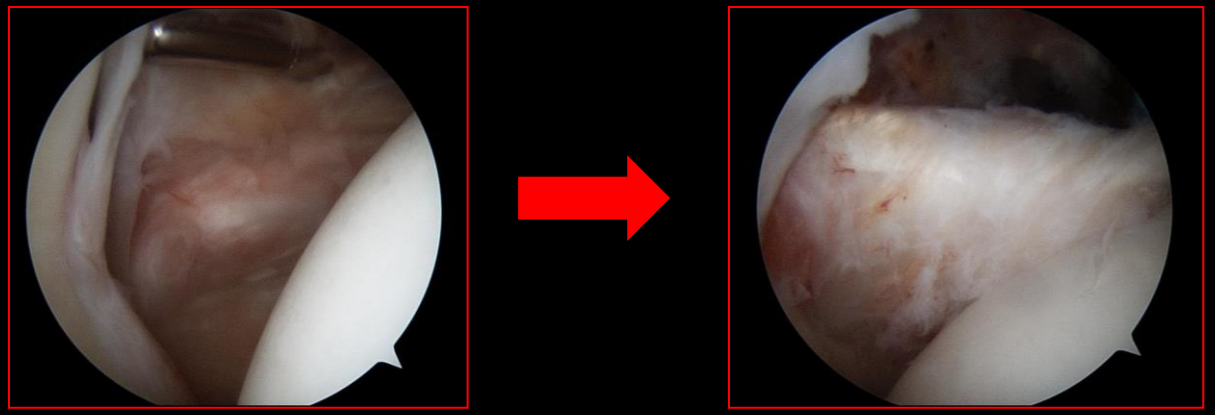
# Management of Subscapularis Tendon Tears



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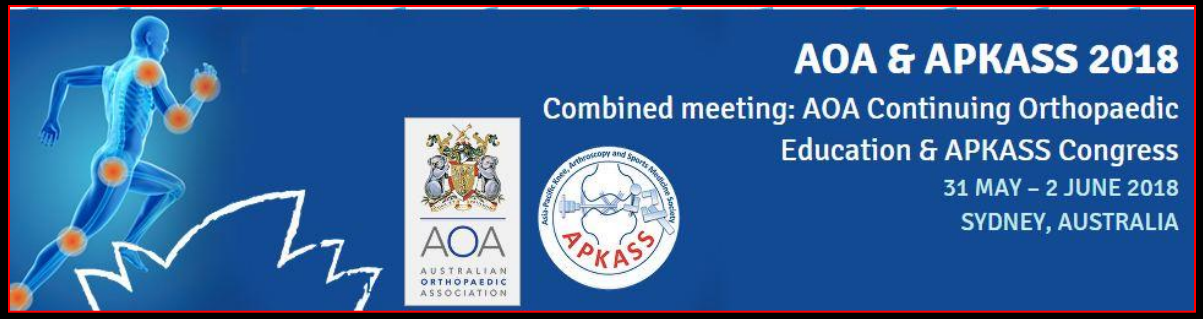
# Declaration of Interest

I declare that in the past three years I have:

- Held shares in - nil
- Received royalties from - nil
- Done consulting work for - Arthrex, Wright Medical, LIMA
- Given paid presentations for - Arthrex, Wright Medical, LIMA
- Received research support from - Arthrex, DePuy Synthes

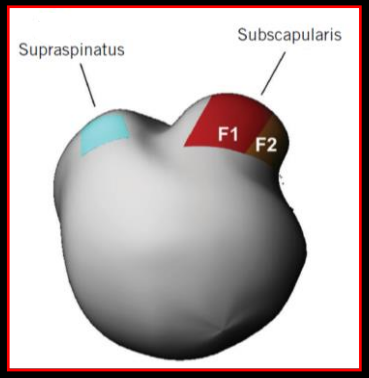
Signed: Craig M Ball



# Introduction

- Subscapularis largest and most powerful muscle of RC, providing up to 50% of RC force alone
  *Keating et al. JBJS (Br) 1993; 75: 137-140*
- Plays an essential co-ordinating role in shoulder function and as an important static and dynamic stabiliser

- Best thought of as two separate muscles, because of two distinct origins, innervation patterns, and insertions
  *Collin et al. Orthop Traumatol Surg Res 2013; 99: S255-S258*

