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CLINICAL CASE MANAGEMENT STUDIES

ACBSP Chiropractic Sports Medicine Conference

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SCU Health

October 22, 2022

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LEARNING OBJECTIVES

- Review Sports Medicine and Tactical Sports Medicine clinical cases.
- Present key historical, examination, studies, and management flow.
- Address key diagnostic criteria of MSK and NMS pathology.
- Understand the **appropriate imaging** to confirm the diagnosis, and referral indications.

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LEARNING OBJECTIVES

- Please do not read ahead with the cases. I ask this to maximize the learning objectives of the cases.
- Reading ahead will reduce the potential each case offers.
- Thank you.

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CASE ONE

- 44-year-old, female, LASD deputy had a major MVA 7 years ago. Pt c/o neck pain and right shoulder pain post MVA.
- Orthopedic surgeon ordered an MRI of the right shoulder revealing a complete rotator cuff tear.
- Pt asked about her neck pain and she was told the neck pain is from the rotator cuff tear.
- Pt underwent a rotator cuff repair.

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CASE ONE

- Shoulder pain resolved and neck pain remained after rotator cuff repair.
- 7 years later patient comes to SCU Tactical Sports Medicine with a complaint of ongoing neck pain for the last 7 years.

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CASE ONE

- Pt denies pain with coughing, sneezing, straining. No clicking and popping in the C/S.
- Seeing massage therapist.
- Saw a DC. No diagnosis.
- Reports cervical spine pain and interscapular pain.

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CASE ONE

- Patellar, Achilles, biceps, brachioradialis, triceps 2+ bilaterally. Ankle clonus, Hoffman's reflex absent B.
- MMT right triceps and extensor digitorum profundus 5-/5. All other muscles 5/5.
- C4-T1 dermatomes equal and normal to light touch.
- Cervical compress in neutral, right rotation, right lateral flexion elicits focal cervical spine pain.

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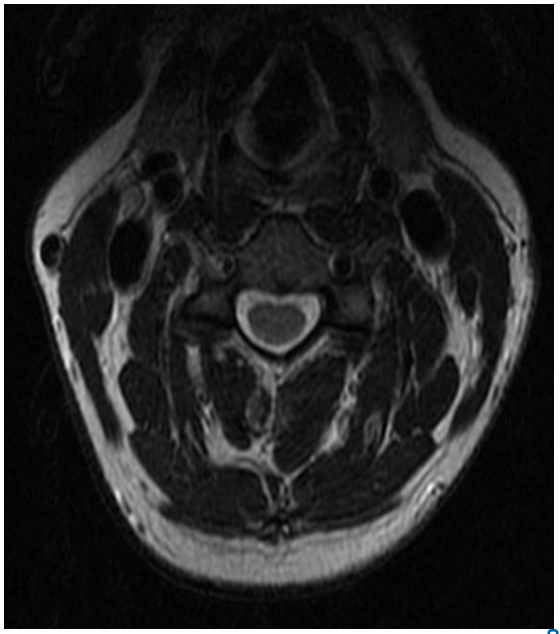

