UNITED STATES
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COMMITTEE

Jonathan Finnoff, DO, FAMSSM, FACSM
Chief Medical Officer, US Olympic & Paralympic Committee
Clinical Professor, Dept PM&R, University of Colorado

DIAGNOSTIC & INTERVENTIONAL ULTRASOUND IN SPORTS MEDICINE

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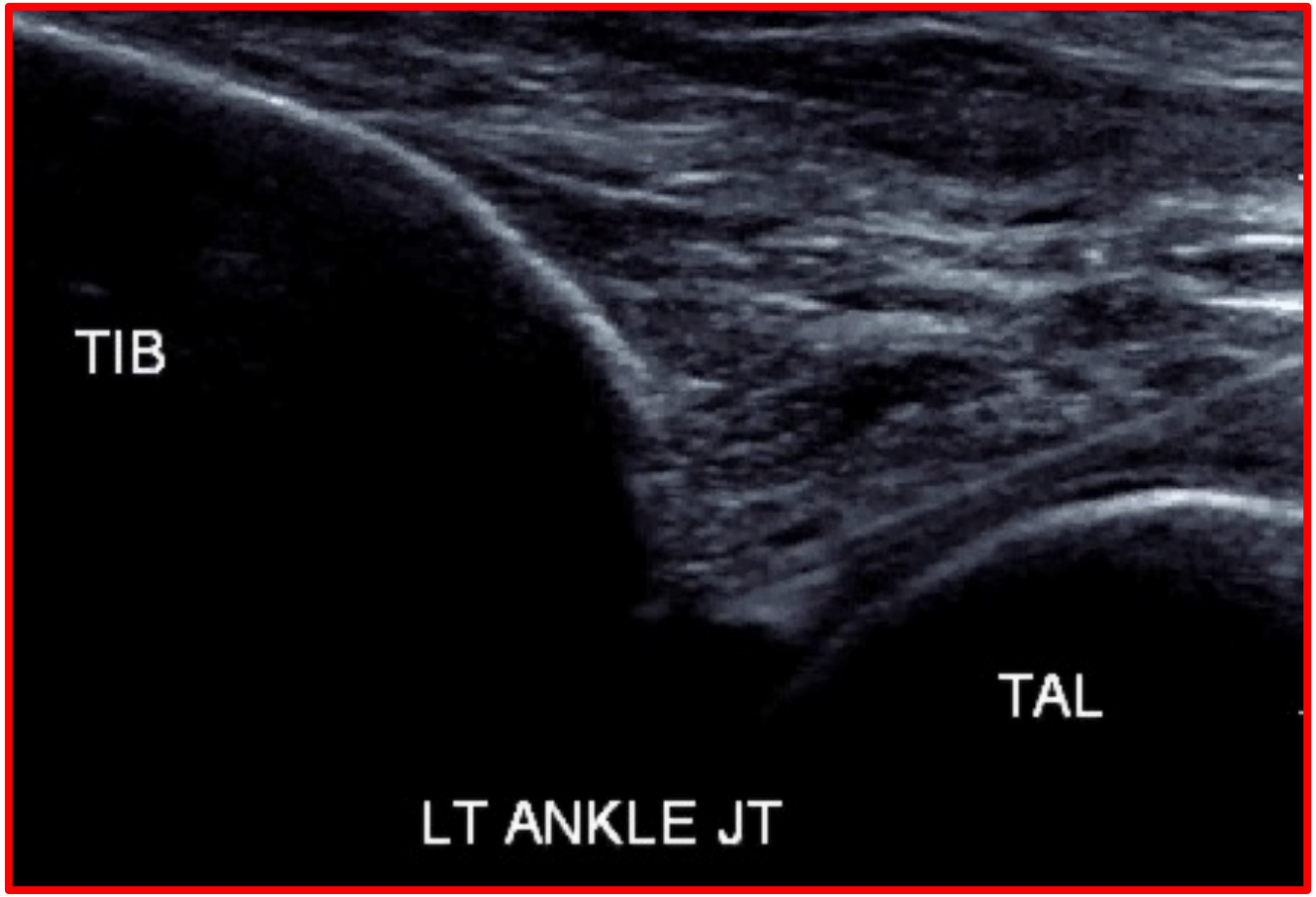
  - Royalties – Springer, Up to Date

Outline

Introduction

Case studies

Conclusions



What are we talking about?

Ultrasound uses high frequency sound waves (3-17 MHz) to image soft tissues and bony surfaces

Why Sports US instead of MSK US?

Is US only used for MSK purposes in sports medicine?

No!

Applications of US in sports medicine go well beyond MSK diagnoses/interventions

- eFAST
- Limited cardiac echo
- Vocal cord dysfunction
- Papillary edema
- Etc, etc, etc

To reflect the broad and unique applications of US in sports medicine, a new term was required…

- Sports Ultrasound

Evolution of Ultrasound-Guided Procedures

First Generation: US-guidance of established procedures

- E.g., intra-articular and peri-tendinous injections

Second Generation: US-guided advanced procedures with needle

- E.g., peri-neural hydrodissections, lavage and aspiration of intra-tendinous calcifications

Third Generation: US-guided procedures with existing or specially designed surgical tools

- E.g., sonographic debridement, hook knives, Sonex device

Case 1

23 y/o RHD male weight-lifter

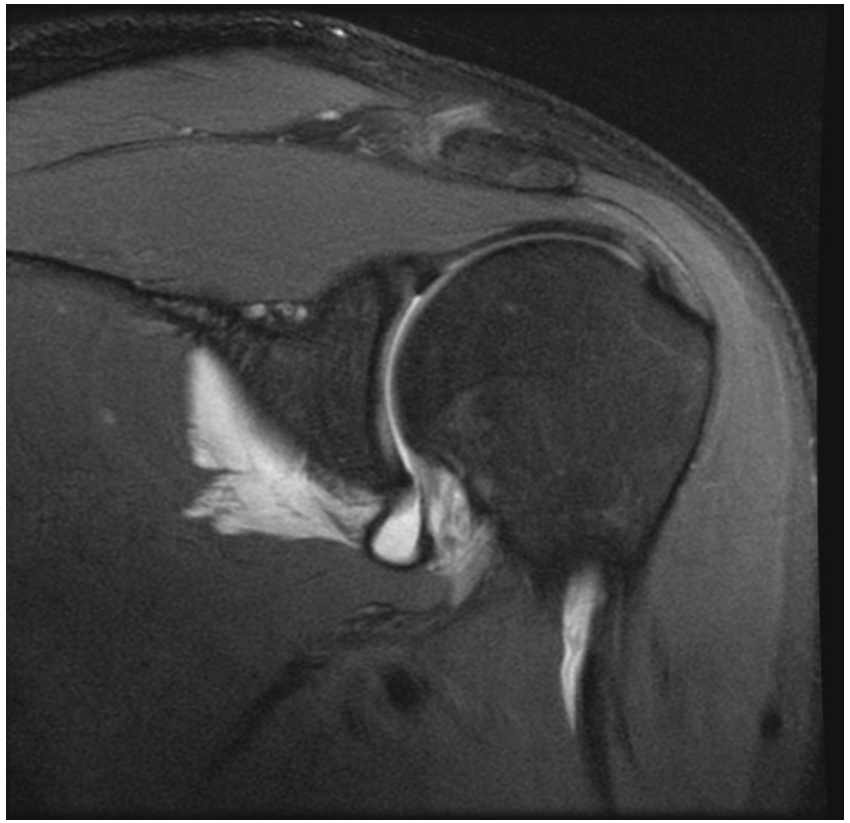
- 2 months of painful anterior shoulder “snapping”
- Increased with horizontal abduction or overhead motions in an abducted/externally rotated position
- Symptoms not improved with 1 month rest, 2 months of rehabilitation