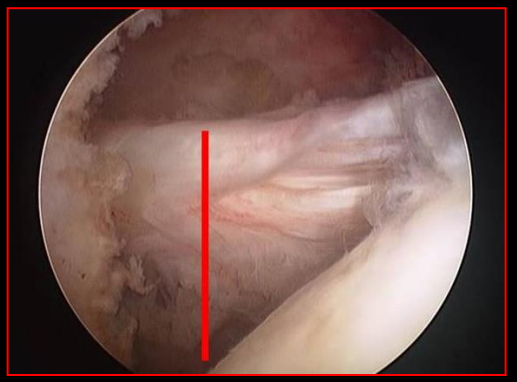


# Introduction

- Diagnosis and treatment of posterosuperior RC tears well documented in literature

<u>However</u>

- Until last decade, paucity of information regarding subscapularis tendon tears, despite its importance - the “forgotten tendon”
  *Lo et al. Arthroscopy 2003; 19: 334-337*
- As knowledge about subscapularis and associated structures has expanded, tears in these areas increasingly recognized as key sources of pathology

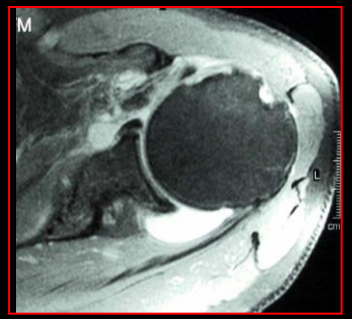


# Diagnosis

- Requires high index of suspicion based on history and examination and must specifically search for subscapularis pathology intraoperatively

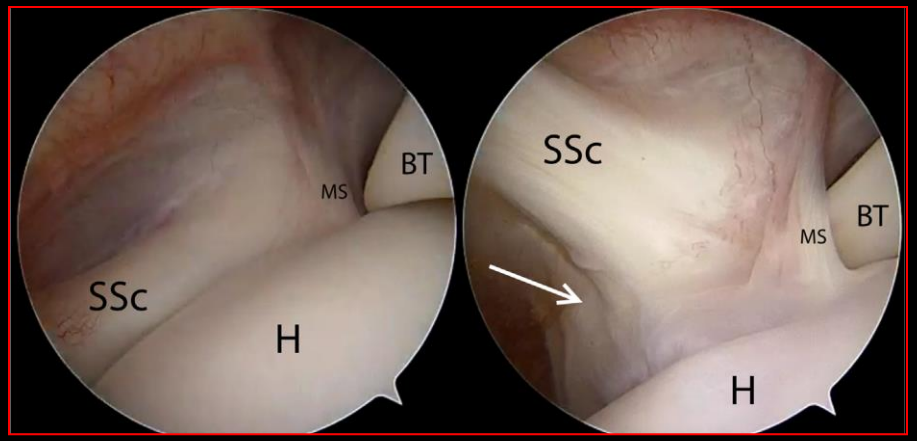
- True incidence of subscapularis tears unknown
  - many patients lack classic symptoms and signs
  - imaging diagnosis of subscapularis tears poor (MRI may not provide adequate preoperative information, even when arthrogram performed)

  *Foad et al. Arthroscopy 2012; 28: 636-641*
  *Smucny et al. Arthroscopy 2016; 32: 246-251*

