur in CrossFit—like any sport

Common Injuries

- Rotator Cuff
- Labrum
- Meniscus
- ACL

Meniscus Tears



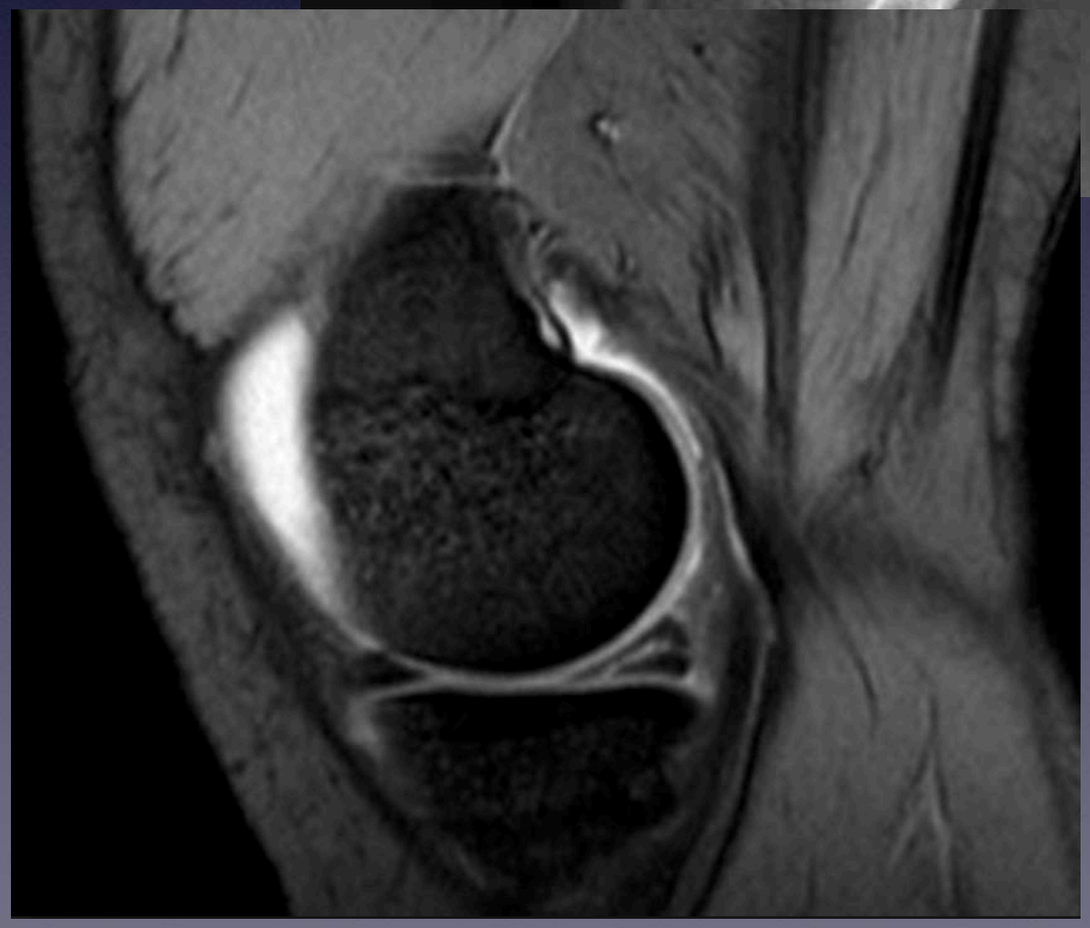
- Cartilage that extends the tibial articulation
- Distribute forces
- In extension, the meniscus bears 40-50% of the total load across the joint; 85% at 90 degrees of flexion
- Secondary role in stability

Treatment

- Stable tear can be treated nonoperatively
  - Partial tears
    - Tears less than 1 cm in length that displace less than 3 mm
    - Radial tears less than 5 mm
- Meniscectomy (it is not a benign surgery)
  - Partial meniscectomy increases peak loads up to 65%
  - Total meniscectomy increases load up to 235%

53 yo CrossFit athlete

- Complains of ongoing right knee pain with failure of conservative treatment
- Increased with squatting, running and box jumps
- Medial joint line tenderness on exam, increased pain with McMurrays

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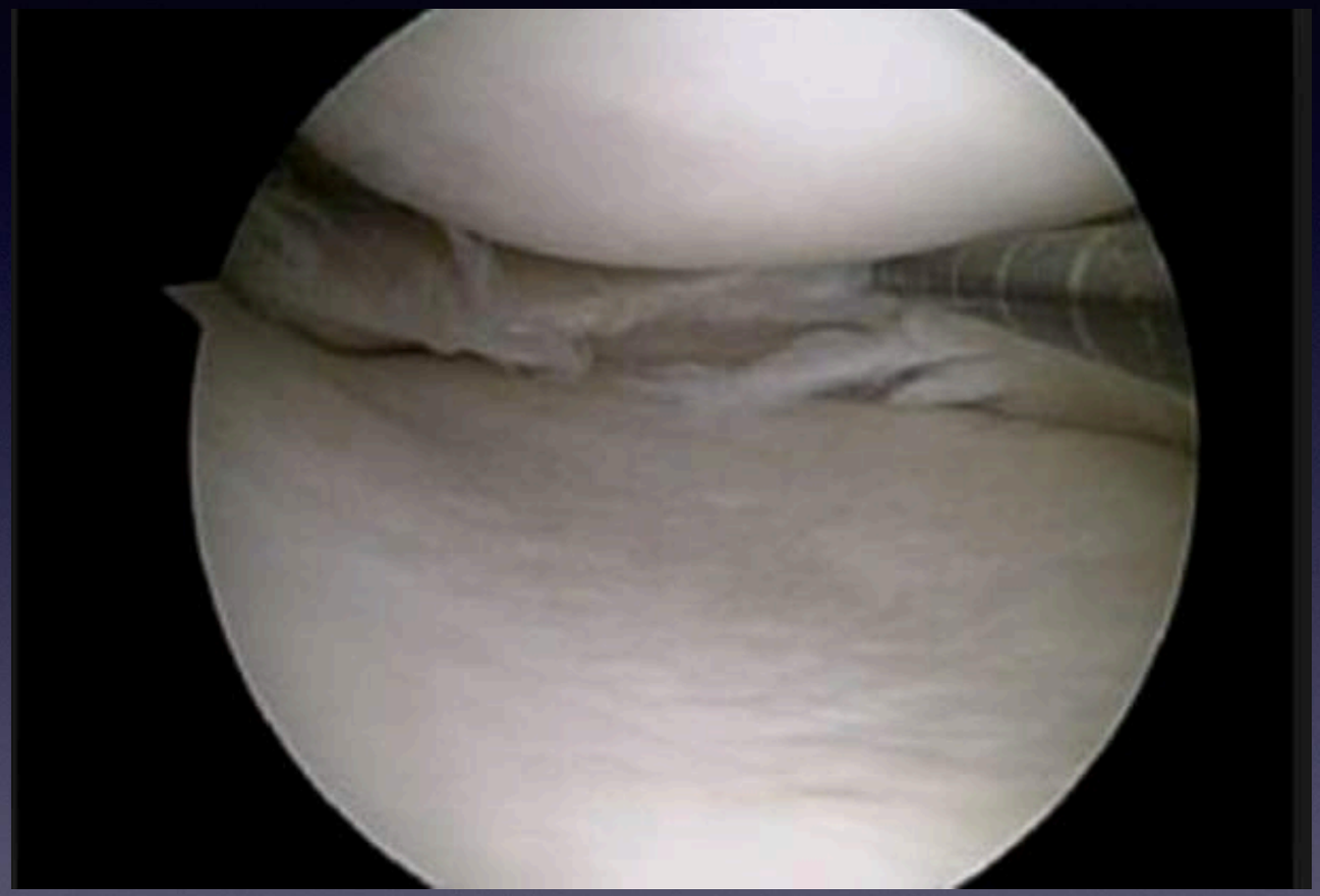