Case 1

Diagnostic Studies

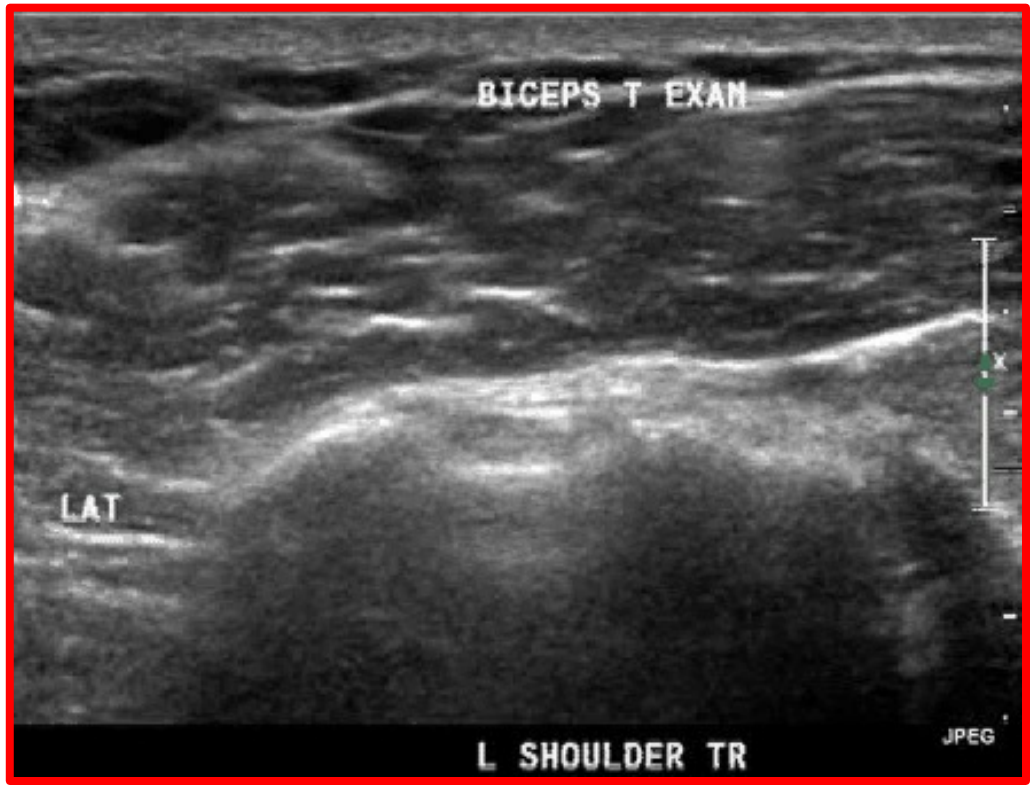
Case 1

Diagnostic Studies



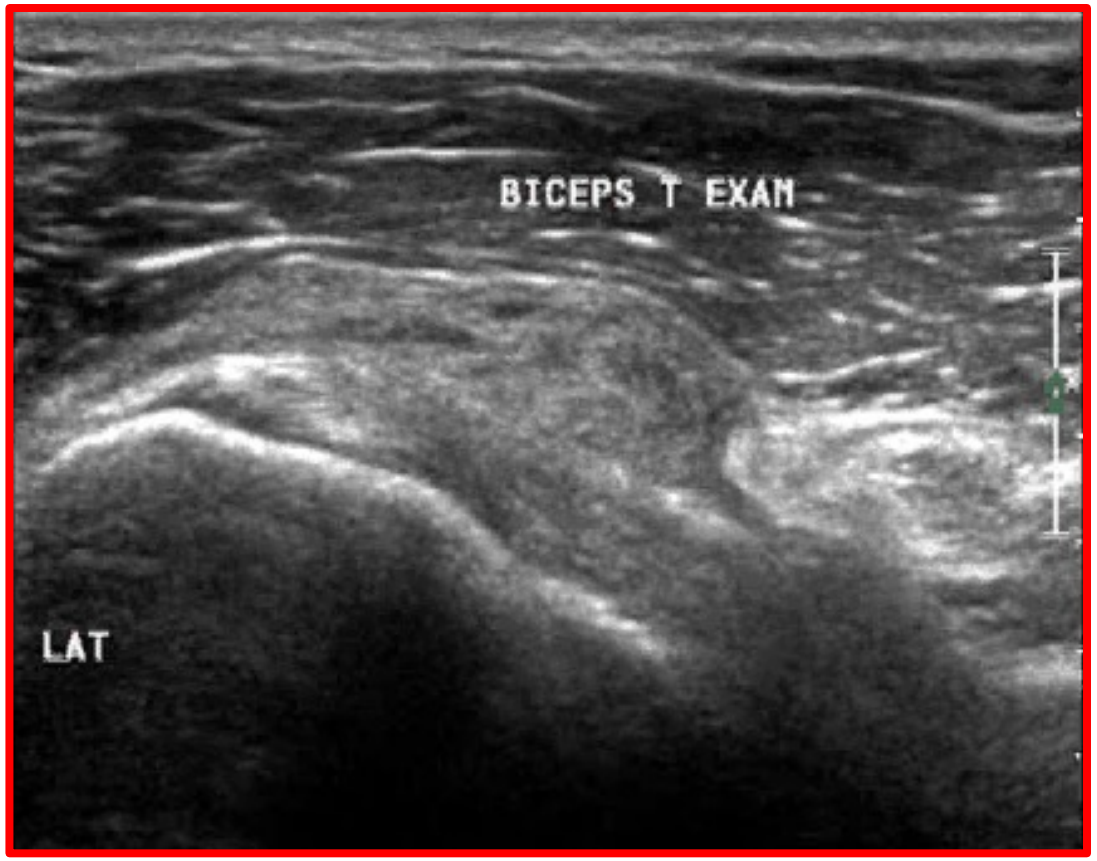
Case 1

Diagnostic Studies



Case 1

Diagnostic Studies



Case 1

Diagnoses

- Subcoracoid bursopathy
- Subcoracoid impingement

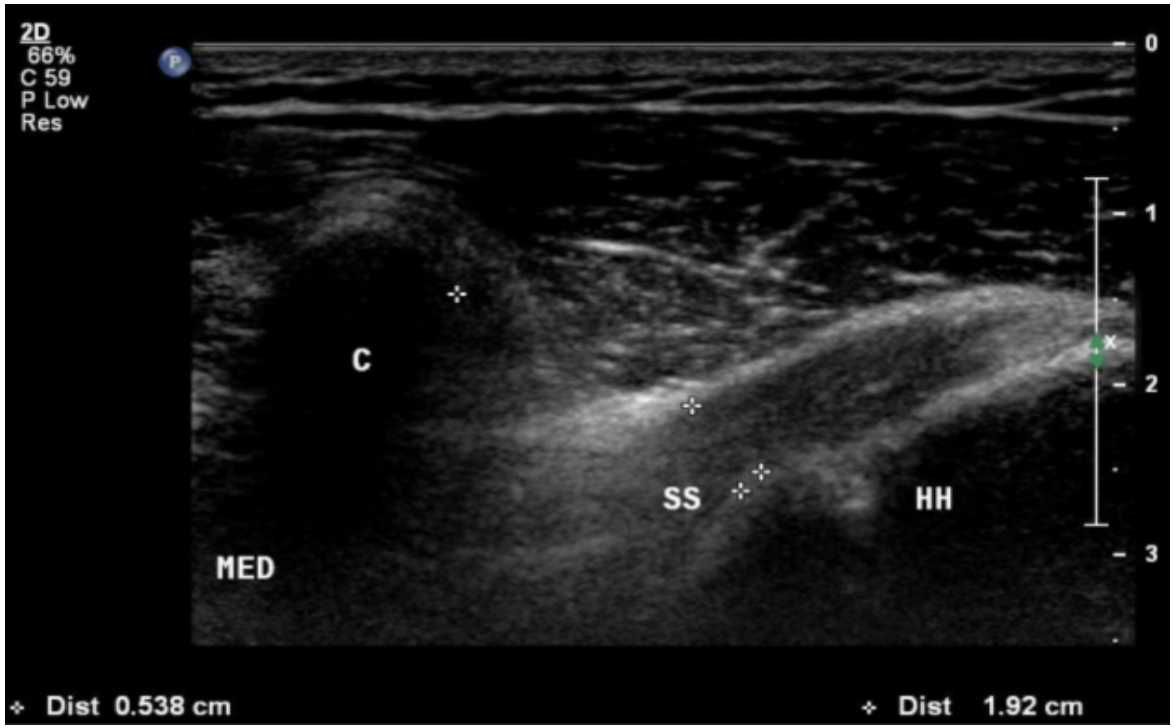
Subcoracoid impingement

- Diagnostic Imaging (coracohumeral interval)
  - MRI: < 10.55 mm (women) and < 11.5 mm (men)[8]
  - CT: < 6.7 mm[9] (coracoid index does not have adequate data to recommend)
  - US: mean asymptomatic 12.2 mm, mean symptomatic 7.9 mm [10]

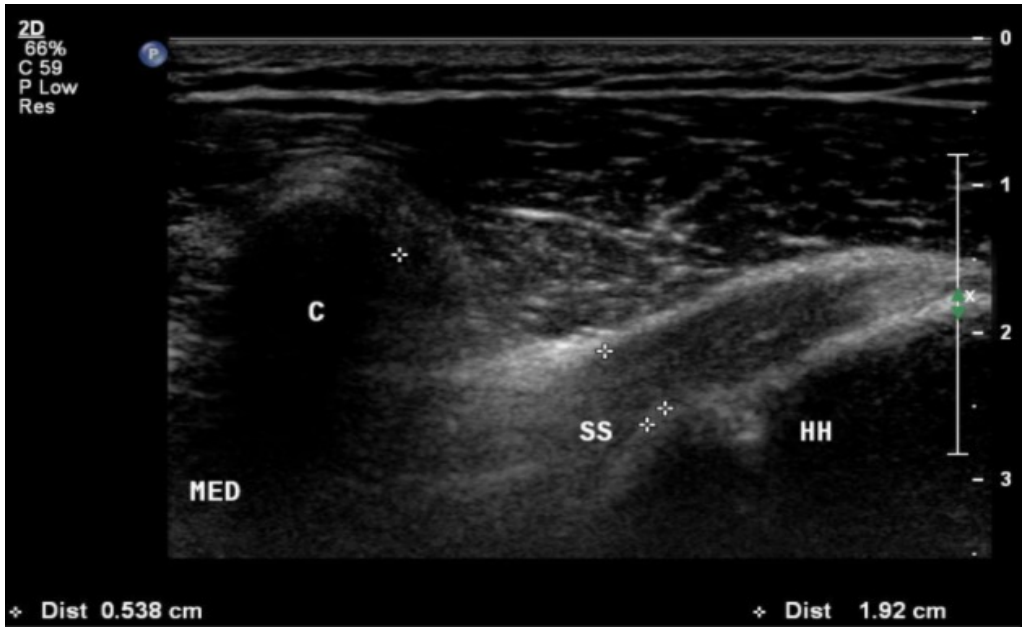
Case 1

Coracohumeral interval in this patient = 19 mm

Why did they develop subcoracoid impingement?



Case 1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C 59
P Low
Res
C
SS
HH
MED
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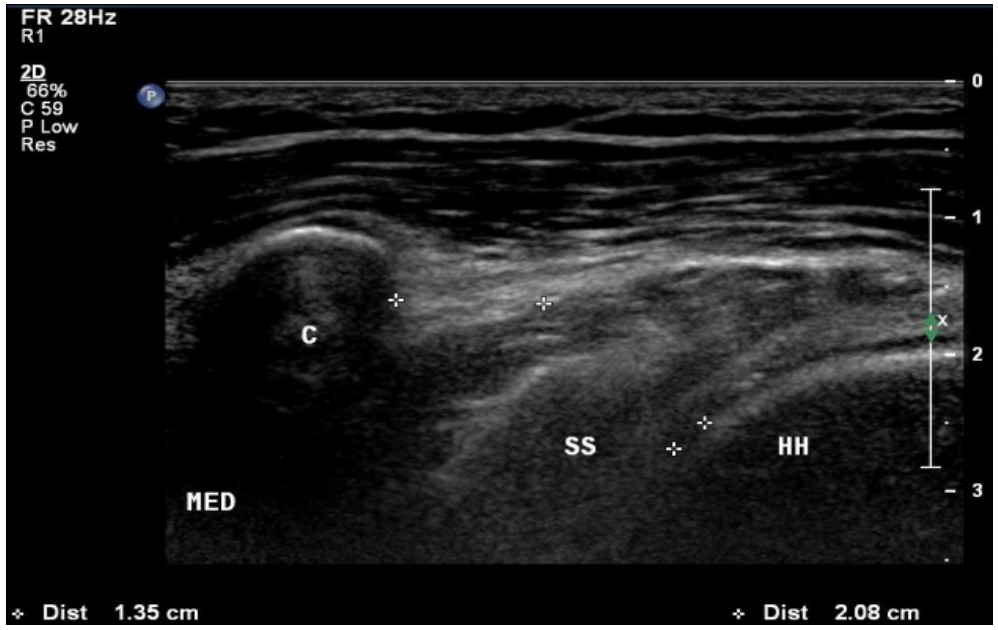
Dist 1.92 cm


FR 28Hz
R1
2D
66%
C 59
P Low
Res
C
SS
HH
MED
Dist 1.35 cm
Dist 2.08 cm

Case 2

48 y/o bike racer with 2 yr hx of R lateral leg pain, and paresthesias over the distal anterior leg and dorsal foot after crashing during a cyclocross race and striking the proximal lateral aspect of his leg on a barrier

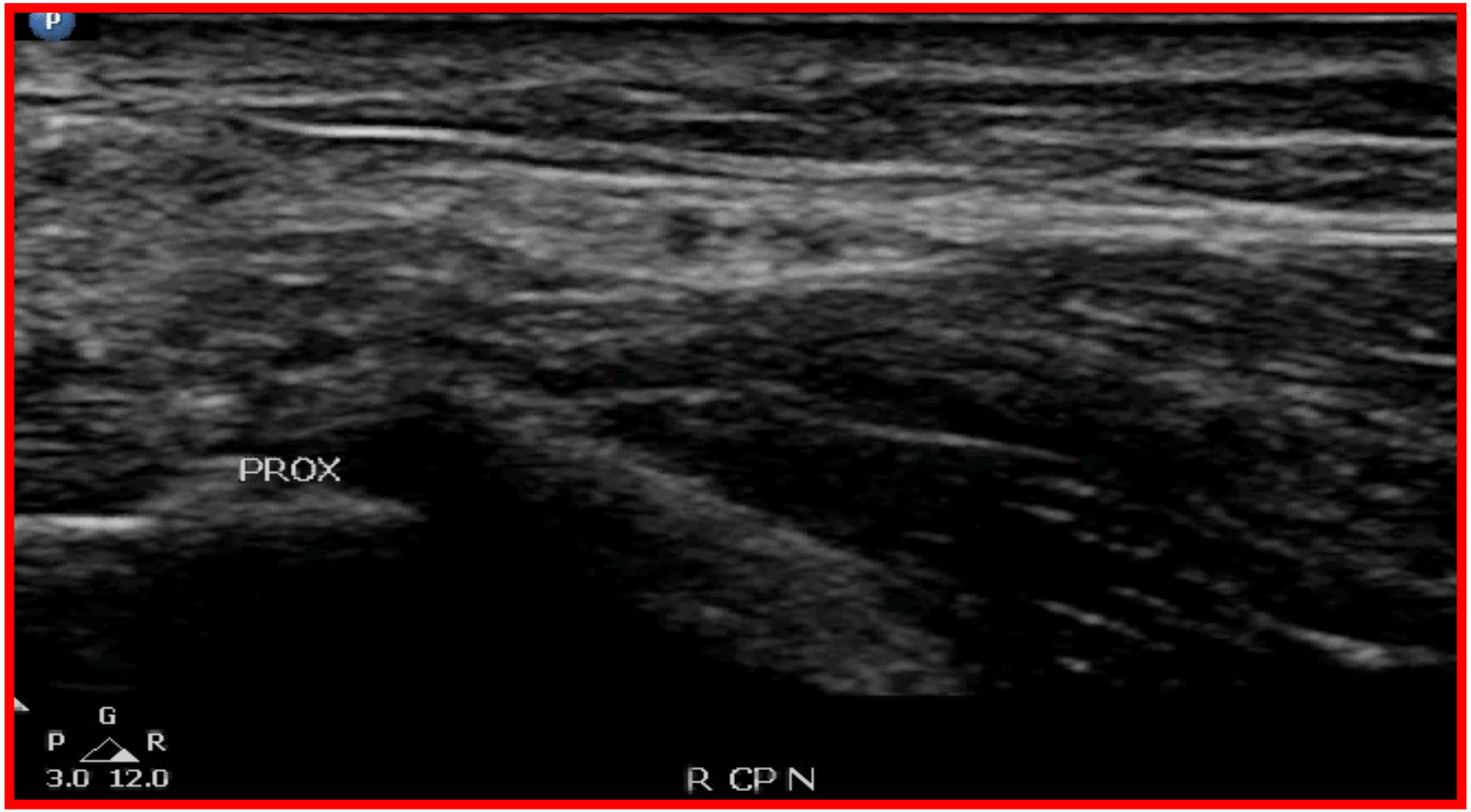
- 6/10
- Aching, burning
- Increased with exercise (running/biking)
- Absent at rest