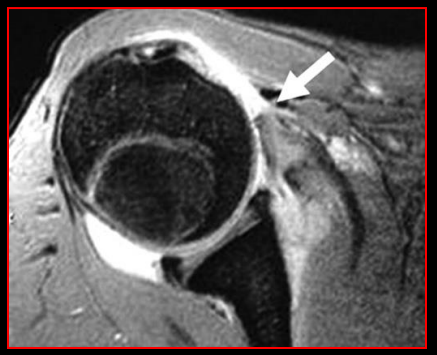



# Remember

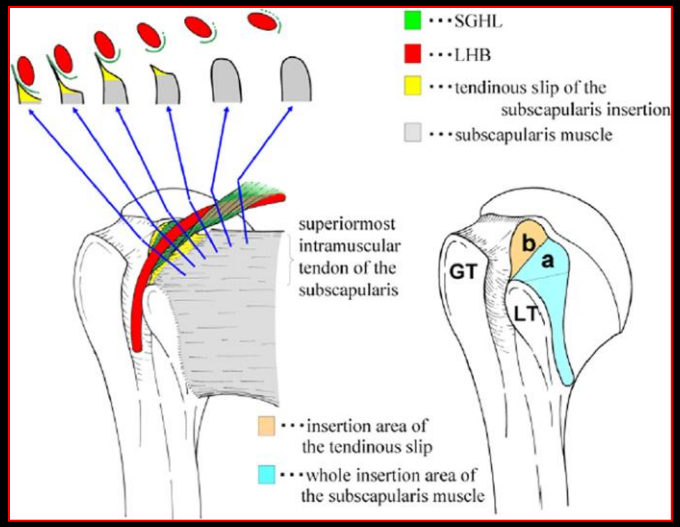
- Soft tissue attachments of subscapularis tendon and its intimately associated structures (CHL, SGHL, MGH, supraspinatus tendon, LH biceps, bicipital tunnel) are complex, but they are easily amenable to examination by careful diagnostic arthroscopy
  *Hartzler et al. Oper Tech Sports Med 2018; 26:10-23*



# Pathoanatomy



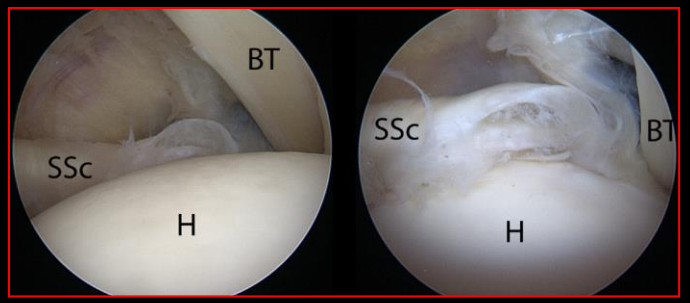
- No universally accepted classification system for subscapularis tendon tears
- Proposed descriptive classification:
  - partial vs full thickness tear (medial-lateral extent)
  - length of the tear (superior-inferior extent)
  - extent of retraction
  - presence of associated pathology (most commonly LH biceps)




*Hartzler et al. Oper Tech Sports Med 2018; 26:10-23*

# Subscapularis Tears

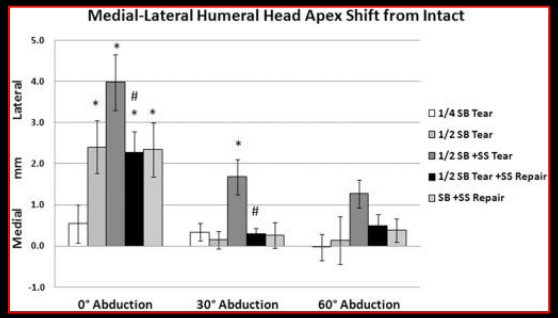
- Many smaller tears only discovered at time of arthroscopy - may go undiagnosed if not specifically looked for
  *Adams et al. Arthroscopy 2010; 26: 1427-1433*
- Reported in 27 to 43% of patients undergoing shoulder arthroscopy
  *Lafosse et al. JBJS (Am) 2007; 89: 1184-1193*
  *Arai et al. Arthroscopy 2008;24:997-1004*

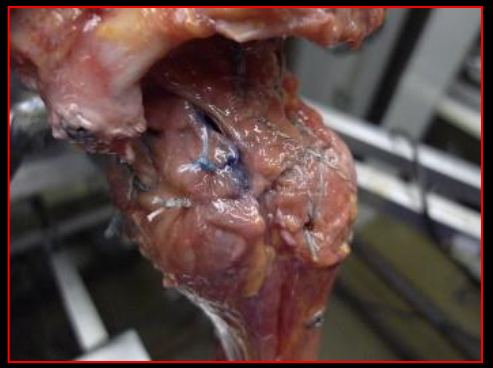


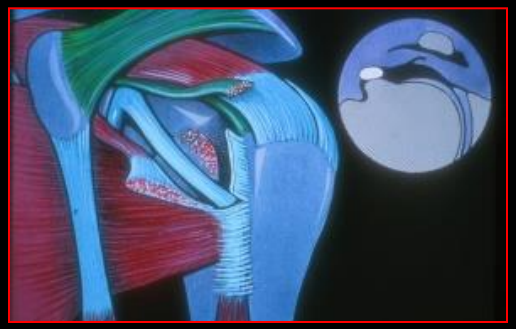

- Subscapularis tears of any size combined with supra +/- infraspinatous tears more common than isolated subscapularis tears