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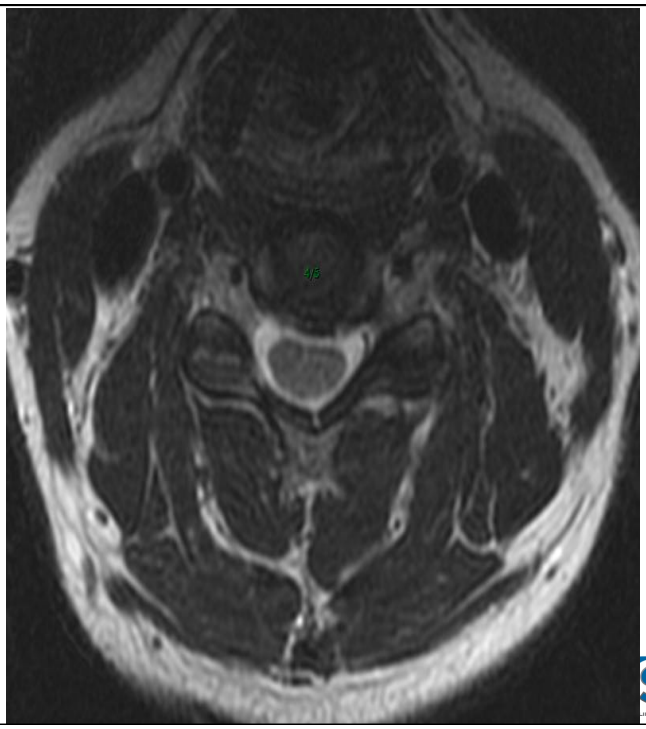
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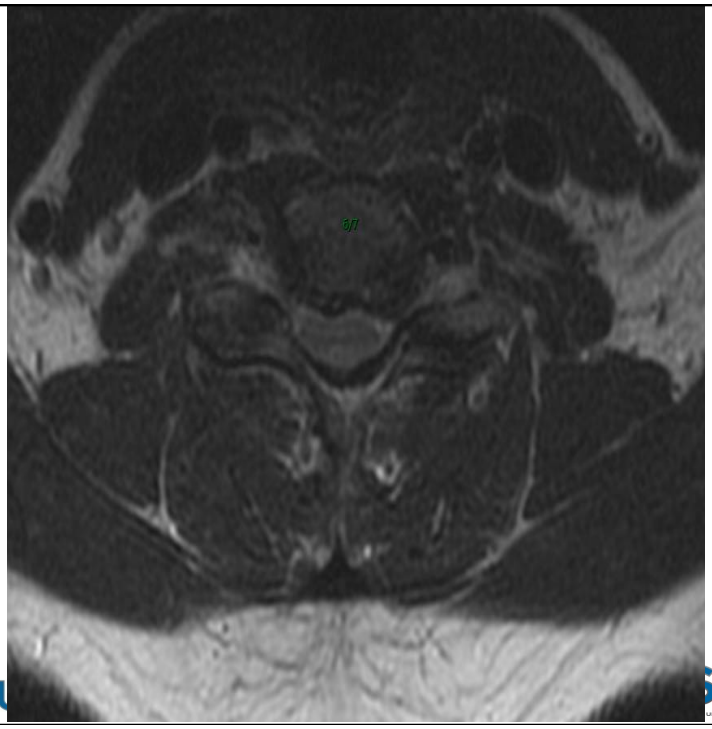
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