Case 2

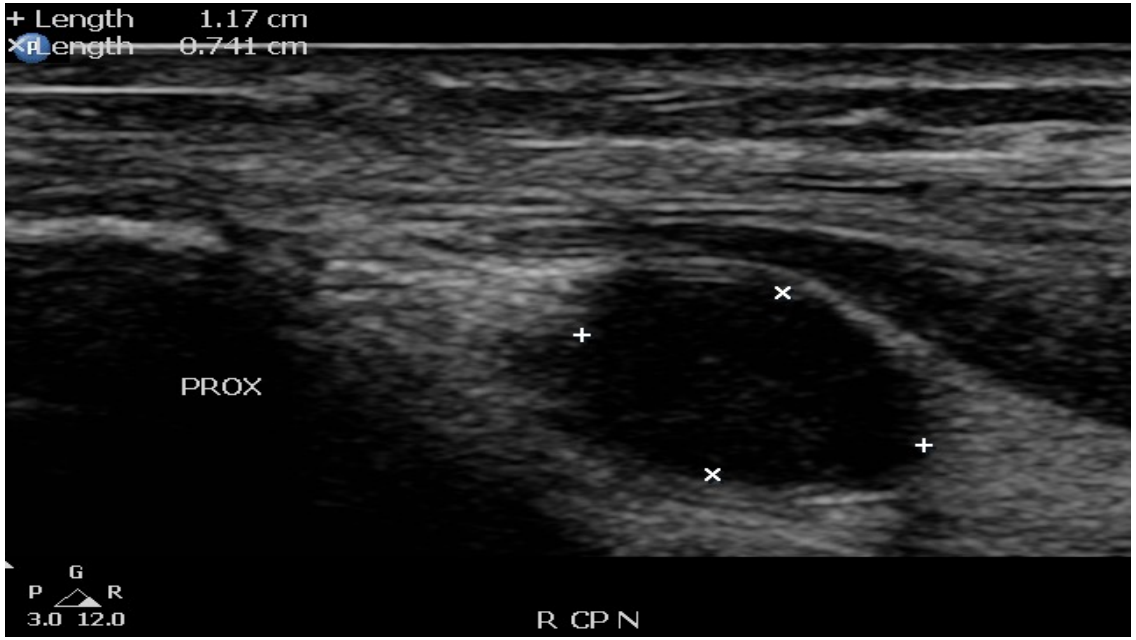
Physical Examination

- TTP at fibular neck
- 4/5 ankle dorsiflexion and eversion strength
- Decreased sensation over the anterior distal leg, dorsal foot, 1st webspace
- (+) Tinel's over the fibular neck

Case 2



Case 2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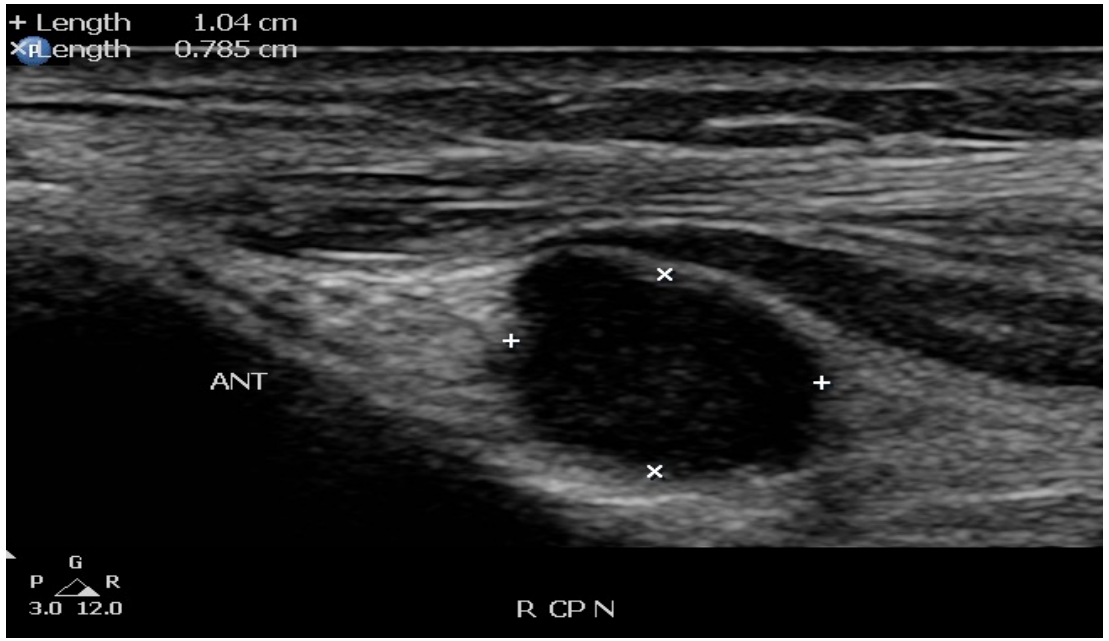
+ Length 1.04 cm
Length 0.785 cm
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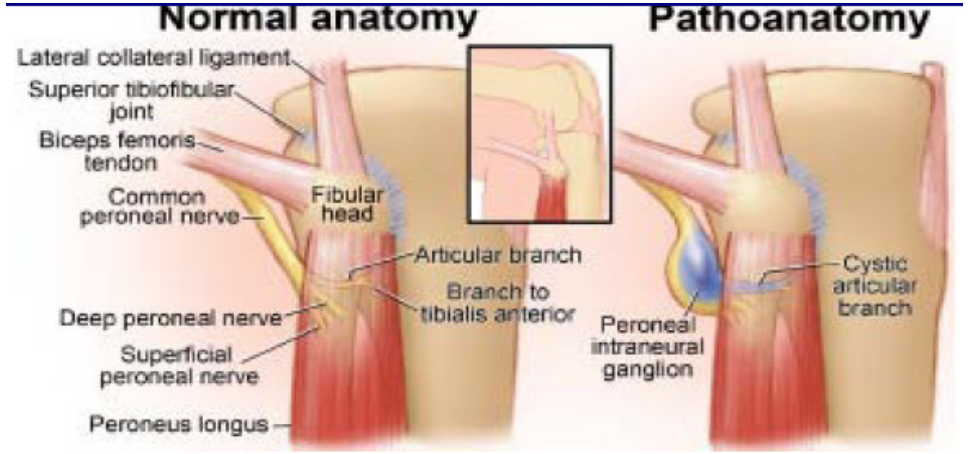
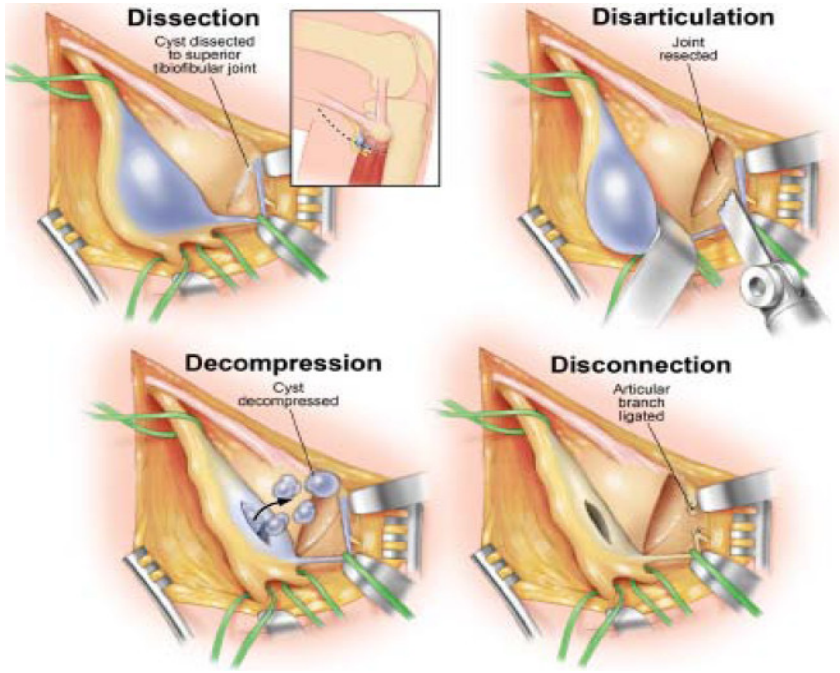
P R
3.0 12.0
R CP N

Case 2

Diagnosis

- Common Peroneal Intra-neural Cyst





Spinner 2007

Case 4

28 year old woman

- Fell trail running in 2008
- Immediate L buttock and knee pain
- Developed snapping in L buttock area
- Over 1 year period, snapping became painful
- Snapping occurred with walking/running activities

Case 4

Treatment

- Left hip arthroscopy x 2
  - 3/09 → psoas tendon release, labral debridement
  - 9/09 → repeat psoas tendon release
- Physical therapy
- Hip injection
  - No significant relief