- Post op he recovered uneventfully
- Biggest issue was slowing him down


HARD
WORK
PAUL
BROWN
ANDREW
KETELSEN
CROSSFIT
WINTERPARK
KENDALL
EISENHUT
UP 32:57

ACL

- Major stabilizer of the knee
- Prevents anterior tibial translation and internal rotation
- Can be injured in any sport, but in CrossFit I commonly see this during box jumps, falls, and even during squats

- Typically presents with effusion, pain, instability
- Can be treated non operatively in certain populations
- Younger, more active, less arthritis? Surgical reconstruction can be considered

52 yo female CrossFit athlete

- Pain and instability in the knee after fall off box
- Immediate pain and swelling
- Positive Lachman on exam
- Pain along the medial and lateral side
- XRAYS negative
- MRI ordered


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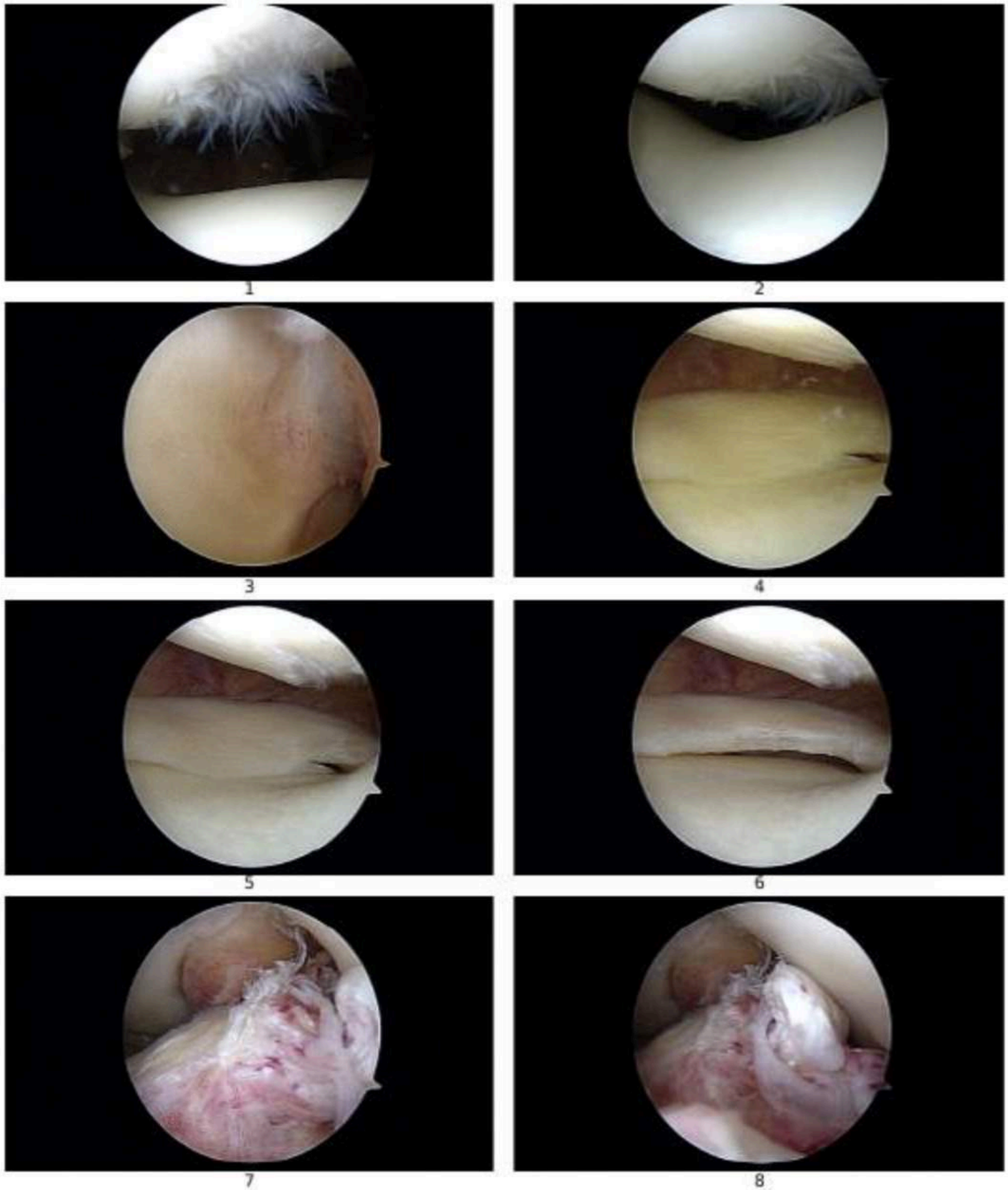
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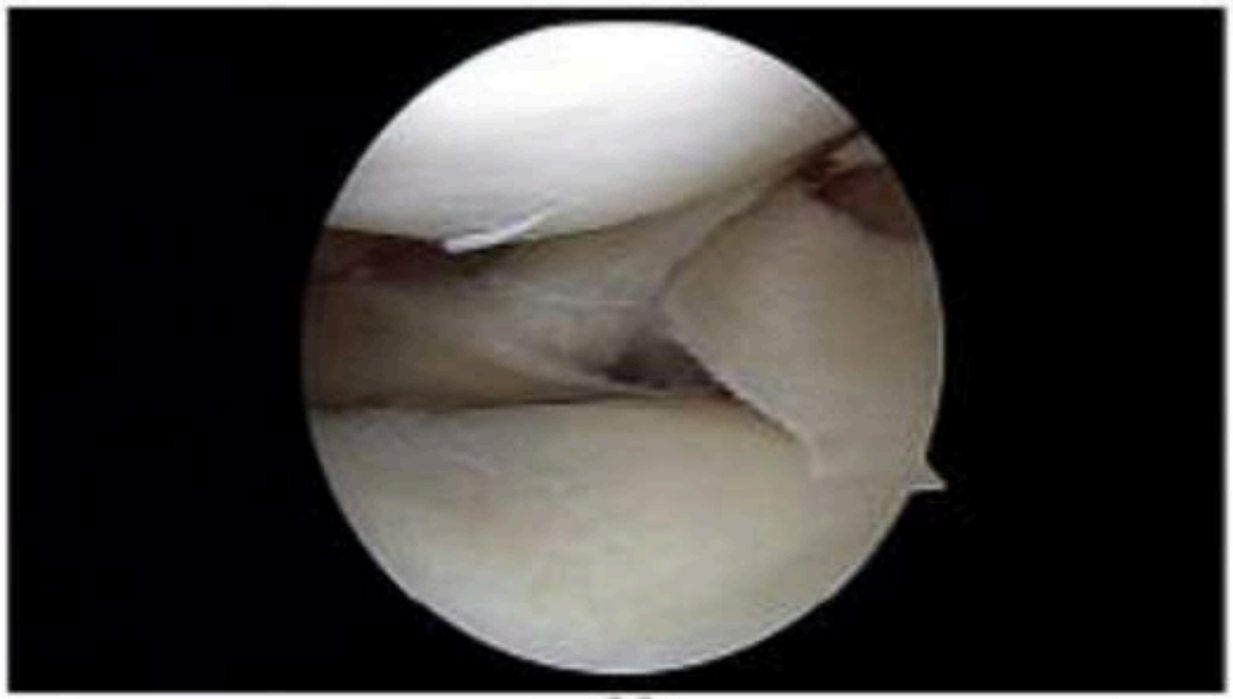