# Subscapularis Tears

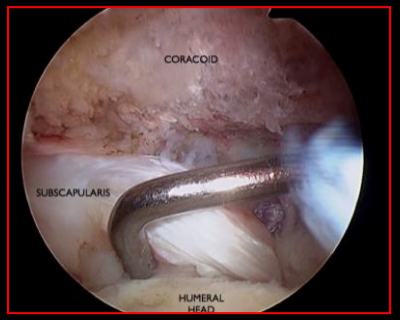
- Vast majority (>90%) start on articular, superior aspect of tendon insertion, and majority partial thickness
- Because of large size of subscapularis these have previously been considered relatively benign
- In an anterosuperior cadaveric study Yoo et al found no additional difference in glenohumeral kinematics with repair of partial subscapularis tendon tears
  *Yoo et al. JSES 2014; 23: 902-908*





# However




- Recent emphasis on importance of subscapularis tendon (especially superior 1/3) for normal biomechanical shoulder function and to increase the viability of concurrent posterosuperior RC repairs
  *Collin et al. Shoulder Elbow Surg 2014; 23: 1195-1202*
  *Gausden et al. J Shoulder Elbow Surg 2017; 26: 331-336*

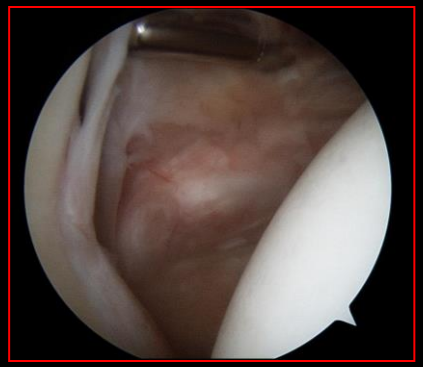
Hence

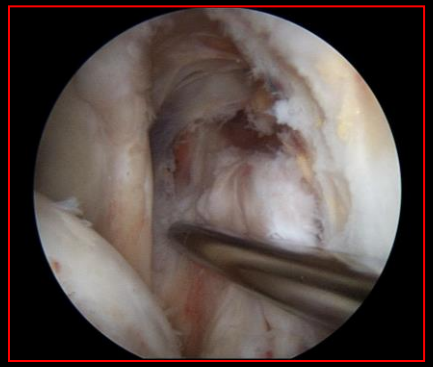
- Unless other factors make repair impossible, current recommendation is to repair all subscapularis tears that have tendon fibre disruption from bone, even partial lesions of the upper tendon
  (also prevents propagation and LH biceps instability)

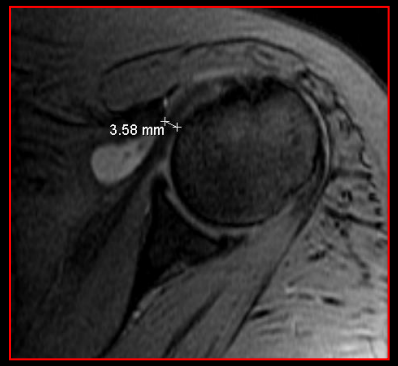
# Surgery

- In contrast to the supraspinatus, repair of subscapularis tendon tears not popularized until 1990's
  *Ticker et al. Arthroscopy 2011; 27: 1123-1128*

- Arthroscopic repair not described until 2002
  *Burkhart et al. Arthroscopy 2002; 18: 454-463*





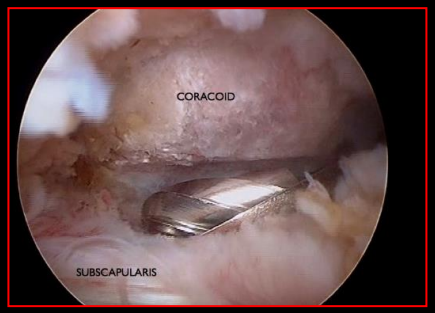



# Arthroscopic Repair

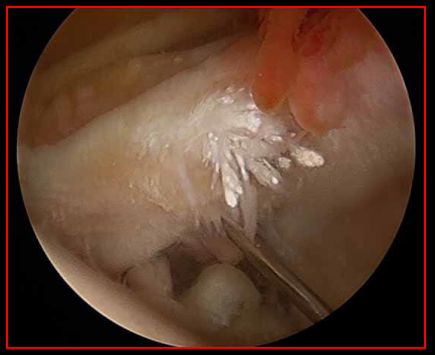
- Challenge of arthroscopic repair is small subcoracoid space which makes visualisation, instrumentation, and suture management more difficult
  - open rotator interval; debride subcoracoid bursal tissue
  - expose coracoid and soft tissue attachments
  - coracoidplasty as indicated (controversial)