Case 4

Case 4

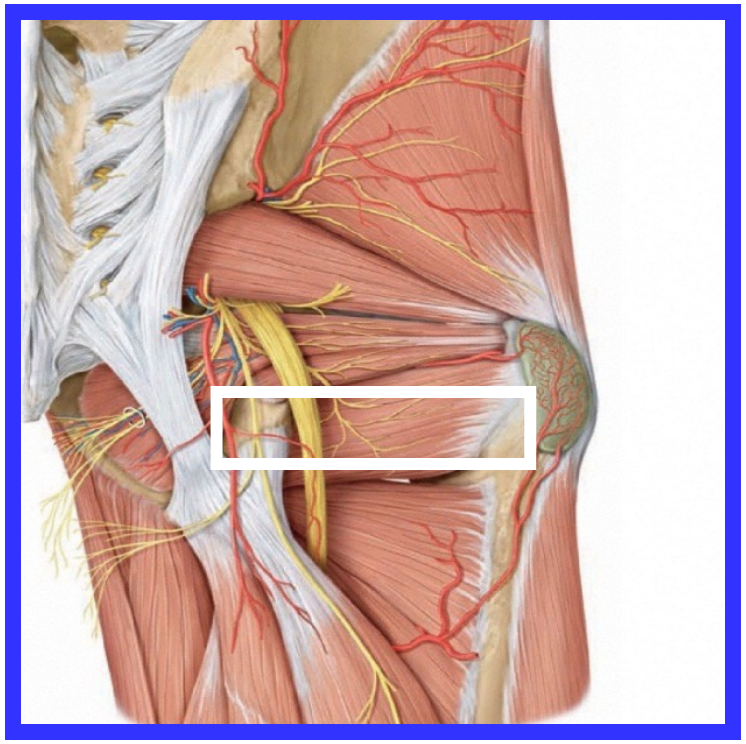
Case 4

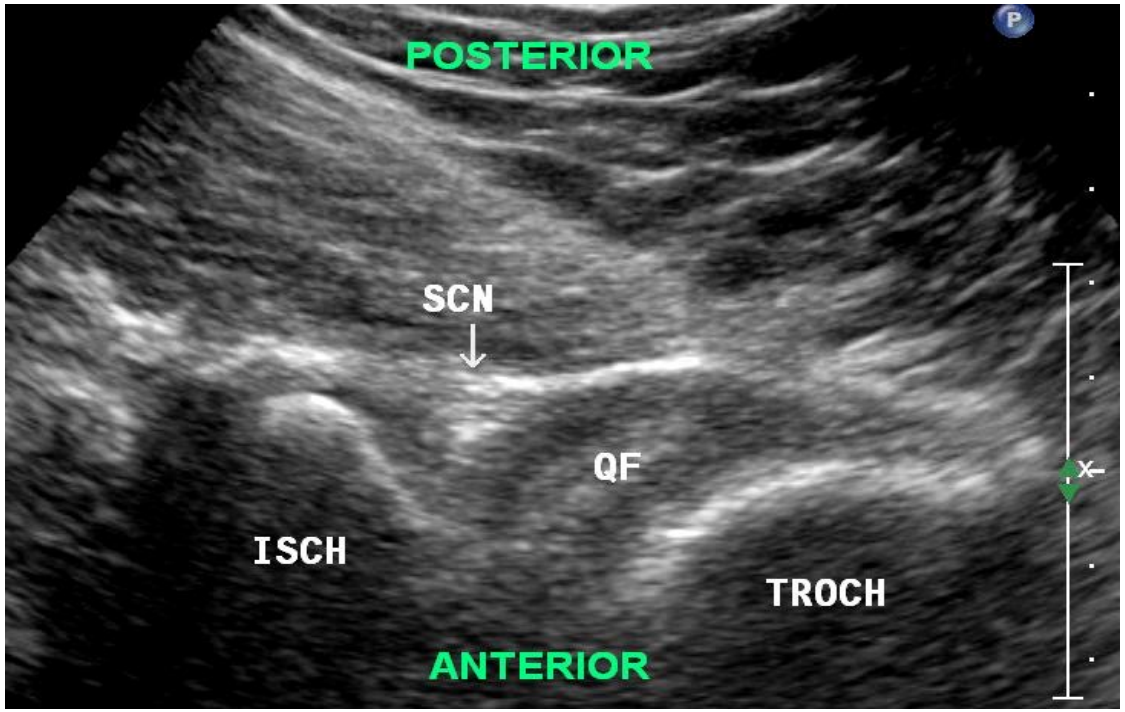
MRI

- Mild labral pathology
- Early chondral damage

Case 4

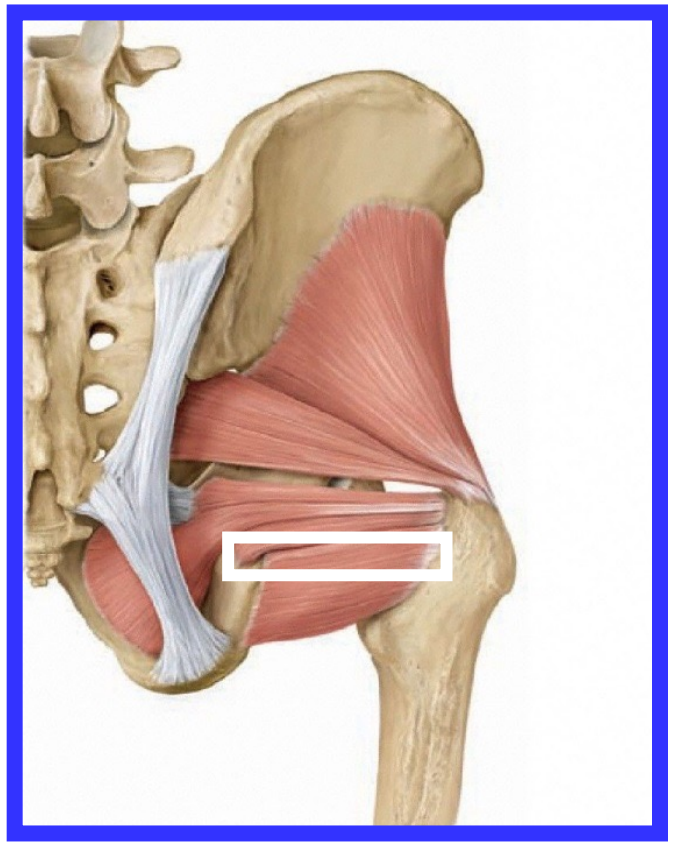
Pt sidelying → affected hip superior

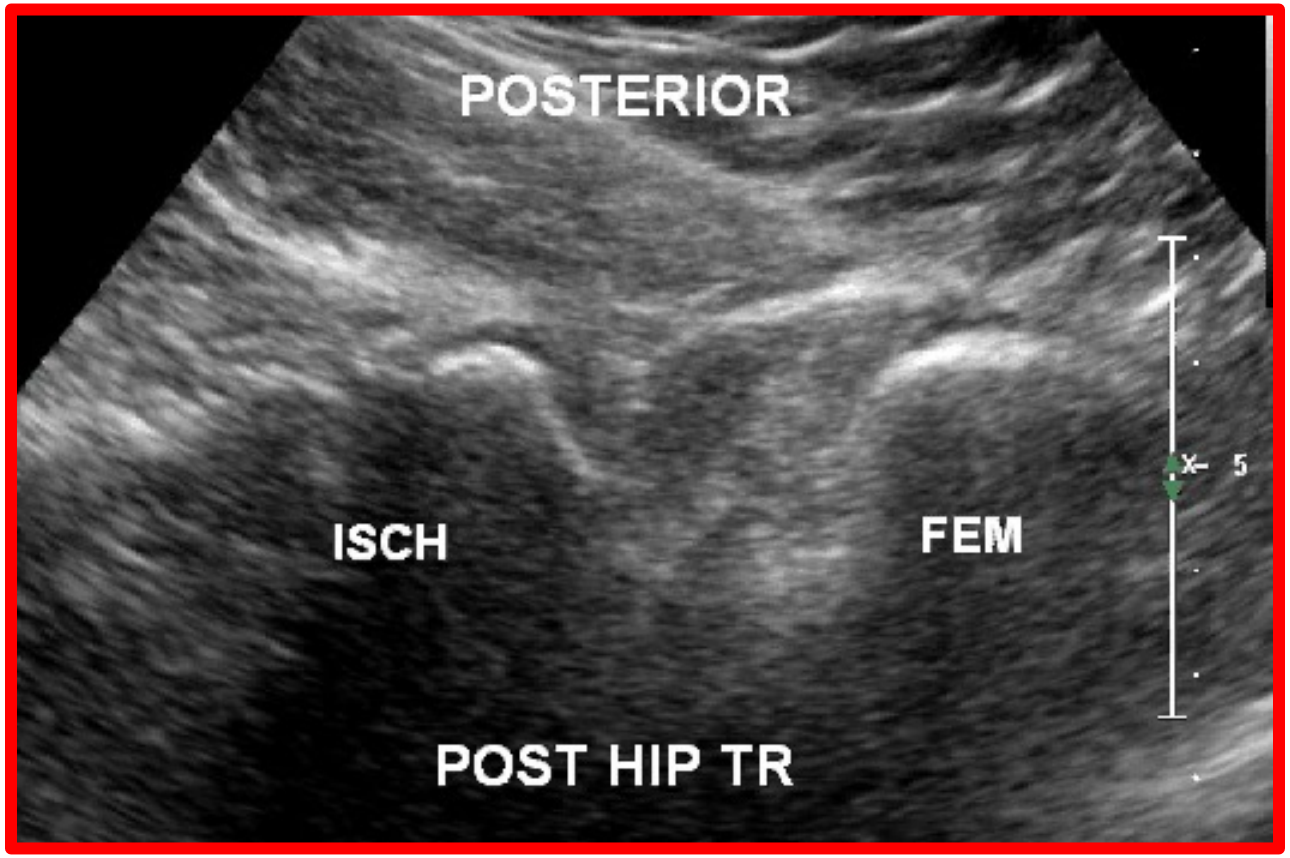




Case 4

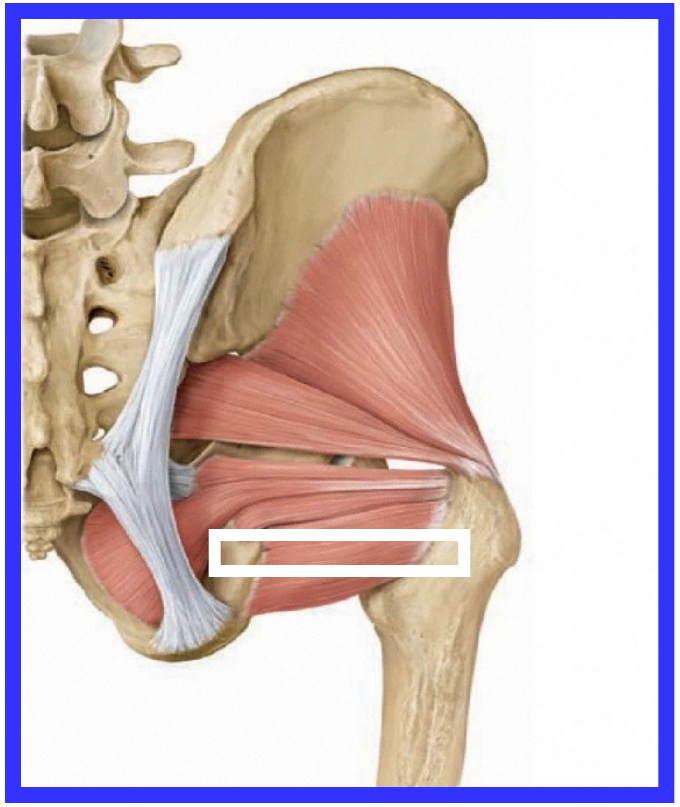
Superior-inferior sweep demonstrates relationship of ischium and lesser trochanter

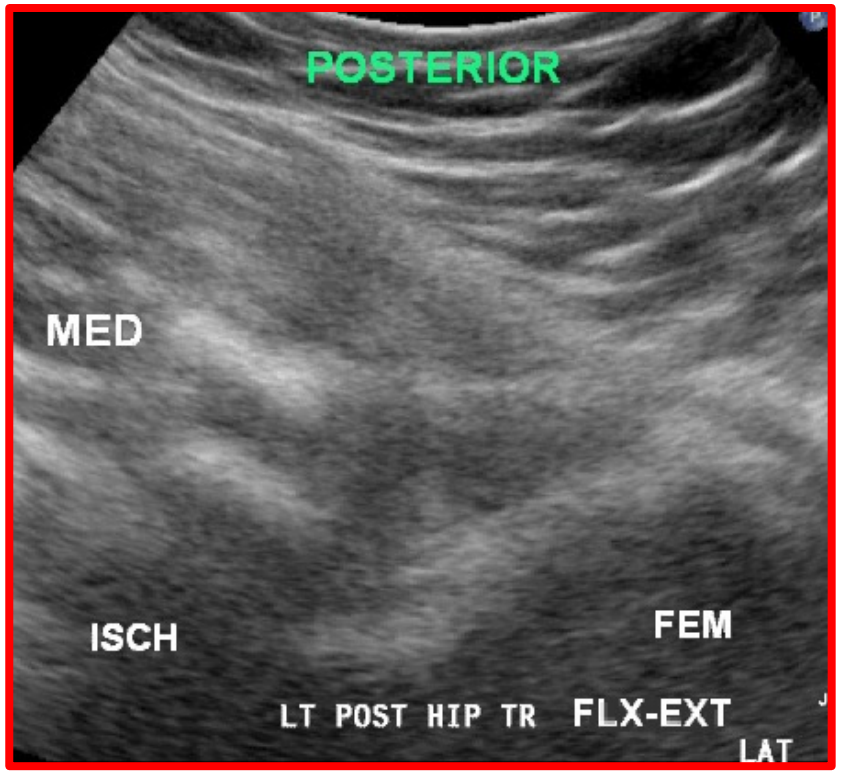




Case 4

During hip flexion ➔ extension, palpable and audible snap/crepitus associated with dyskinetic quadratus femoris posterior motion