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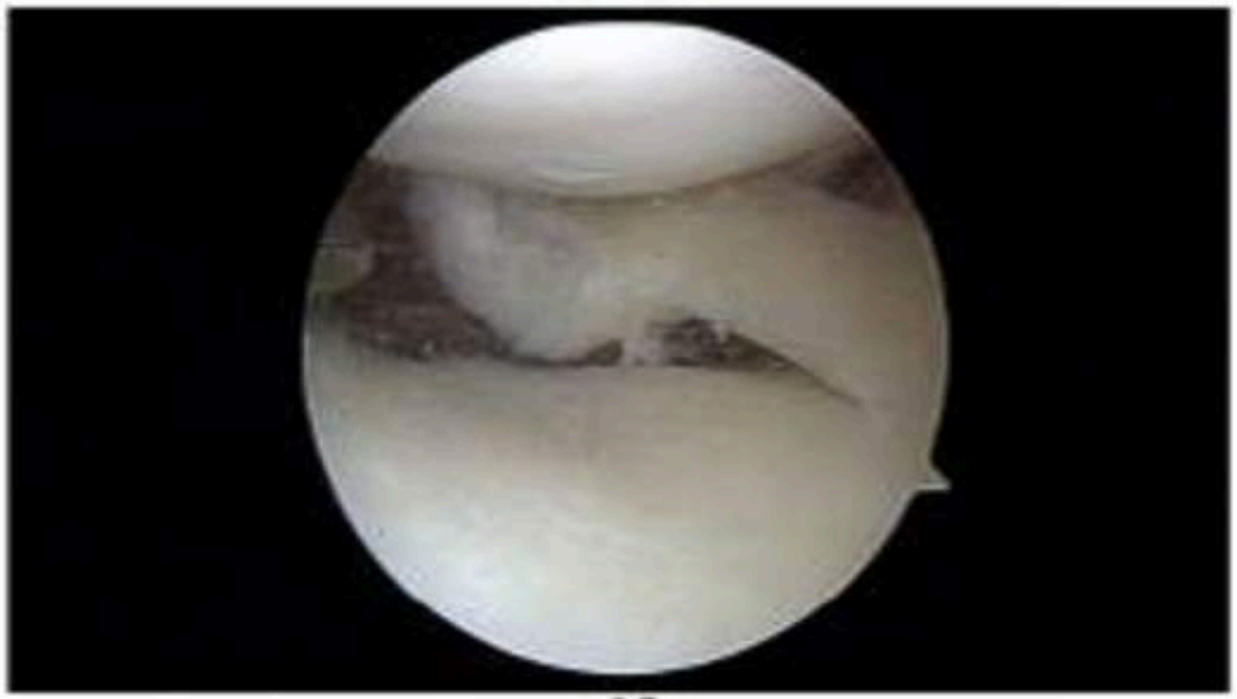

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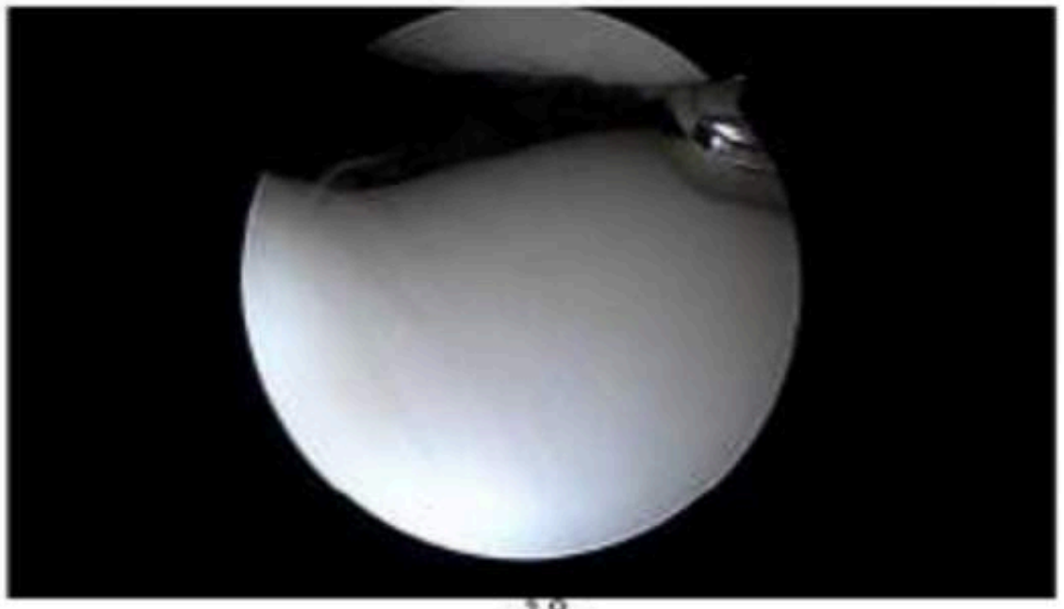

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- Uneventful recovery
- At 4 months returned to the gym for “gentle” activities
- 6 months returned to full CrossFit activities

Shoulder Injuries

- Any shoulder injury can occur in CrossFit
- In my experience, the most common are rotator cuff tears and labral tears
- Olympic lifts like snatch and overhead squats, and gymnastic movements like muscle ups and handstand push ups put tremendous strain on the shoulder

Labral Tears

- Labrum acts as an attachment for the glenohumeral ligaments and capsule
- Long head of the biceps attaches superiorly
- Deepens the glenoid

Injury Mechanism

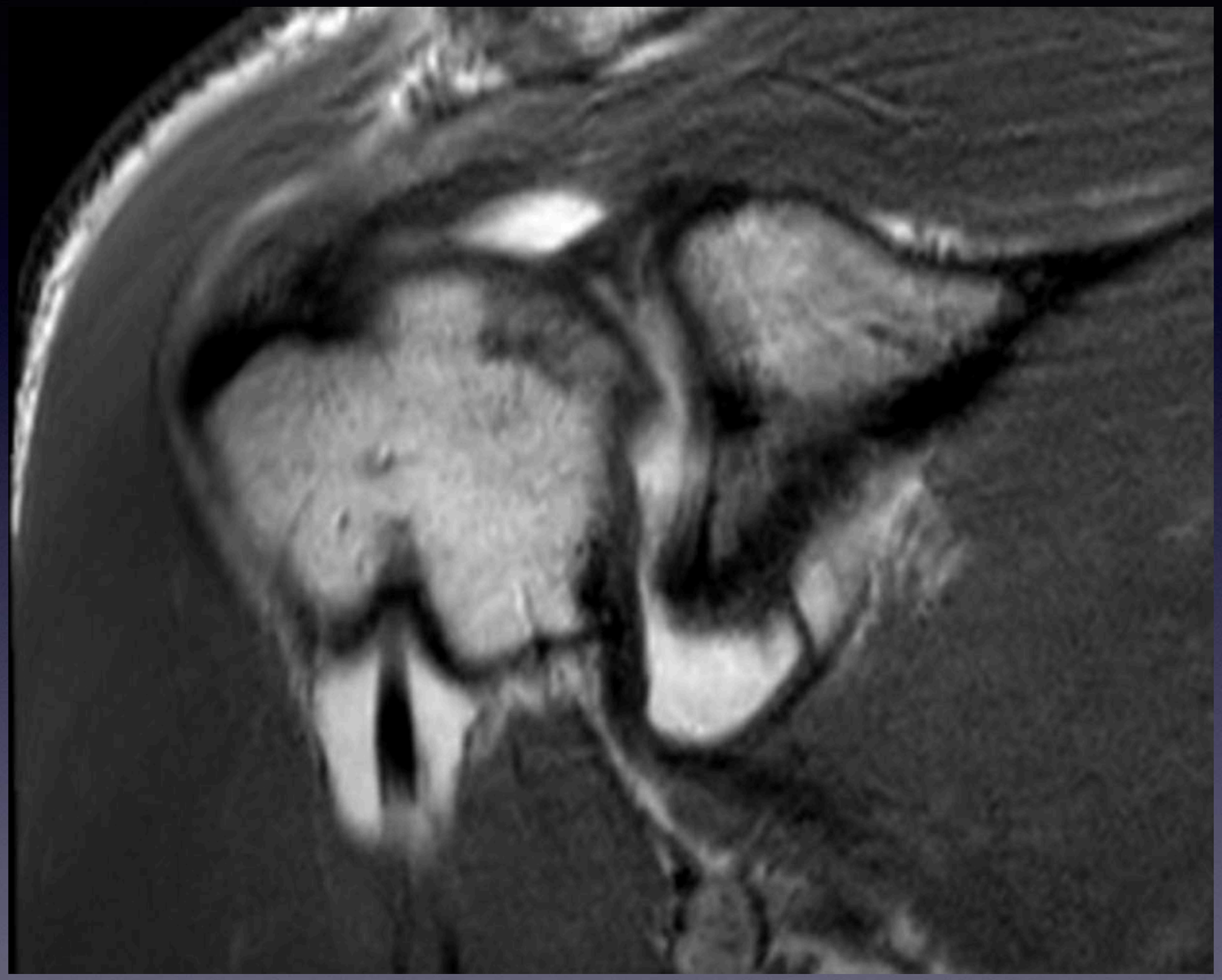
- Forceful traction
- Direct compression
- Throwing