- Avoid inferior dissection
  - neurovascular structures > 2.5cm from coracoid tip

*Lo et al. Arthroscopy 2004; 20: 591-595*

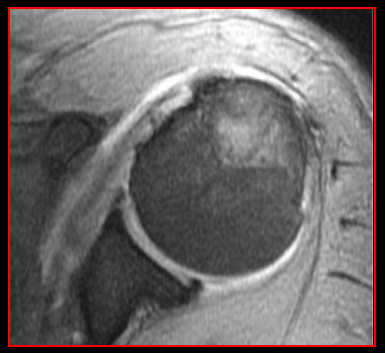


# Biceps Management



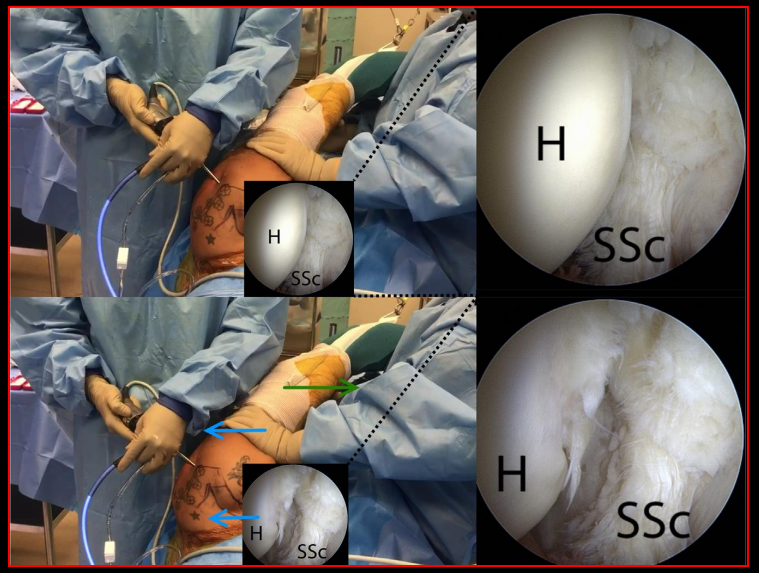
- Biceps tendon pathology exceedingly common with subscapularis tendon tears
- Preservation a risk factor for repair failure and continuing biceps symptoms
  *Edwards et al. J Bone Joint Surg (Am) 2005; 87: 725-730*
- Tenotomy is typically only done in elderly more sedentary patients, with tenodesis being more routine in order to preserve fullest function and cosmetic appearance of biceps

# Remember



- Even large subscapularis tears can be missed without a careful and systematic diagnostic approach
- Ideally look with both 30° and 70° scopes when evaluating subscapularis and associated structures, as 70° scope greatly improves visualization
- Employ shoulder flexion and posterior lever push to open anterior viewing space and put tendon on tension

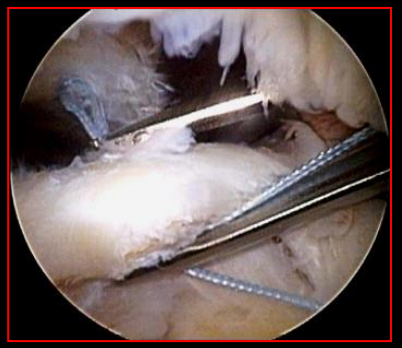
  *Burkhart et al. Arthroscopy 2006; 22:1014-1027*



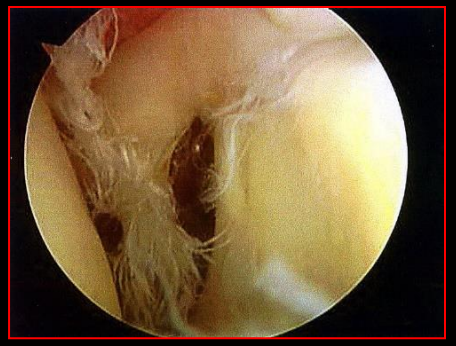

# Upper Tendon Tears


- Usually < 1cm superior/inferior length
- Importance of repair relates to intrinsic biomechanical and functional properties of tendon
  *Ticker et al. Arthroscopy 2011; 27: 1123-1128*
- Amenable to intra-articular repair
  - posterior viewing portal
  - anterior +/- anterolateral working portal
  - single anchor
  - simple, mattress, or knotless repair