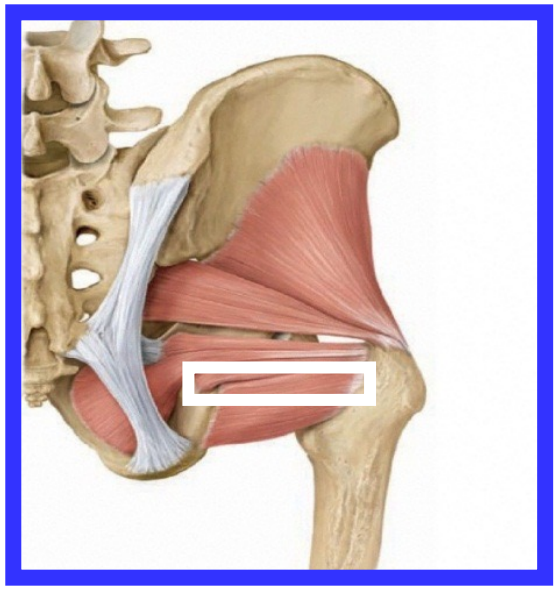
Case 4

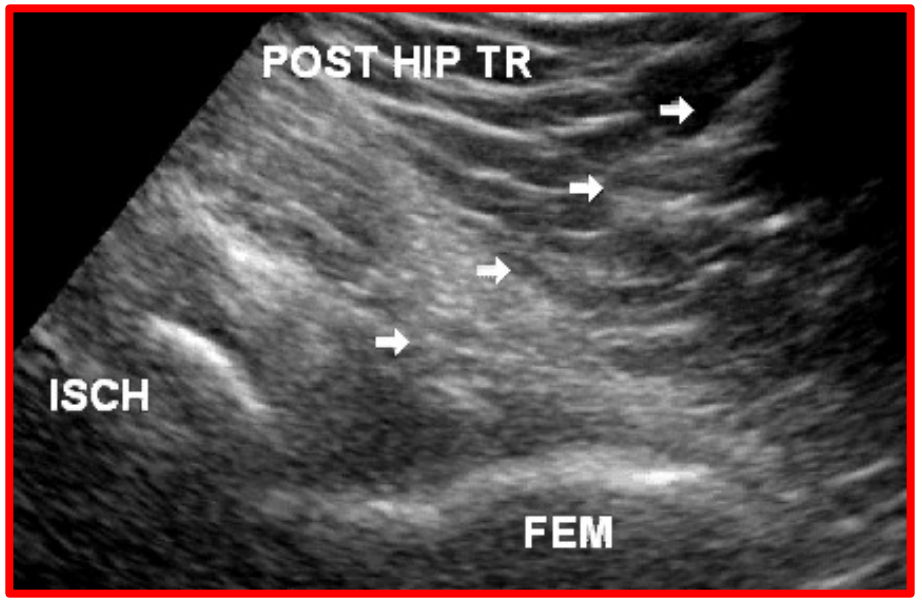
Diagnosis

- Snapping quadratus femoris secondary to ischiofemoral impingement

Treatment

- Ultrasound guided quadratus femoris muscle injection
- PT





Case 4

Due to failed non-operative treatment, patient opted for surgical intervention:

- Subperiosteal release of quadratus (sparred hip abductors)
- Lesser trochanteric osteotomy

NOTE: surgeon was able to reproduce snapping of quadratus femoris with external rotation and hyperextension when the area was dissected and exposed

Case 4

Case 4

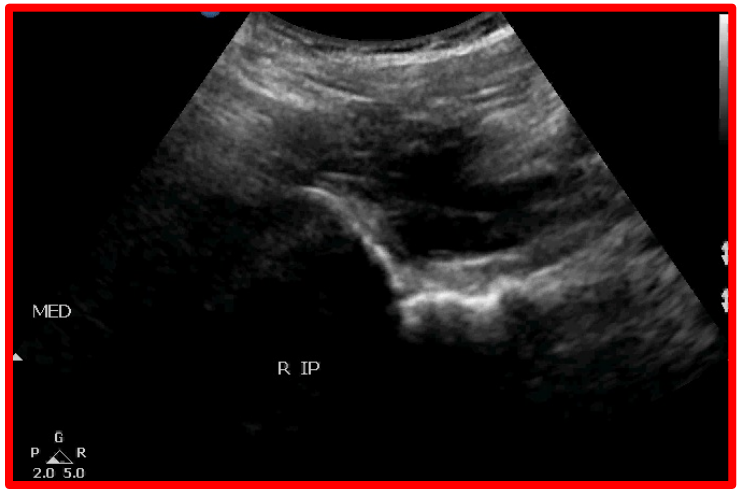
Immediately post-op

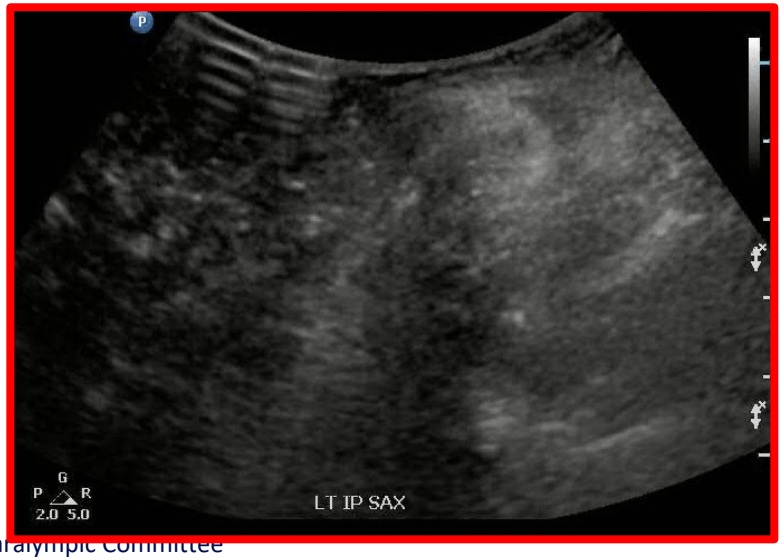
- Snapping gone

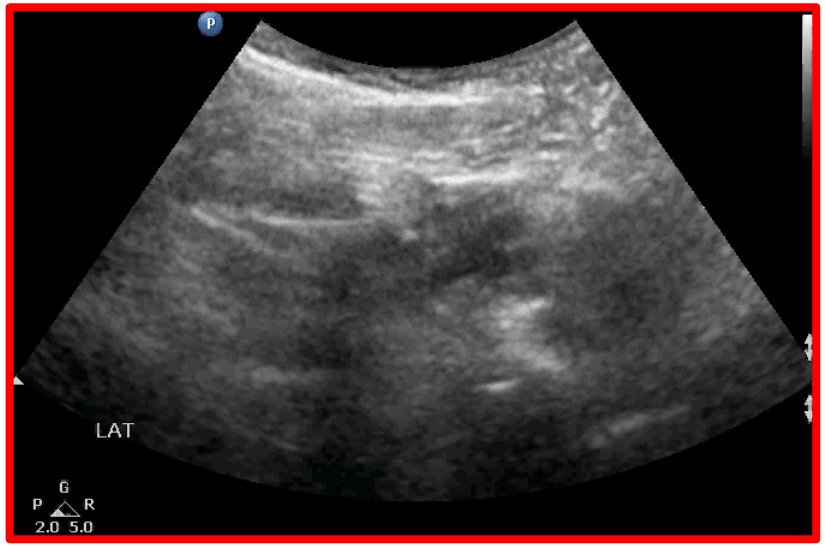
6-month f/u

- No pain
- Returned to normal activity

Other Causes of Coxa Saltans







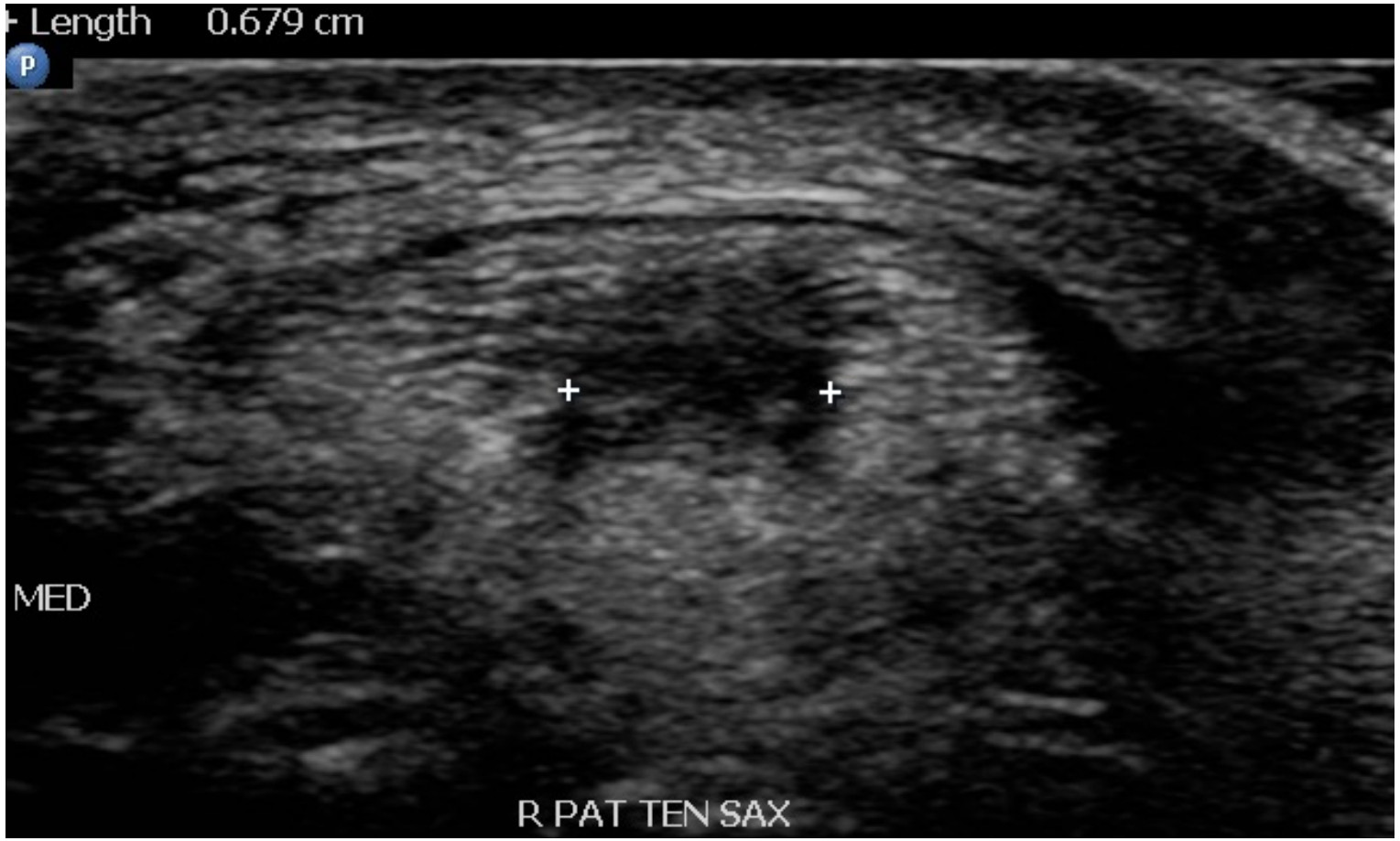
Case 5

24 y/o alpine ski racer with 2 yr hx of worsening R proximal patellar tendinopathy

- Increased with plyometrics and skiing
- Failed rest, ice, NSAIDs, eccentrics, nitro-patch
- Interested in interventional options
- Currently September

Case 5

Case 5



Case 5

Case 5

Diagnosis

- Patellar tendinopathy with high grade focal region of tendinopathy vs partial thickness intrasubstance tear

Treatment options

- Needle tenotomy with or without AB or PRP
- Neovessel sclerosing with polidocinol
- Tendon scraping procedure
- Surgery

Case 5

Background on tendon scraping

- Tendinosis rather than tendonitis
- Neurogenic inflammation rather than prostaglandin mediated inflammation
  - Increased
    - pain nerve fibers
    - Sympathetic fibers
    - Neuropeptides (glutamine, Substance P, etc)
- Pain fibers associated with neovessels
- Get rid of the neovessels, eliminate pain??