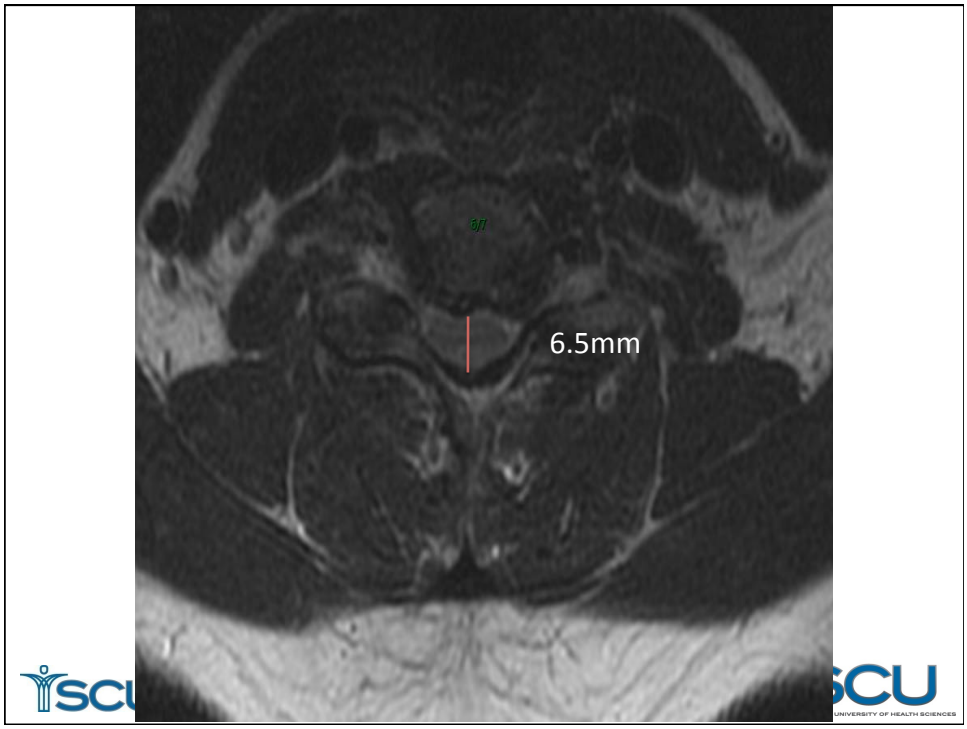
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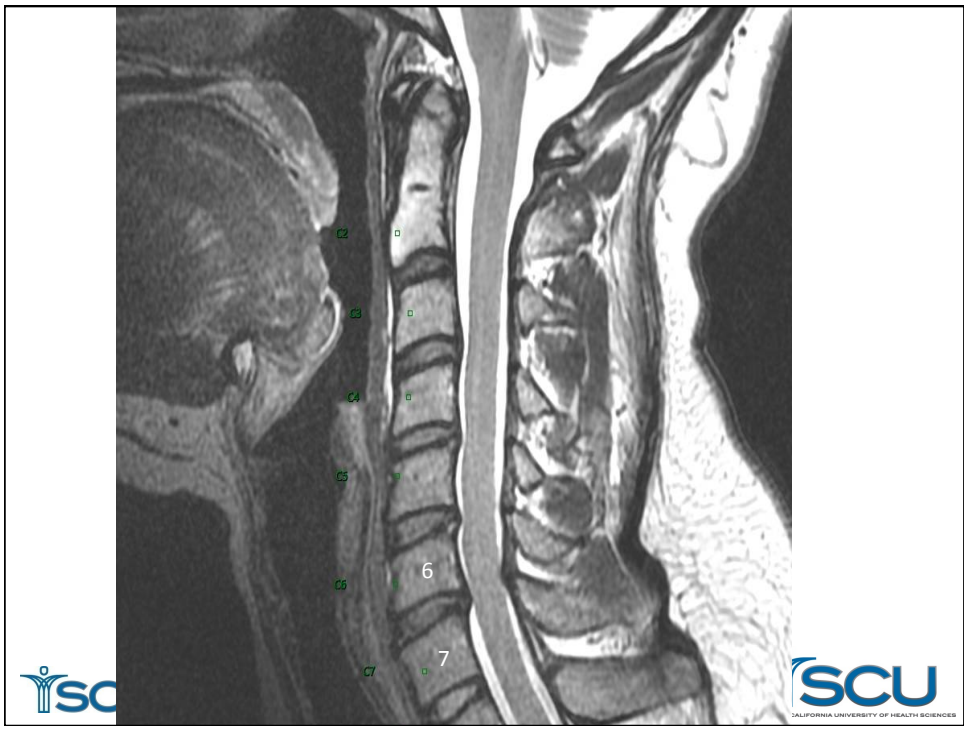
C2
C3
C4
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7
C7