  *Denard et al. Arthroscopy 2011; 27: 861-866*
- Good biomechanical justification for repair
  *Lorbach et al. 2016; 24: 3855-3862*

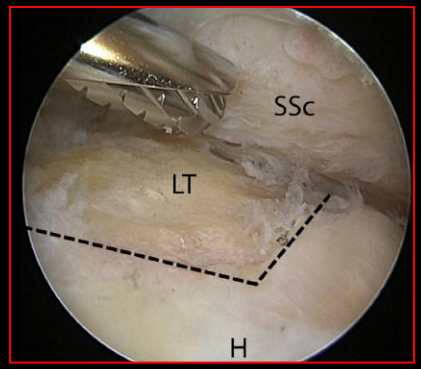


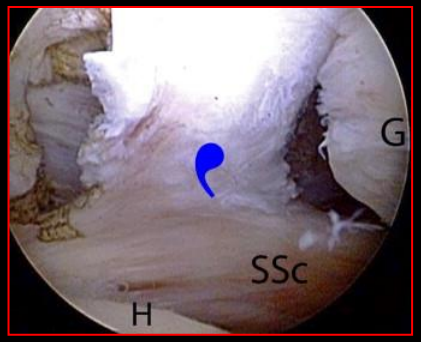
# Isolated Tendon Tears



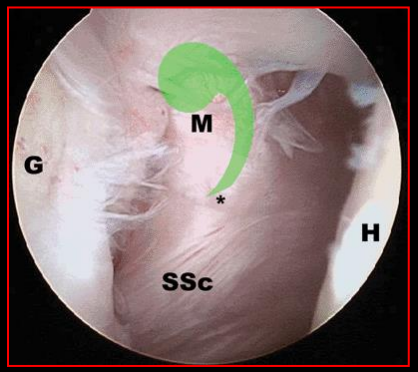
- Usually traumatic, younger, and male
- Concomitant pathology not uncommon

- Vast majority are reparable, even if this requires repair to a slightly medialized bone bed
  *Denard et al. Arthroscopy 2012; 28: 1608-1614*
- Knowledge of bony anatomy of lesser tuberosity key
  - trapezoidal shape
  - average dimension 1.8 x 2.5 cm
  *Richards et al. Arthroscopy 2007; 23: 251-254*

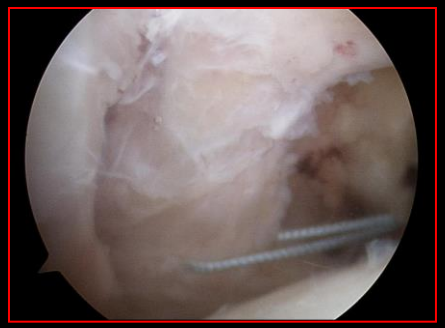


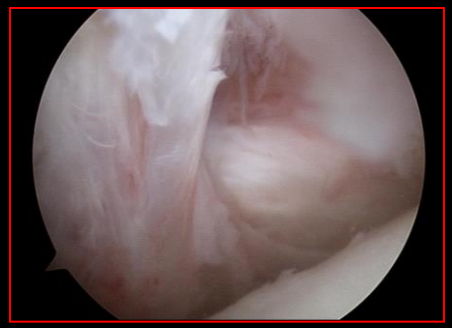



# Retraction



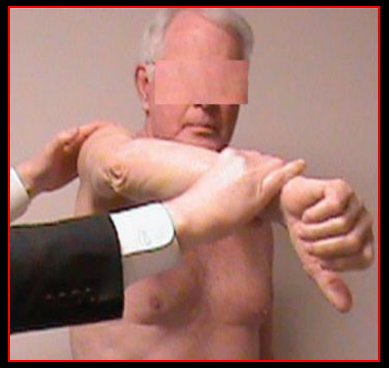

- With retraction key to identification is finding comma sign (arthroscopic guide to superolateral edge of torn tendon)
  - portion of superior GHL/coracohumeral ligament complex
  *Lo et al. Arthroscopy 2003; 19: 334-337*
- Initial three-sided release facilitated by use of traction suture





- Can also address an isolated retracted subscapularis tendon tear via an open deltopectoral approach

# Anterosuperior TendonTears



- More common than isolated tendon tears
- Usually degenerative; older patients
- Symptoms primarily from superior component
- Comma sign links with anterolateral edge of supraspinatous
  *Lo et al. Arthroscopy 2003; 19: 224-337*