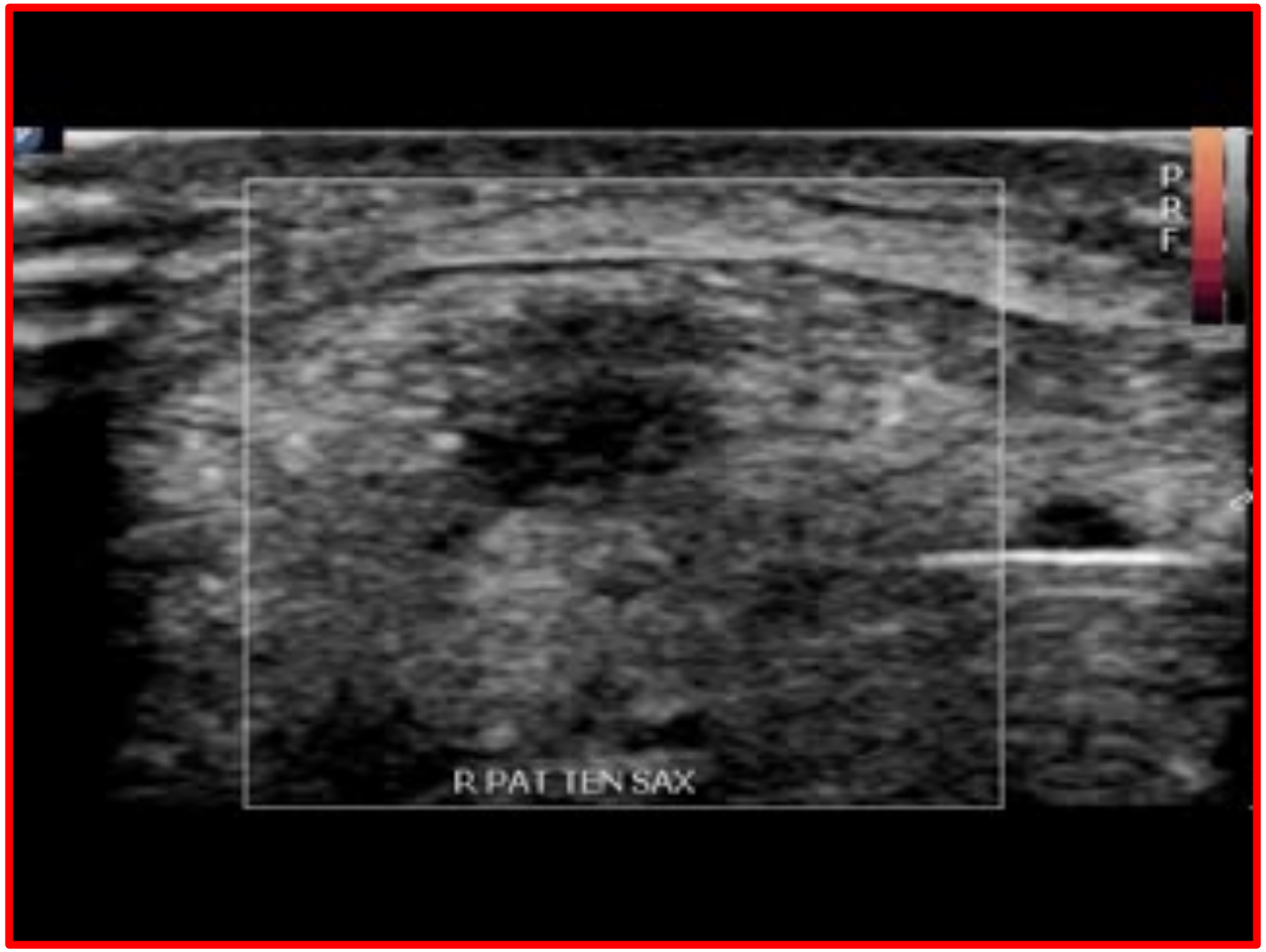
Case 5

Background on tendon scraping

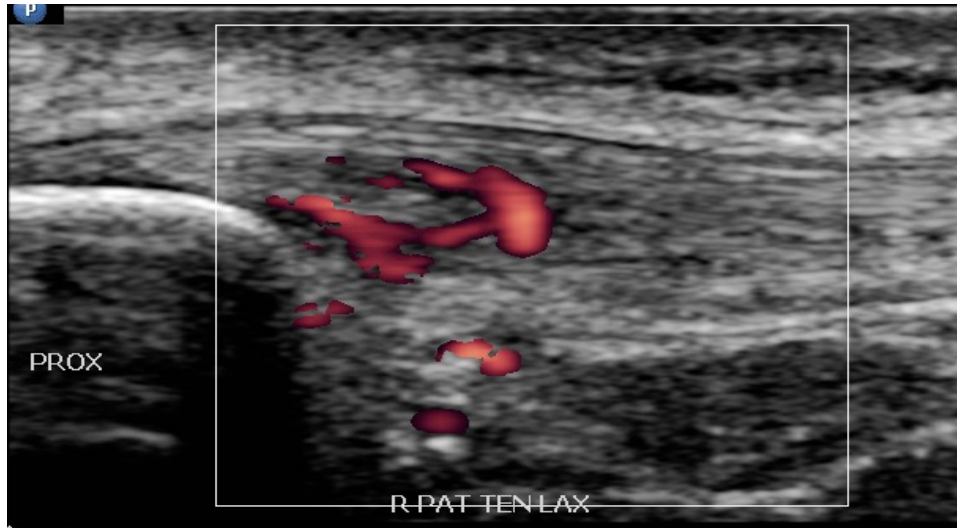
- Extra-tendinous neovessel sclerosis
  - 6 case series, 1 randomized, placebo controlled trial[26-32]
  - Immediate pain relief, rare complications (2/400)
  - Often required 2-3 treatments for permanent pain relief
- Tendon scraping
  - Theorized mechanical disruption would result in rapid pain relief without need for repeat treatments
  - Randomized trial comparing arthroscopic shaving to sclerosing treatment in patellar tendinosis[33]
    - Arthroscopic shaving = better, more rapid, and more permanent relief
  - Arthroscopic shaving vs US-guided hydrodissection and scraping in Achilles[34]
    - Similar outcomes between groups
  - 2 case series with similar results[35-36]

Case 5

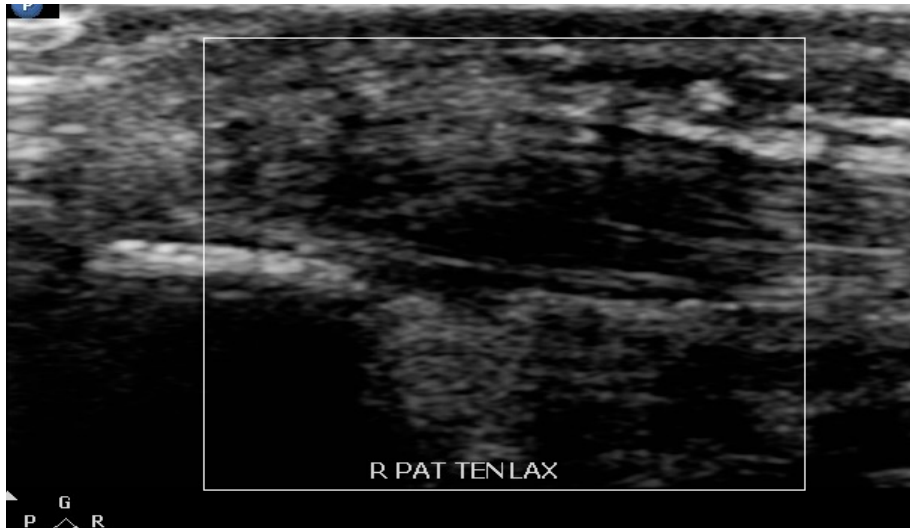
Case 5



Case 5



Pre



Post

Case 5

Post-procedure

- Rest, ice, elevation
- AROM
- Limit activity x 1 week

1 wk f/u

- Pain-free
- Resume unrestricted activity
- Begin eccentric loading of patellar tendon

Case 5

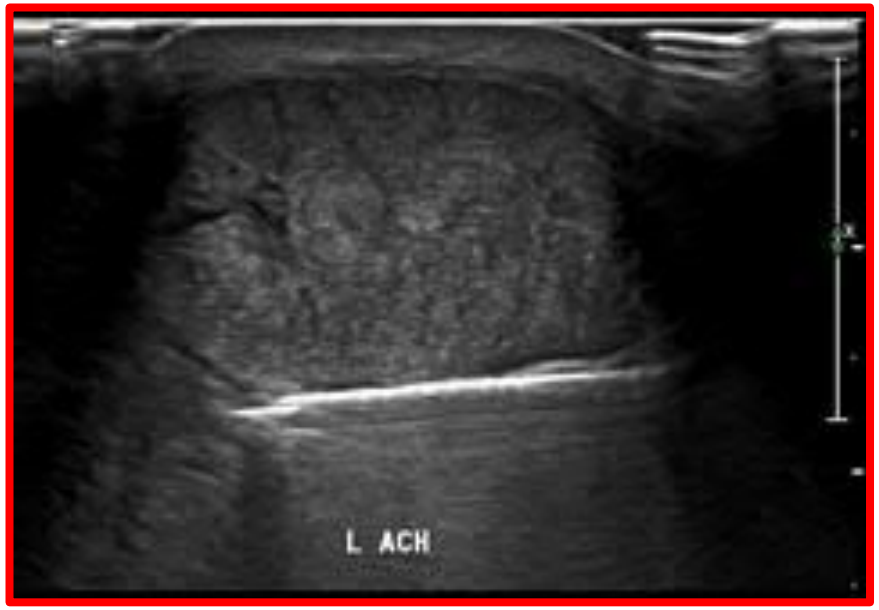
9 month follow-up

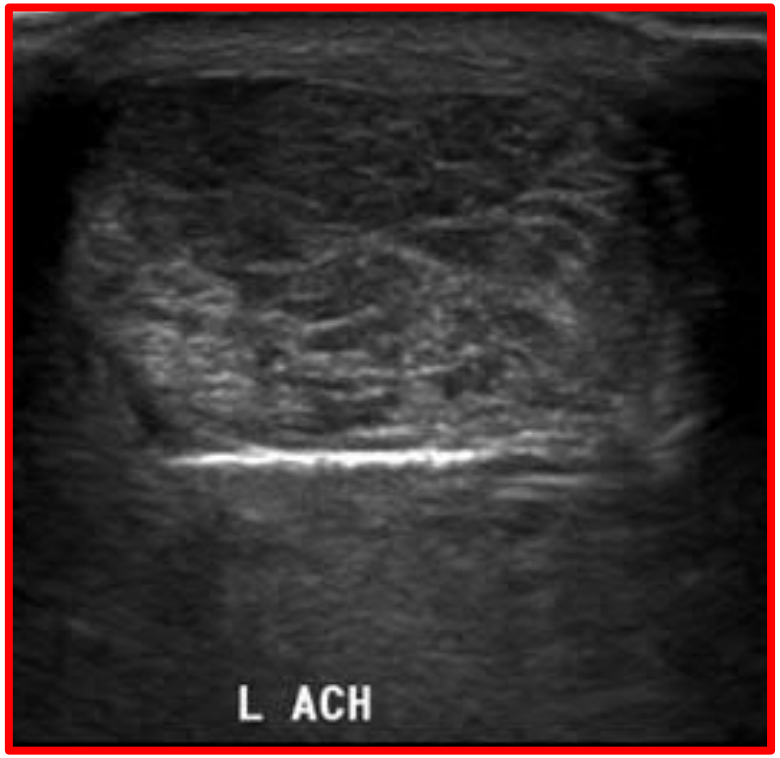
- Pain-free, successfully completed a world cup season