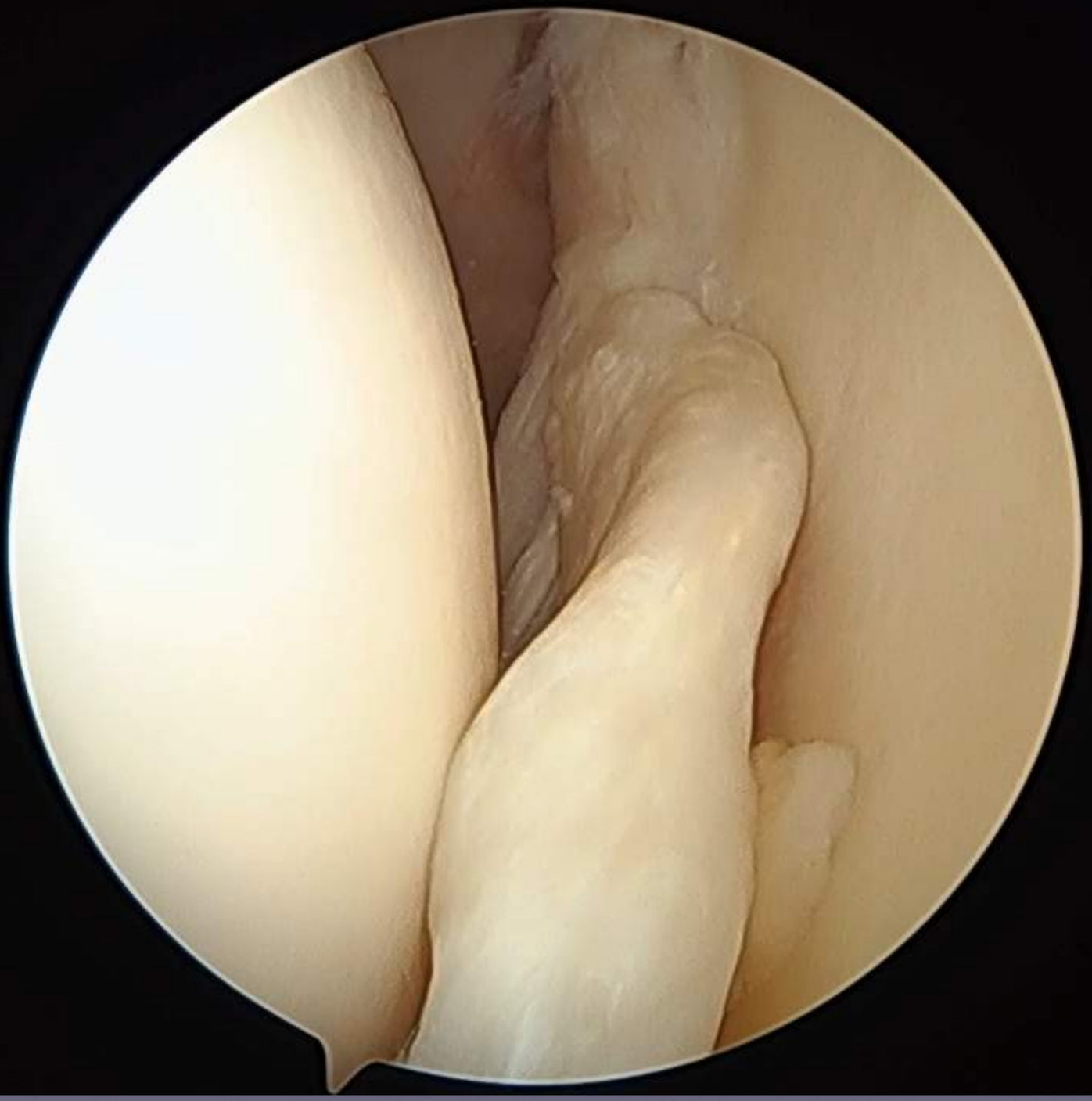
Labral Tears

- Present in a similar fashion to rotator cuff
- Less weakness, but this can sometimes be difficult to elicit secondary to pain
- Pain with overhead motion, reaching
- Physical exam undertaken
- MR arthrogram is diagnostic test of choice

Labral Tears

- 41 year old male CrossFit athlete
- Pain in the left shoulder for 6-12 months
- Initial injury skiing and MRI noted fraying
- Reinjury doing pull-ups and OH squats
- Catching, feelings of instability
- Pain with overhead activity, lifting, pull-ups impossible
- Spent 12 months modifying activity, NSAIDS, period of complete rest, with continued pain





Rotator Cuff

- Rotator cuff is the main dynamic stabilizer to the shoulder
- Overhead lifting can cause significant strain on the shoulder and rotator cuff
- Add in fatigue and speed, and the rotator cuff can be injured

Rotator Cuff

- Injuries to the rotator cuff will present with pain in the shoulder, particularly with sleep
- Weakness with overhead activity or reaching
- Can range from inflammation of the tendon to partial thickness tears to full thickness tears

Rotator Cuff

- Full history and physical exam is mandatory, including instability testing in younger patients
- NSAIDs, PT, rest, etc
- MRI is useful, sometimes MR arthrogram is better