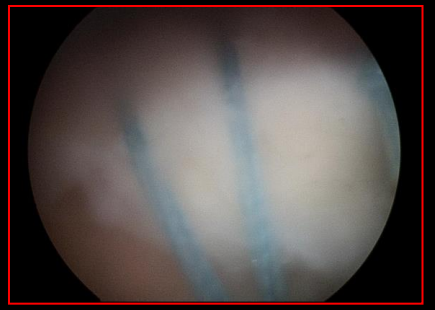
- Repair of both tears will influence overall security of *entire* repair construct
  *Denard et al. Arthroscopy 2012; 28: 1587-1591*
- When in continuity with supraspinatous tear subscapularis should be repaired first (brings supraspinatous lateral)
  *Ticker et al. Arthroscopy 2011; 27: 1123-1128*

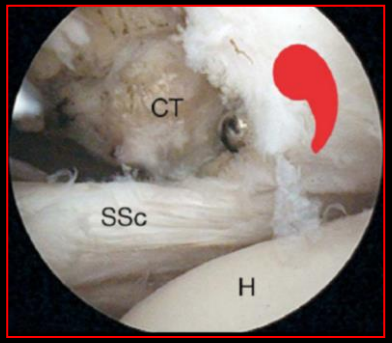
# Arthroscopic Repair

- Larger tears perform subacromial space repair
  - beach chair position with arm in forward elevation and internal rotation
  - midlateral viewing portal
  - anterior portal for anchor placement / suture management (medial row sutures passed vertical mattress)
  - anterolateral portal for subscapularis preparation, suture passage, completion of repair
- Biceps tenodesis lower portion of groove
- Turn camera on side to aid orientation

# Arthroscopic Repair

- The larger and more retracted the tear, the more important to use a double-row repair
  - biomechanically and anatomically superior
  - ideal to provide optimal coverage of subscapularis footprint
  - lateral release of tendon but preserve attachment of comma to help with mobilisation, suture passage, and reduction of supraspinatous tendon

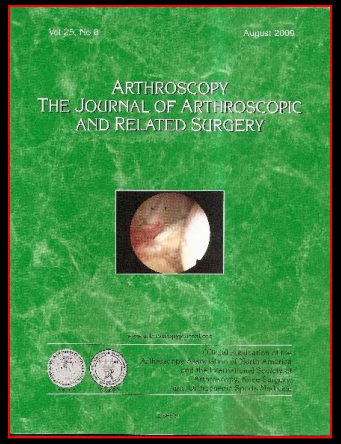




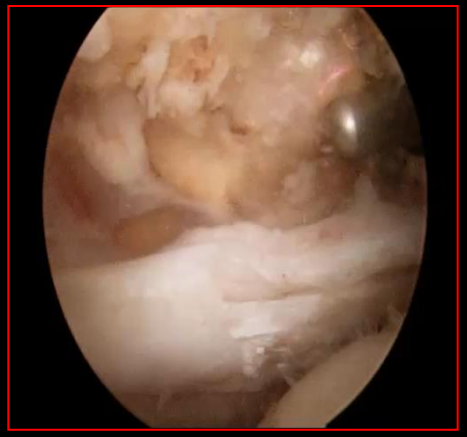

*Richards et al. Arthroscopy 2007; 23: 251-254*
*Wellmann et al. Knee Surg Sports Traum Arthro 2009; 17: 1477-1484*

# Results

- Arthroscopic subscapularis repair first reported in 2002
  *Burkhart et al. Arthroscopy 2002; 18: 454-463*




- Subsequent reports from same group showed sustained results at intermediate and long-term
  *Adams et al. Arthroscopy 2008; 24: 1381-1389*
  *Denard et al. Arthroscopy 2012; 28: 1587-1591*

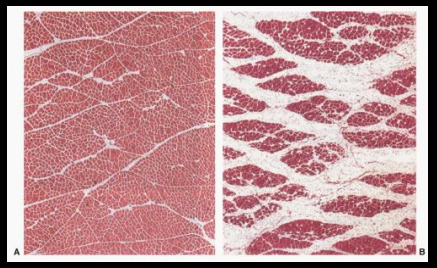


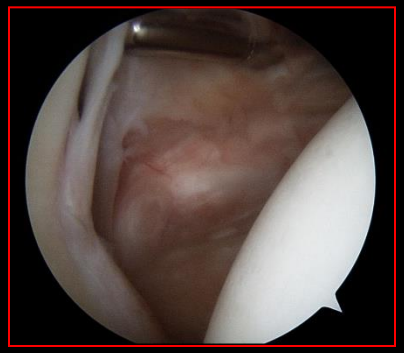
# Recently

- Numerous studies have shown very good clinical results with few complications and an acceptable rate of healed repairs utilising both arthroscopic and open techniques
  *Saltzman et al. Arthroscopy 2017; 33: 849-860*
  *Seppel et al. Am J Sports Med 2017; 45: 759-766*
  *Katthagen et al. Arthroscopy 2017; 33: 1286-1293*
  *Kim et al. Am J Sports Med 2017 45: 1269-1275*