Case 5

Modifications to the procedure

- Instead of 18 gauge needle, can use
  - –Tenex
  - –Meniscotome





Case 7

26 y/o rock climber with R hand 3rd digit triggering

Tried conservative measures without sustained benefit

Opted for US-guided surgical trigger finger release

Case 7

18 gauge spinal needle modifications to create cutting device

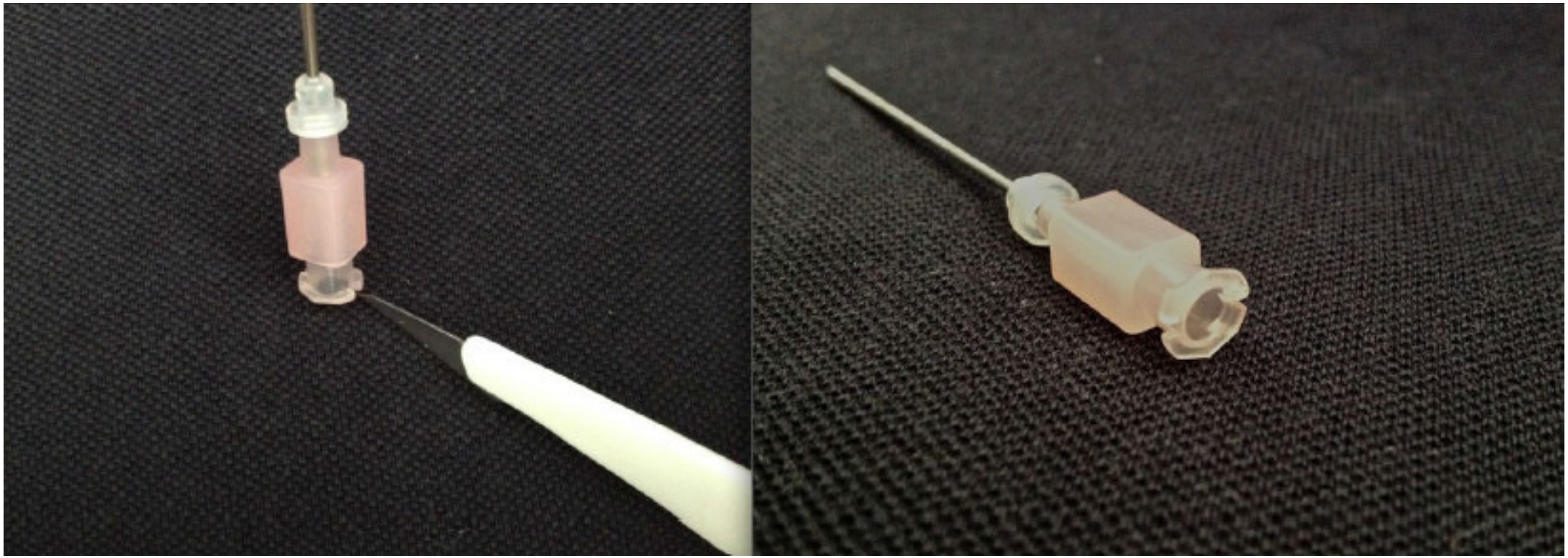
First described by Hopkins et-al[90] who studied it in a porcine cadaveric model

Cut notch in needle hub 180° from normal location

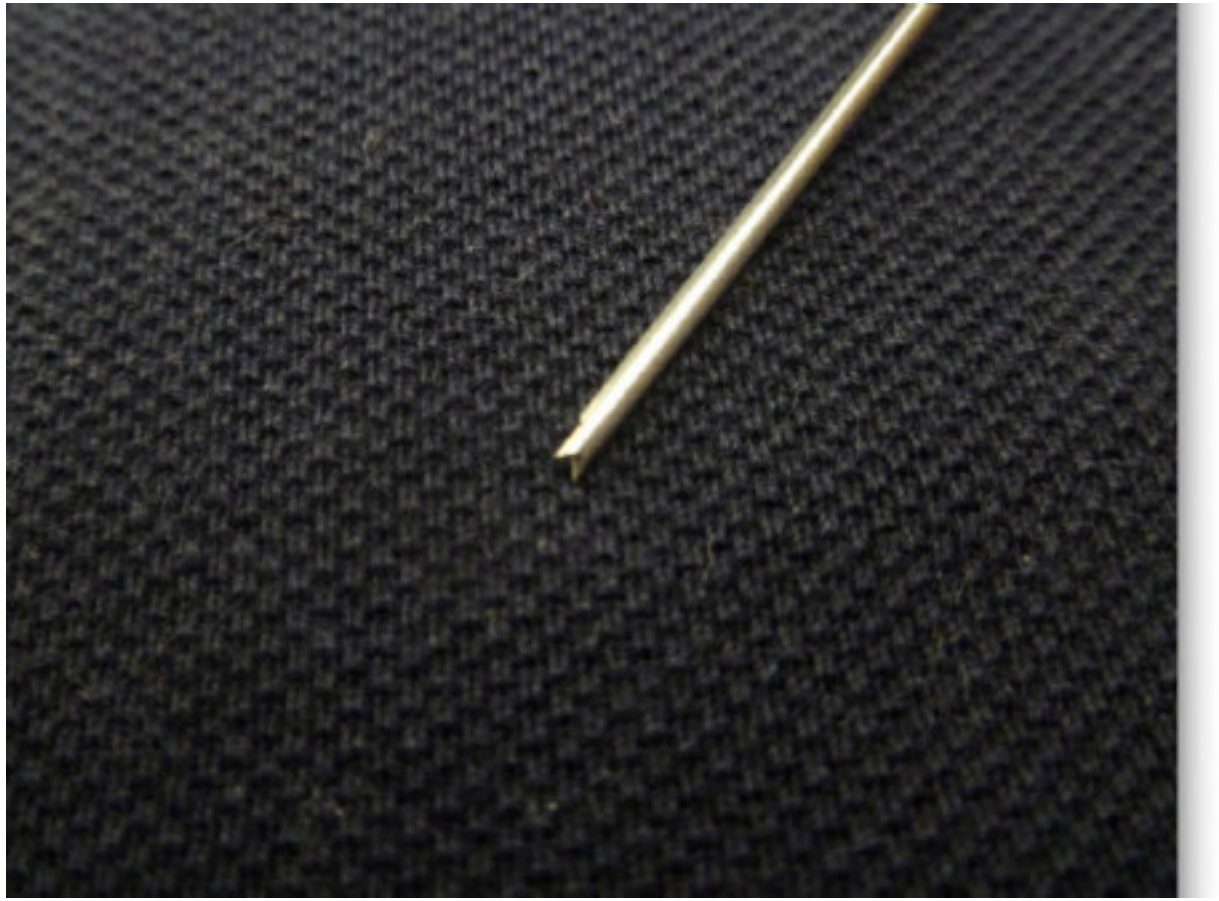
Insert stylet 180° from normal orientation

Creates “v” shaped cutting end

Case 7



Case 7



Case 7

Case 7

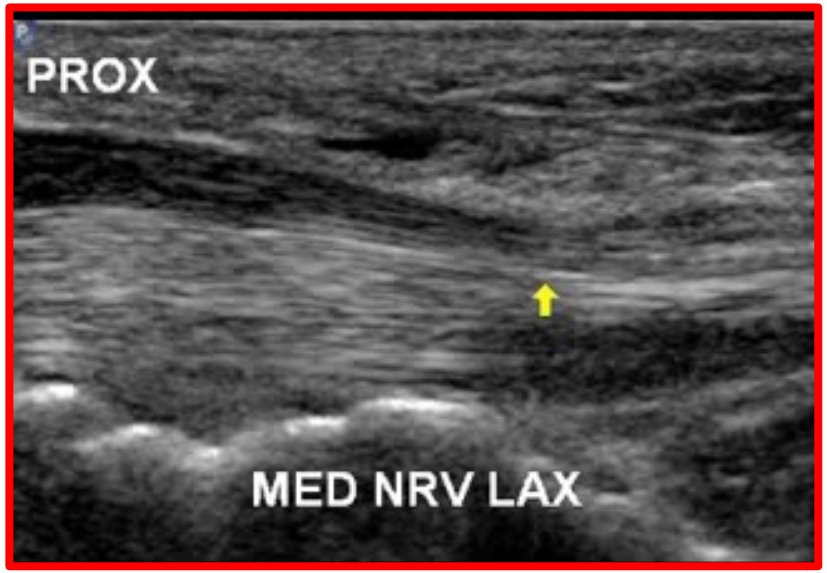
Post-procedure

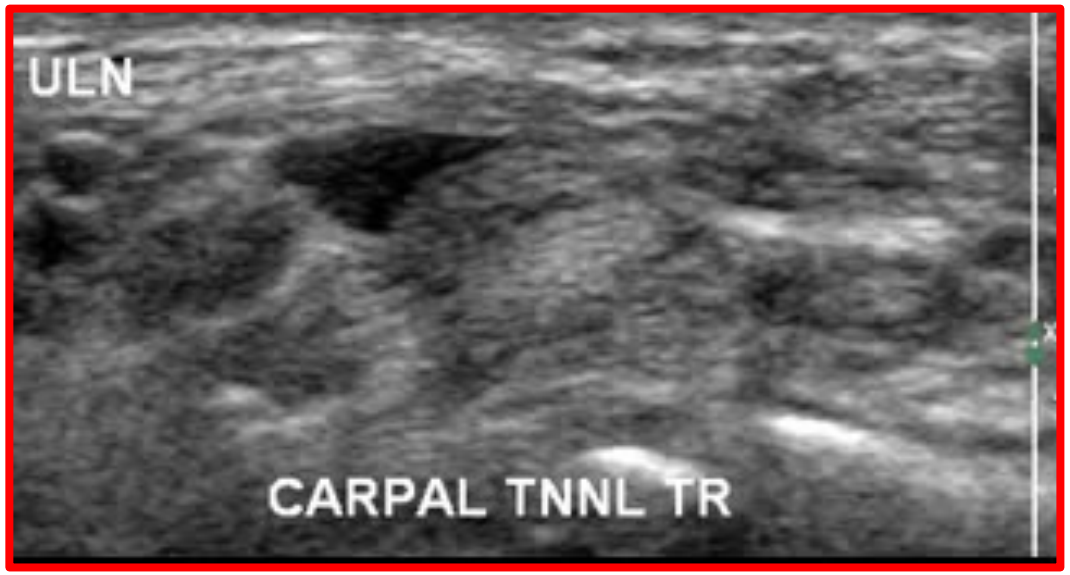
- Immediate relief of triggering
- Take it relatively easy for a week
- Resume normal activities

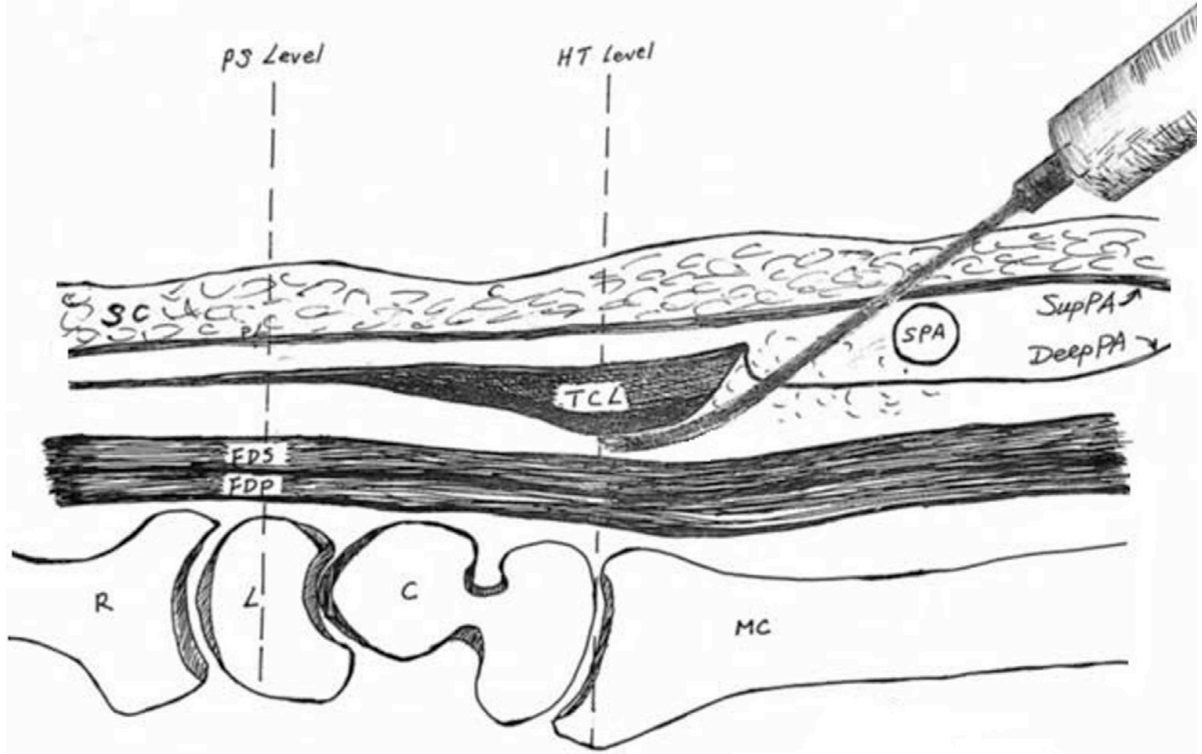
Case 8

26 y/o right handed gymnast presented with hand paresthesias and pain

- Electrodiagnostic studies = moderately severe CTS
- Pt failed non-operative measures, given option of surgical release vs US-guided surgical release of the transverse carpal ligament using cutting thread loop technique
- Pt opted for US-guided surgery