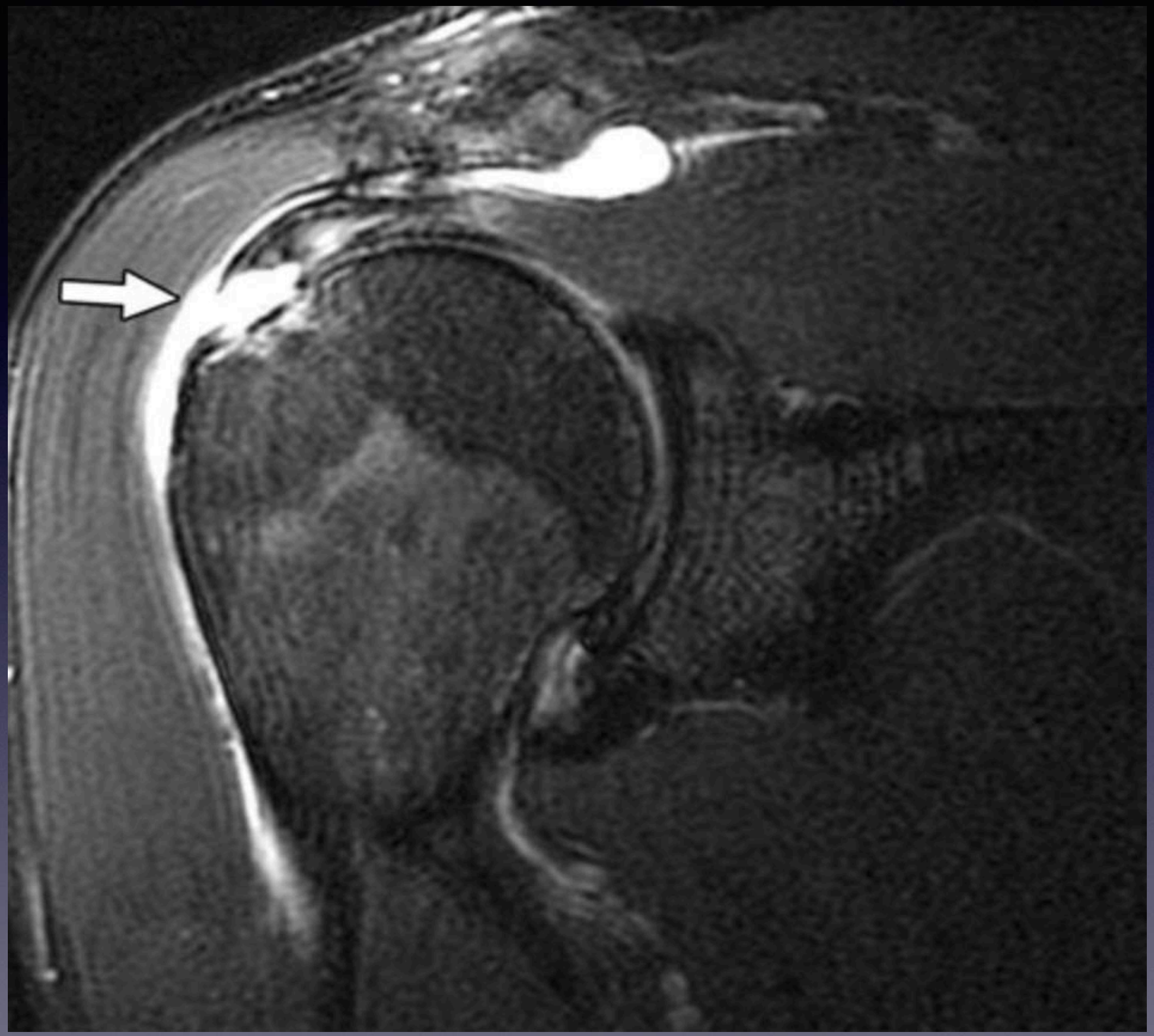
Treatment

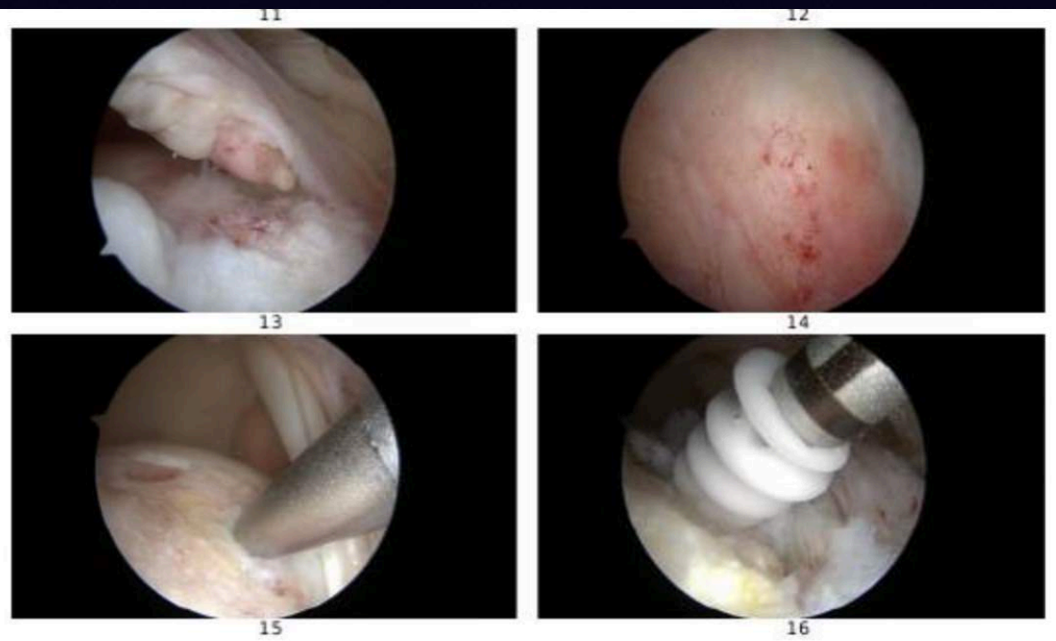
- Nonoperative management is considered:
  - Partial tears
  - Interstitial tear
  - Irreparable tears (chronic, retracted)
  - Patient age or comorbidity
- Surgical
  - Full thickness tears
  - Weakness and pain that fails conservative treatment

Case....

- 42 year old CrossFit athlete
- Pain in the shoulder for 6 months
- Pain with overhead lifting, pull-ups
- Weakness on exam, particularly with abduction

- Conservative treatment included activity modification
- NSAIDS
- HEP
- Eventually we order an MRI