- Outcomes worse with longer time from injury

- Re-tear rates typically very low and correlate with pre-operative stage of fatty infiltration



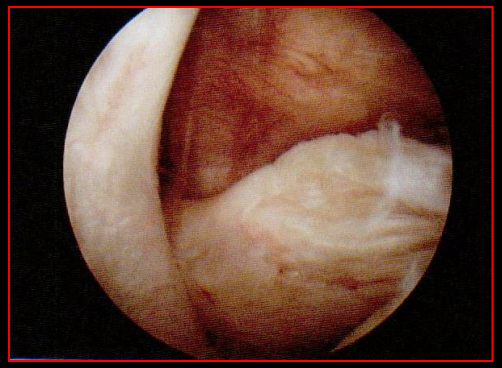


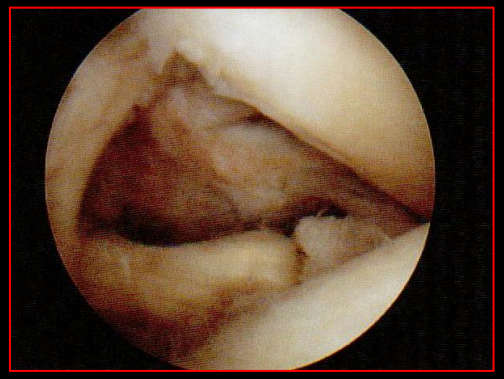
# Summary

- Arthroscopy gold standard for diagnosis of subscapularis tendon injuries (don’t rely on MRI)
- Use of arthroscopy has enabled surgeons to recognize even subtle pathology of this tendon
- Several studies have shown importance of subscapularis tendon, highlighting importance to properly recognise and treat
- When subscapularis tendon has any significant fibre disruption from bone, then repair should be undertaken, as should treatment of any associated biceps tendon pathology

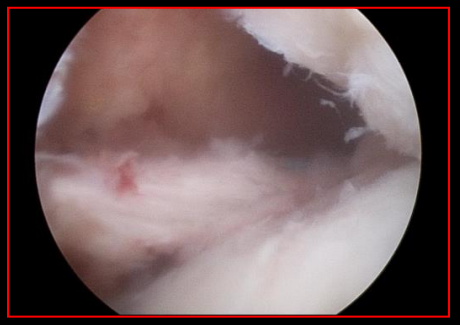
# Summary

- Majority of subscapularis tendon tears are partial thickness articular sided tears or full thickness tears < 25% footprint
- In these cases the footprint can be successfully repaired from within the joint using a single anchor technique





# Summary



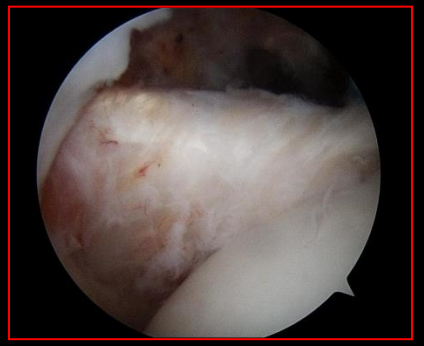
- Isolated tendon tears usually upper half to 2/3rd
- Anterosuperior tendon tears usually upper 1/3rd to half

- Tight subcoracoid space presents unique challenges compared with arthroscopic repair of superior RC tears and mastering arthroscopic techniques can be difficult
  - repair from subacromial space
  - use arthroscopic retractor to increase working room

- Results of open surgery likely just as good
  - isolated tears from in front, anterosuperior tears from above

# Summary

- Important to understand relationship of larger subscapularis tendon tears with tears of the posterosuperior RC (in continuity)
- Recognition and treatment of subscapularis tendon tear in this setting is critical (subscapularis tendon repaired first)
- Larger tears ideally require a double row repair technique to better restore the footprint
- Outcomes usually very good



# Thank You