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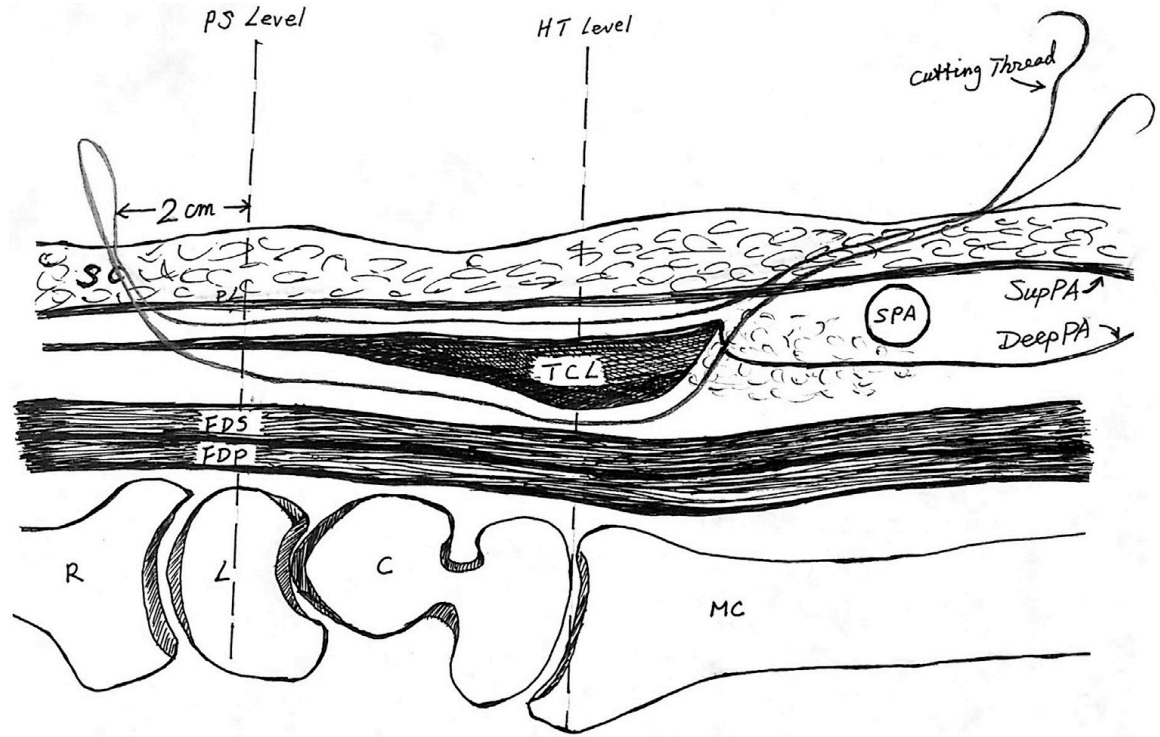
PS Level
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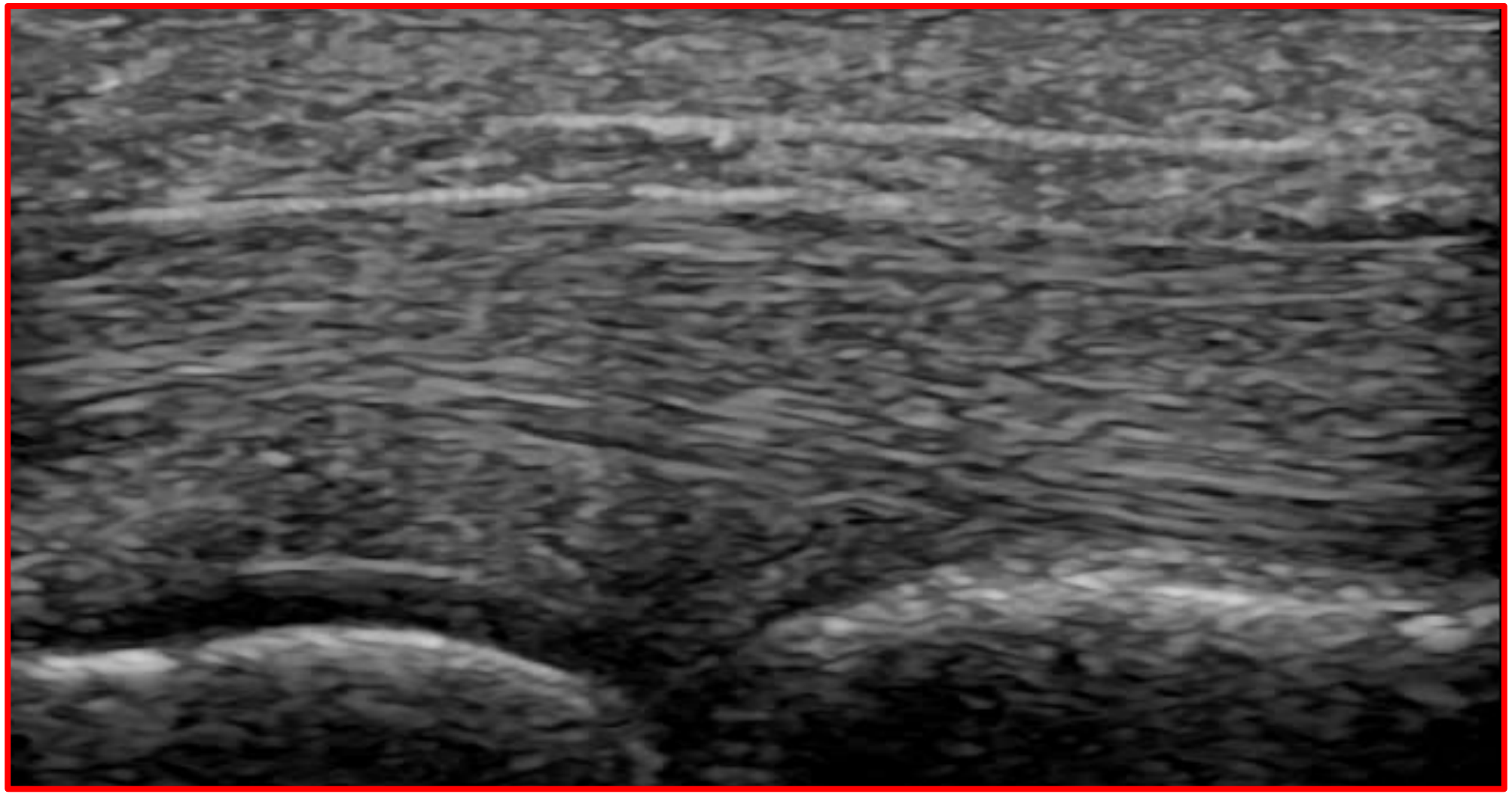
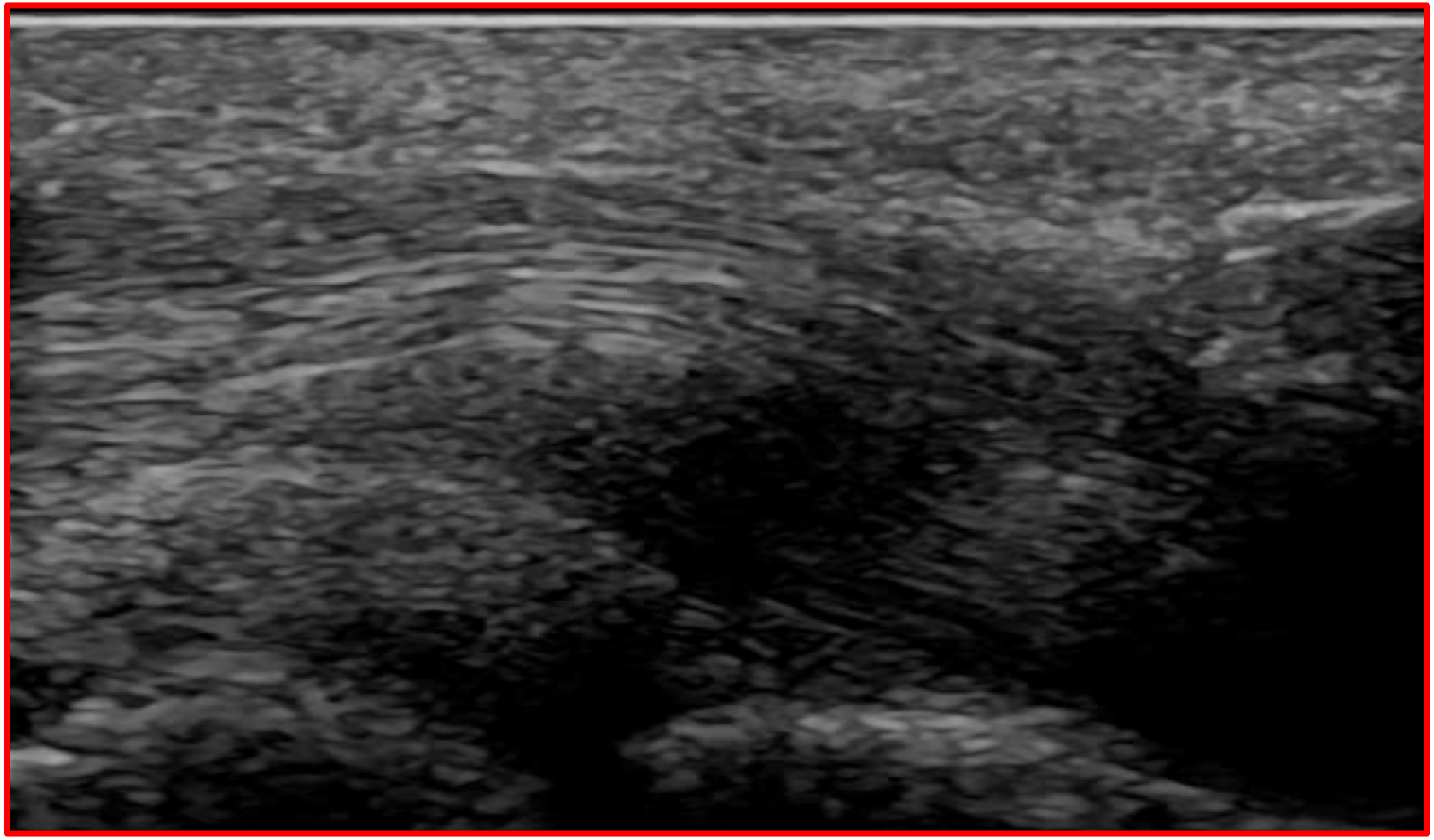
Case 8



Case 8



Case 8

Relative rest x 1 week

Returned to unrestricted activity 1 wk post-procedure

1 year follow-up still symptom free

Case 8

Percutaneous loop thread CTR[91-93]

- 34 hands/20 patients, all had significant improvement, no complications
  - –Took 7 minutes to perform the procedure (excluding prep time)
- 159 hands/116 patients, all had significant improvement
  - –Complications: 2 infections treated with oral abx
  - –8 patients with mild to moderate pillar pain diagnosed as FCR tenosynovitis in 3, FCU tenosynovitis in 2, periostitis of the hook of the hamate in 2, and periostitis of the trapezium in 1.
    - All successfully tx with 5-mg kenalog injection

Conclusions

Understanding the benefits and limitations of US enables optimal use of this imaging modality

Ultrasound can be used for a broad range of purposes in Sports Medicine

US-guided procedures are more accurate and likely more efficacious and cost-effective than landmark guided injections

Provides:

- Diagnostic information
- Prognostic information
- Guide therapeutic interventions

Enhances the care of our patients

Future is only limited by our imagination

THANK YOU

Jonathan Finnoff, DO, FAMSSM, FACSM

Jonathan.finnoff@usopc.org

719-663-9002

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