Report

- 1. Bilobed right and left paracentral protrusion at C6-7 associated with ligamentum flavum prominence and moderate central stenosis. There is severe left and moderate right-sided foraminal narrowing at this level.
- The patient's central canal is 6.5mm. This is a problem.

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CASE ONE

- We know that mild central stenosis is a central canal that is 12mm.
- At 9mm central canal, the career of a collision sport athlete is terminated. Why?
- When central canals are between 7-9mm, the pt is observed over time for worsening of the symptoms (downhill slide)
- At 7mm, patients are advised to have spine surgery – disc replacement or fusion.

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CASE ONE

- Pt had two consultations, one spine orthopedic, one spine neurosurgical. Both advised the patient to have surgery.
- Pt declined surgery.

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CASE ONE

- Pt was subsequently rear-ended while on duty.
- Pt then developed paresthesia in all four extremities and became frightened.
- Pt began to fall at home. Why?

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CASE ONE

- Three days prior to surgery, she was going for an "easy" jog and she fell. Why?
- She presented to the office with left lateral ankle pain.
- Unable to bear weight.
- What do you want to do?

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CASE ONE

- Exam:
  - +3 TTP to the posterior aspect of the distal fibula.
  - + Anterior drawer, anterior drawer with medial and lateral tilt.
  - Limited exam due to clinical concerns.
  - Ecchymosis and swelling at the ankle.

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CASE ONE

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CASE ONE

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CASE ONE

CASE ONE

- The patient's surgery was delayed six weeks to allow the bone to heal.
- The surgeon did not feel comfortable having a patient with an artificial disc replacement (ADR) ambulating with bilateral axillary crutches post-operatively. Too much stress on the cervical spine.

CASE ONE

- Patient referred to a foot and ankle orthopedic surgeon.
- She was placed in a hard cast in addition to (B) crutches. Cast was for both the fibular fx and ATFL grade II-III tear.
- Once off crutches, she was placed in a CAM boot.

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CASE ONE

- Patient's ADR surgery went well.
- She began therapy 10 days post-operatively.
- Acupuncture and soft-tissue mobilization.

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CASE ONE

- Two weeks post-operative the patient contacted us on the weekend. She fell off her chair and has "electrical pain" in the spine and arms.
- She came in Monday for X-Rays to ensure there was no artificial disk dislocation. The spine surgeon wanted to see the X-rays asap.

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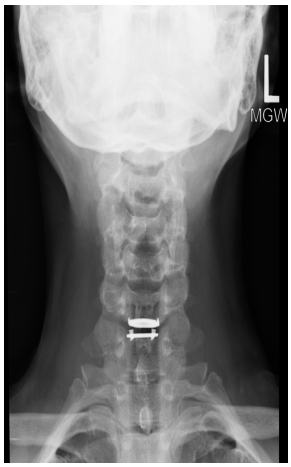
CASE ONE



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CASE ONE

- She was then prescribed a six-day Medrol dose pack from the surgeon.

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CASE ONE

- She continued with acupuncture for post-operative pain.
- We continued with soft-tissue mobilization.
- Six weeks post-operative we began gentle MedX training for the cervical spine extensors.

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CASE ONE

- The patient's ankle continue to hurt the patient.
- Eight weeks post-op:
  - The patient was unable to sleep due to pain in the ankle.

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CASE ONE

- Foot and Ankle orthopedic surgeon wanted a CT w/3D reconstruction to visualize healing.

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CASE ONE

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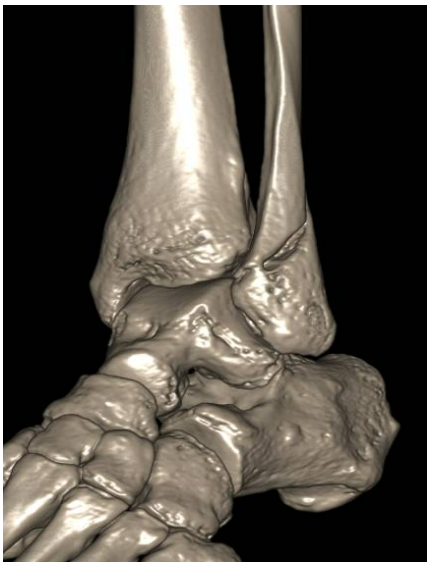
CASE ONE



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CASE ONE

- The patient was given a bone stimulator to wear at all times.
- The patient's C/S continued to improved.
- Patient could not sleep for more than "two hours" each night because of a "deep throbbing pain" at the ankle.

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CASE ONE

- Patient began to complain of burning pain at the ankle. Initially was distal lateral leg. Burning pain spread to the dorsal and plantar foot.
- Deep throbbing pain.
- Cold and clammy to touch.
- Trophic changes present: nails on her foot growing faster than the right. Small black hairs present.

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CASE ONE

- We referred the pt to our CRPS specialist.
- Nurse case Manager did not believe DCs know anything about neuropathic pain/CRPS. Nurse takes patient to her own pain mgmt specialist.
- Dx: CRPS.

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CASE ONE

- Nurse takes the pt to another specialist.
- 2nd opinion is CRPS. Wants to inject stellate ganglion and if it fails, wants to place a spinal cord stimulator. The procedure was pushed back 2 months.
- Pt tells nurse our diagnosis has been confirmed twice. She wants to see the pain management specialist we chose.