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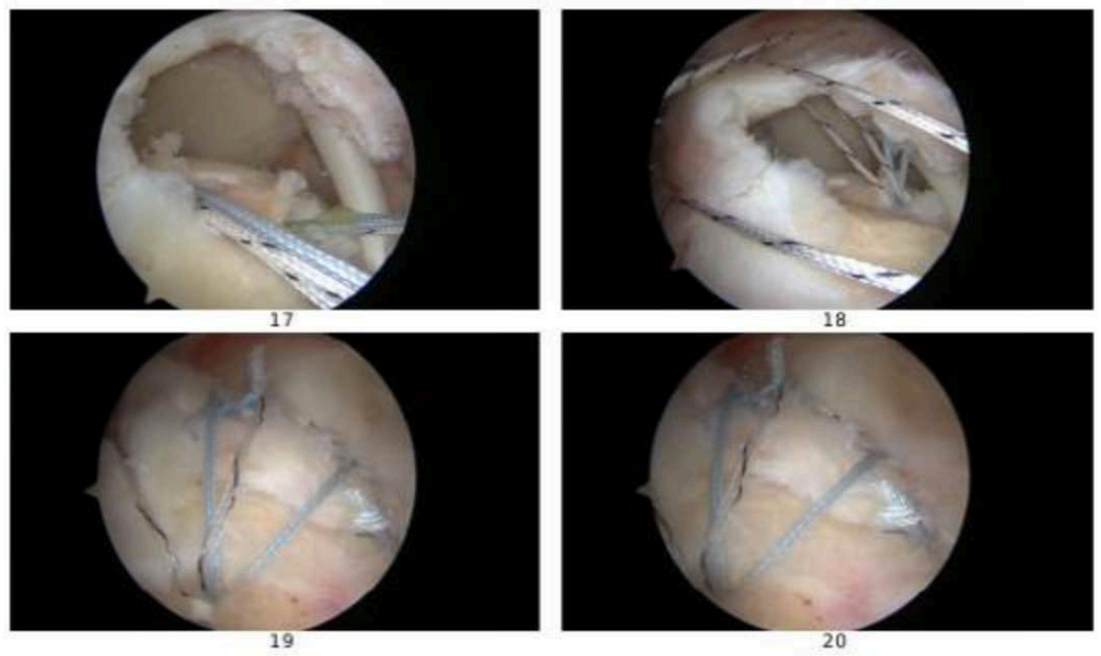
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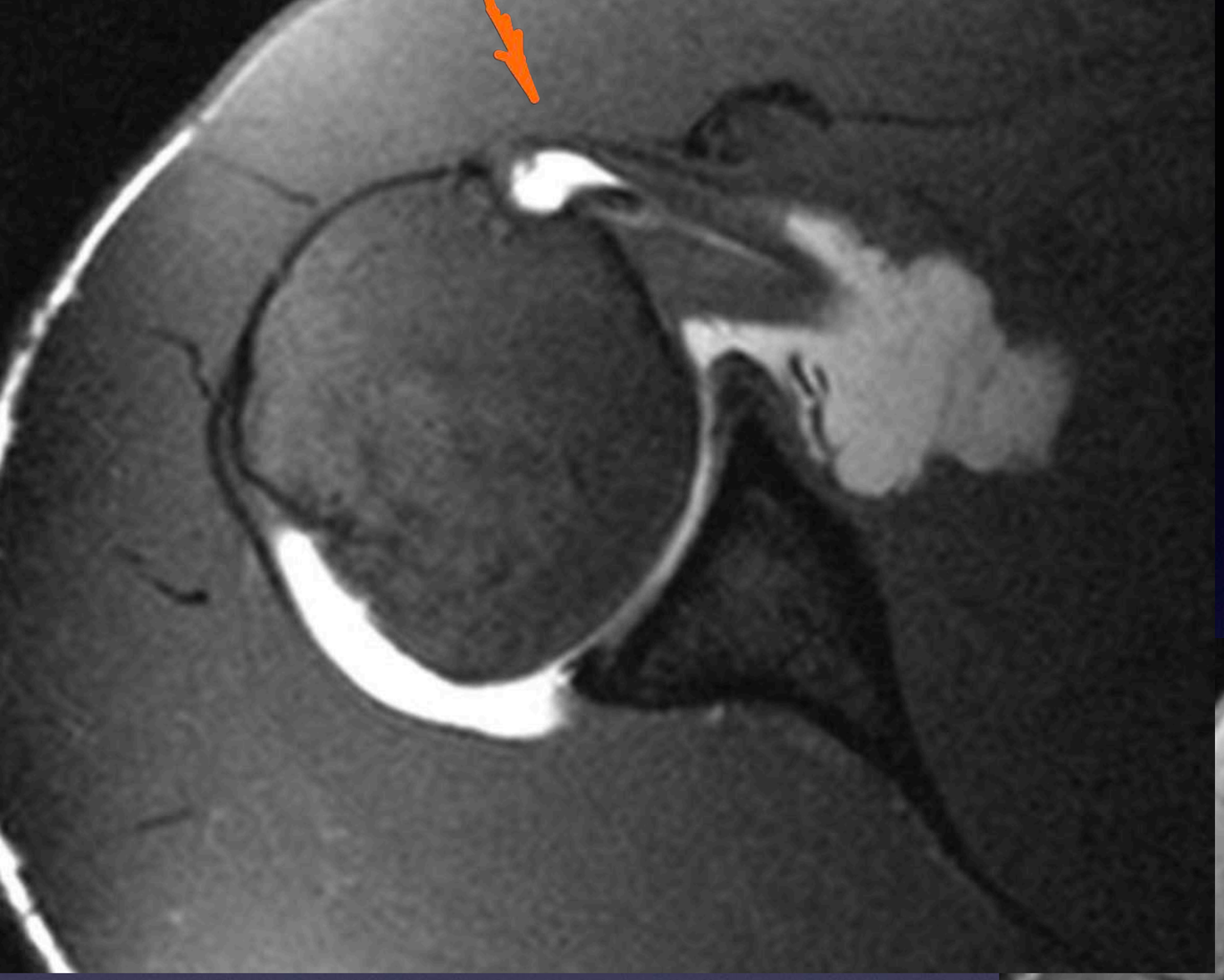
AGAIN FASTER
EQUIPMENT
EXIT

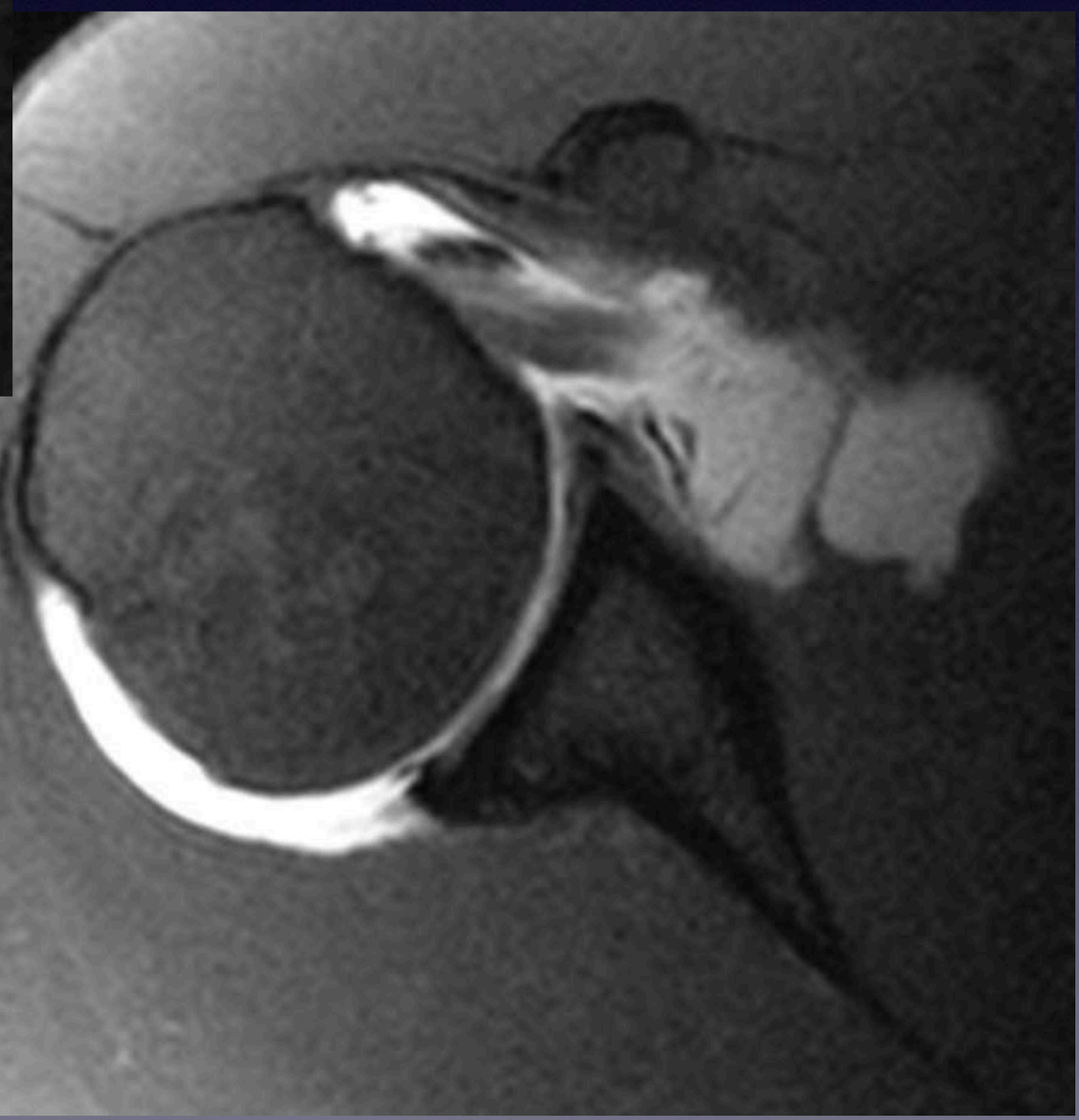
Last Case

47 year old elite CrossFit Athlete (Masters Champion)

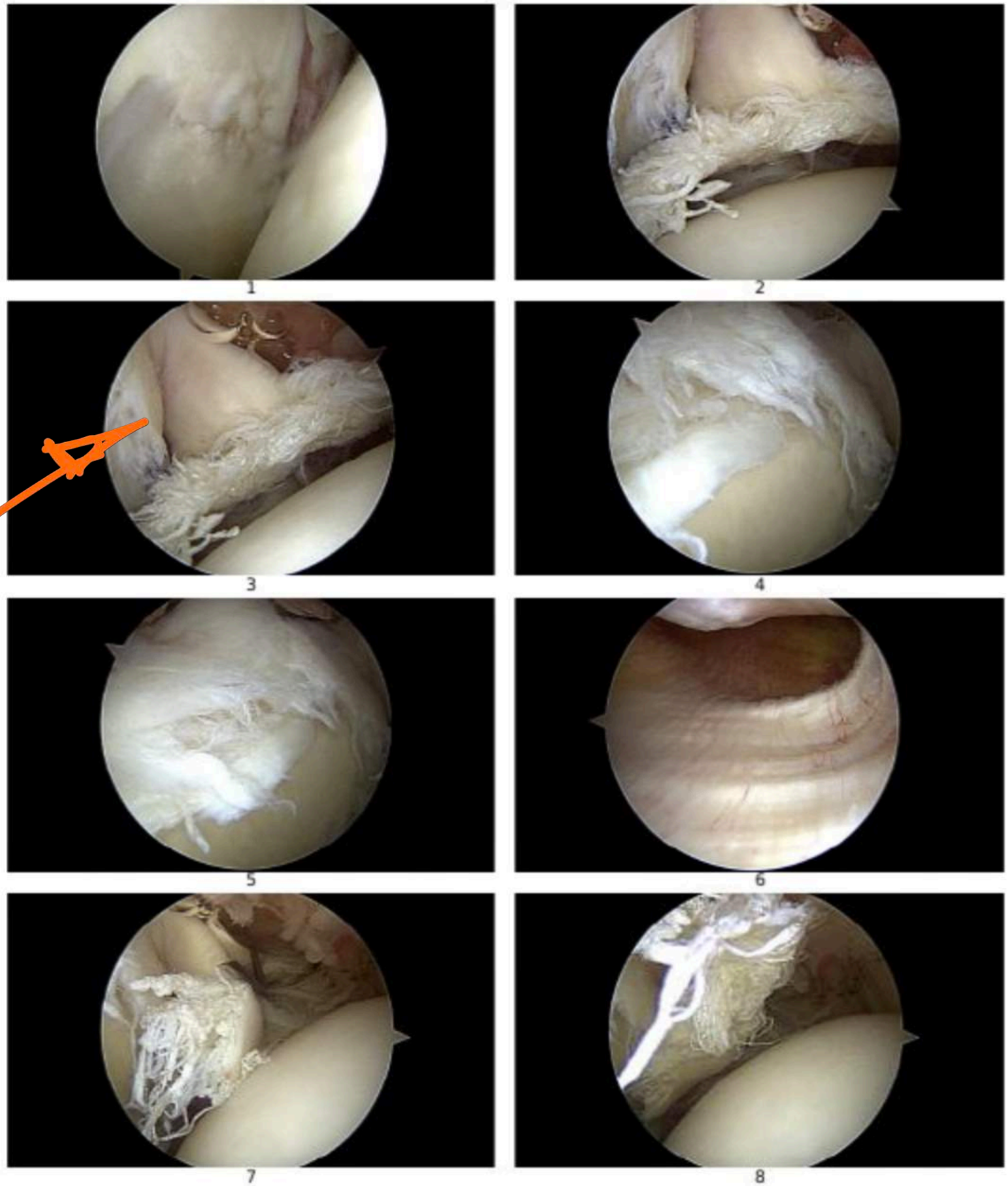
- One year of right shoulder pain
- Failed conservative treatment
- Unable to lift comfortably overhead, pull-ups are difficult. Still able to compete but with significant pain
- Seen in office, substantial pain with internal rotation and abduction, anterolateral pain
- MRI ordered


UNBROKEN DESIGNS
[O] ltevebaugh

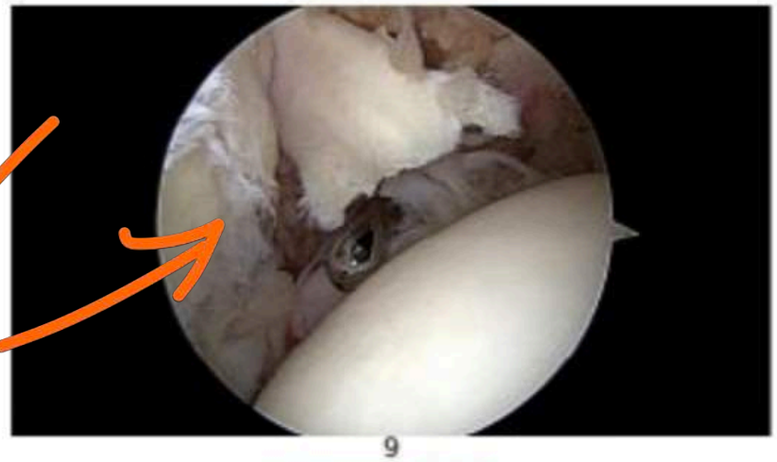




- Diagnosed with an upper border subscapularis tear and subluxated biceps tendon
- Discussed the treatment options
    - In this case, nonsurgical treatment will not give lasting improvement as the biceps is dislocated
    - Discussed arthroscopy with rotator cuff repair and biceps tenodesis
    - Patient wished to compete in “one more event”
    - Surgery scheduled for shortly after



BICEPS!



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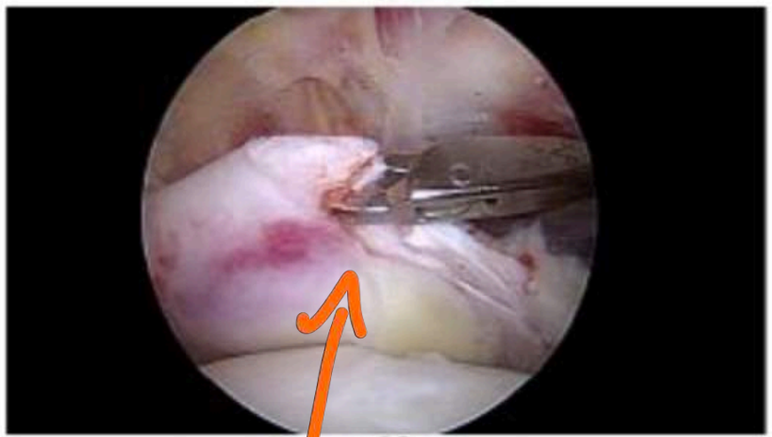