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CASE ONE

- The patient was referred to the chronic pain specialist of our choice.
- He performed a sympathetic block to the left posterior tibial nerve. Block consisted of saline solution and ultra dilute Lidocaine
- The patient had a immediate relief of pain.
- This confirms the CRPS diagnosis.

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CASE ONE

- The pain returned in a few hours. The night pain in the foot never returned.
- The patient ultimately received 12 sympathetic blocks to eradicate the CRPS. Each block lasted longer.
- She also had adjunct therapy for CRPS: alendronate 75mg once oral per week, and one clonidine patch at the ankle per week.

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CASE ONE SUMMARY

- MVA
- Torn rotator cuff repair. Cervical spine pathology missed.
- 7 years later, severe central stenosis identified at C6-7 by SCU TSM.
- Pt becomes myelopathic after another MVA.
- Pt falls and fractures the distal fibula.
- C6-7 disc replacement.
- Develops CRPS and is managed for CRPS.

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CASE ONE SUMMARY

- Nurse Case Manager now refers patients for chiropractic care.

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CASE TWO

- 23-year-old, right-hand-dominant, male recruit reported with a complaint of medial knee pain.
-
- The pt is in week 21 of 22 (one week from graduation).
- He developed pain when running on the Academy track today.

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CASE TWO

- He is a sub-3-hour marathon runner and has run 20 miles/week at the Academy for the last five months.
- He has a lower running volume at the Academy compared to his pre-Academy running volume.

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CASE TWO

- When asked routine questions, he denies lumbar and hip pain, radiating pain, numbness or tingling. He denied pain with coughing, sneezing and straining. He denies lumbar clicking or popping.
- Pt denies the knee giving way, and denies pain when ambulating up and down stairs. Pt admits to having clicking in the medial knee that can cause pain. What is this?

CASE TWO

- PE
- Vital signs – normal
- Patellar, Achilles, biceps, brachioradialis, triceps DTR's 2+ B, no pathologic reflexes.
- No neural tension signs
- No mechanical lumbar pain
- No sensory deficits B LE.
- No strength deficits.

CASE TWO

- PE
- Lachman's normal
- Anterior drawer neutral, lateral, medial rotation normal.
- McMurray's – click and mild pain.
- Palpation reveals medial joint line pain.
- No patellofemoral pain, no patellar pole pain.
- No significant effusion.
- Palpation over the medial aspect of the medial condyle elicits 3+ pain.

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CASE TWO

- Normally, I would immediately suspect a stress fracture or a bone stress response, especially with a recruit. Other factors are involved too: high stress levels (high cortisol) and sleep deprivation.
- This is an accomplished marathon runner who is actually running fewer miles per week at the Academy than prior to the Academy. He should not have a stress fracture, yet he should not have this much pain upon bony palpation.
- What are your differential diagnoses?

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CASE TWO

- What do you want to do now?

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CASE TWO

- MRI right knee
- Medial meniscus tear

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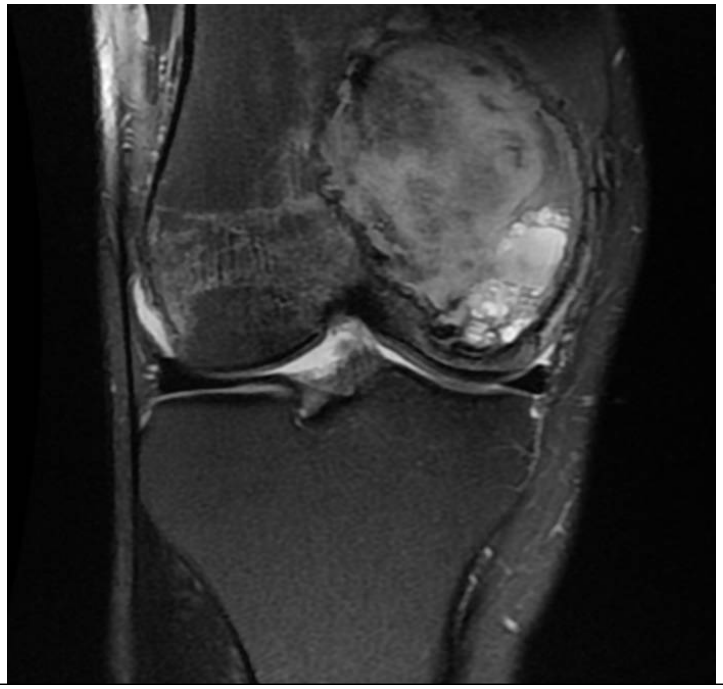