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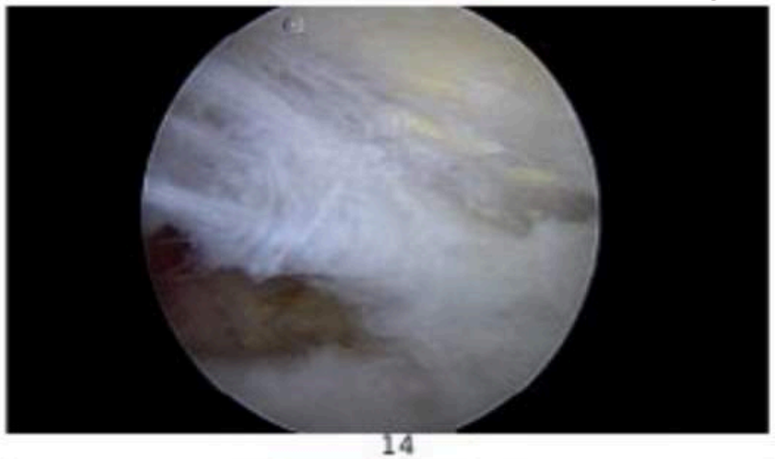

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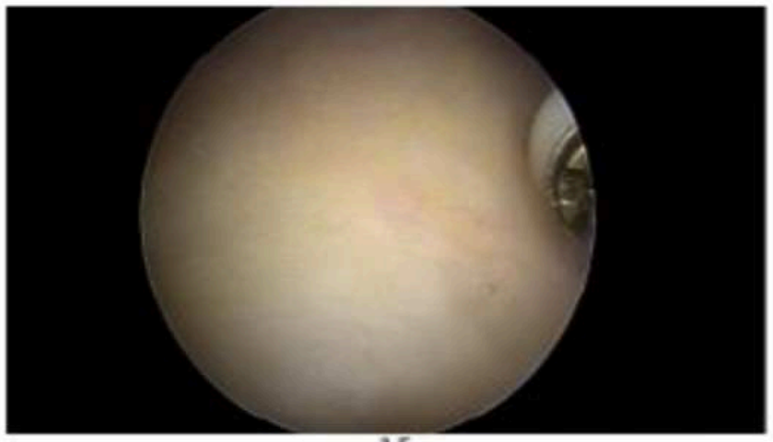

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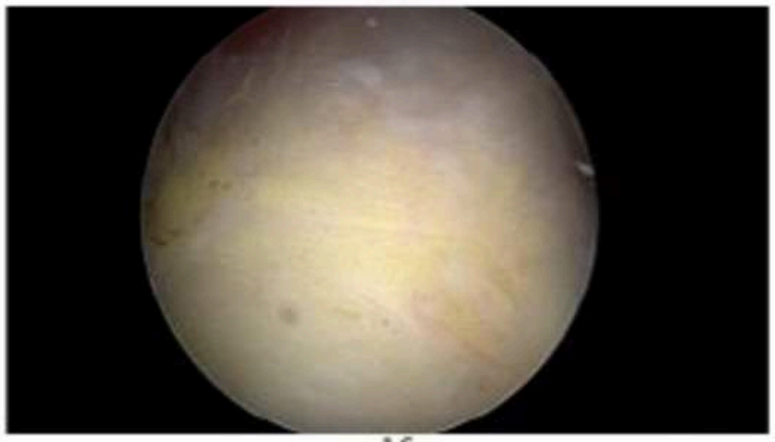

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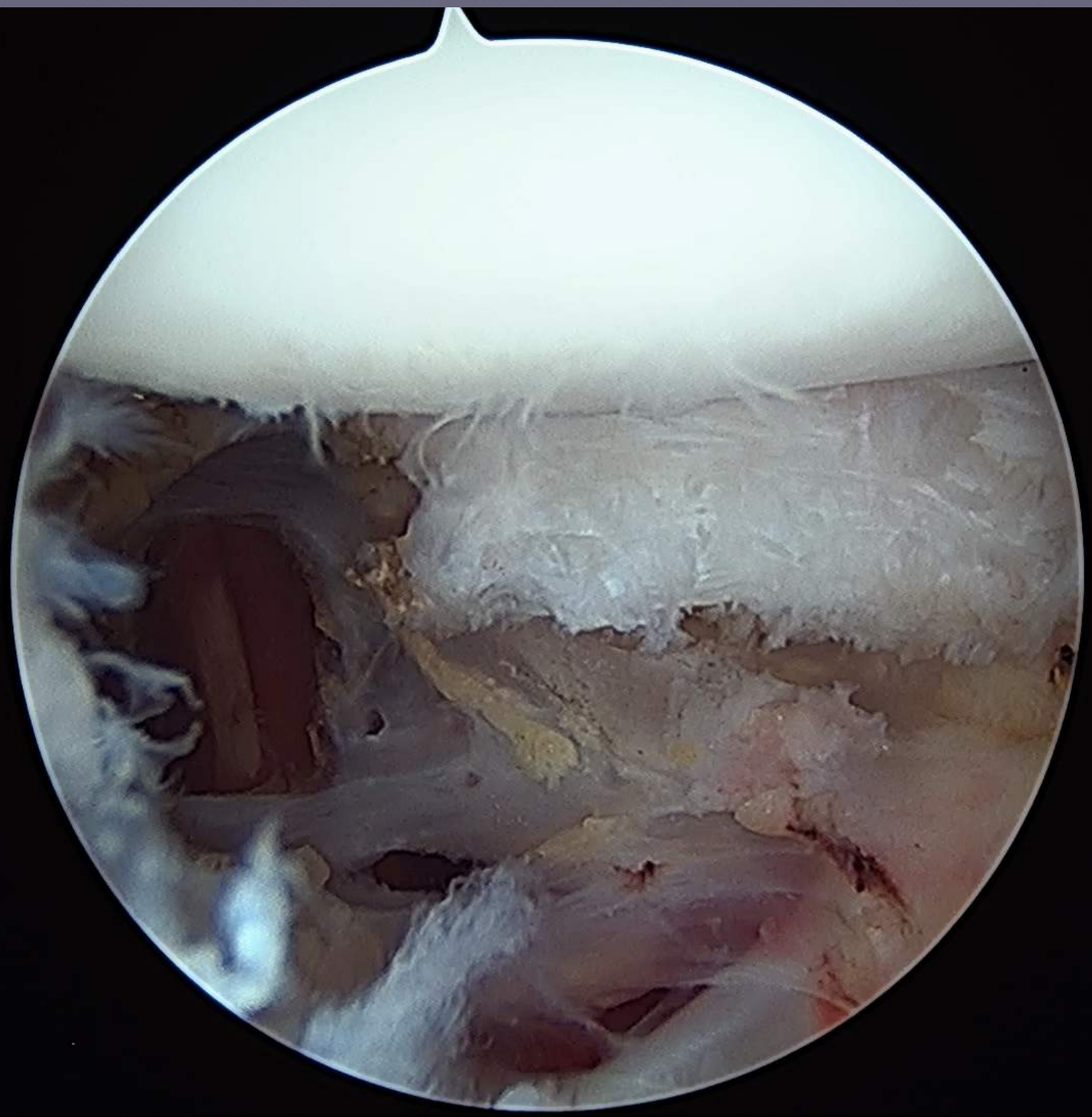
DEBRIDED

REPAIRED




FLO
THE HILLS - MIAMI FL
FLO
5:09.6


ASCENT
HARD
WORK

Summary

- There are numerous studies for an against CrossFit-style workouts
- Any musculoskeletal injury can occur in CrossFit—as with any sport/fitness program
- Be particularly careful with overhead lifting (snatch, overhead squats, hand stand push ups)
- My opinion: CrossFit doesn’t hurt people, Ego hurts people.
- Be smart...focus on form...check the ego