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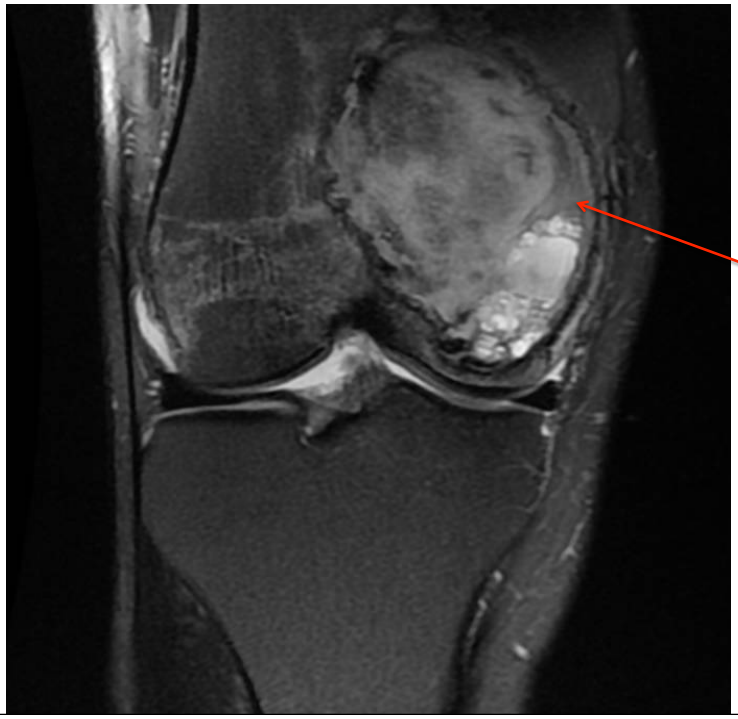
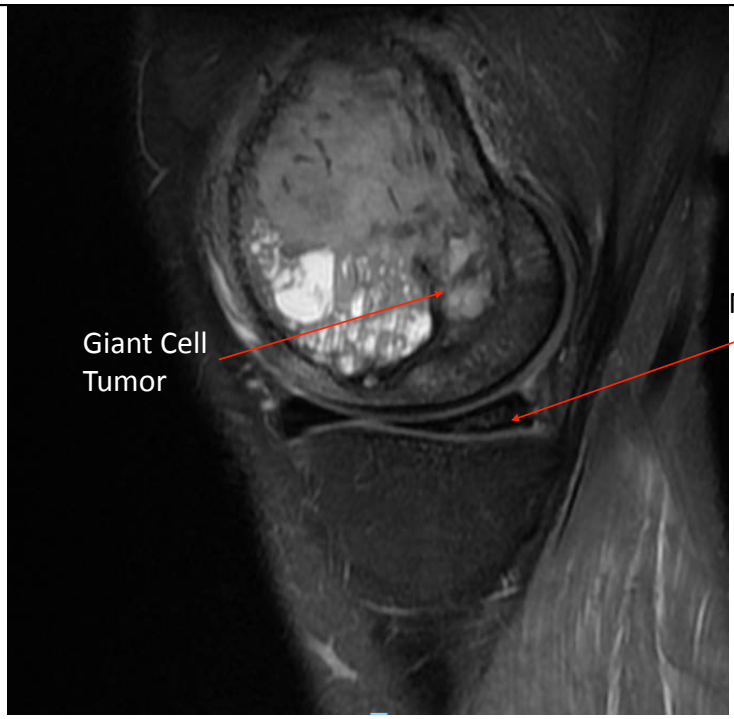
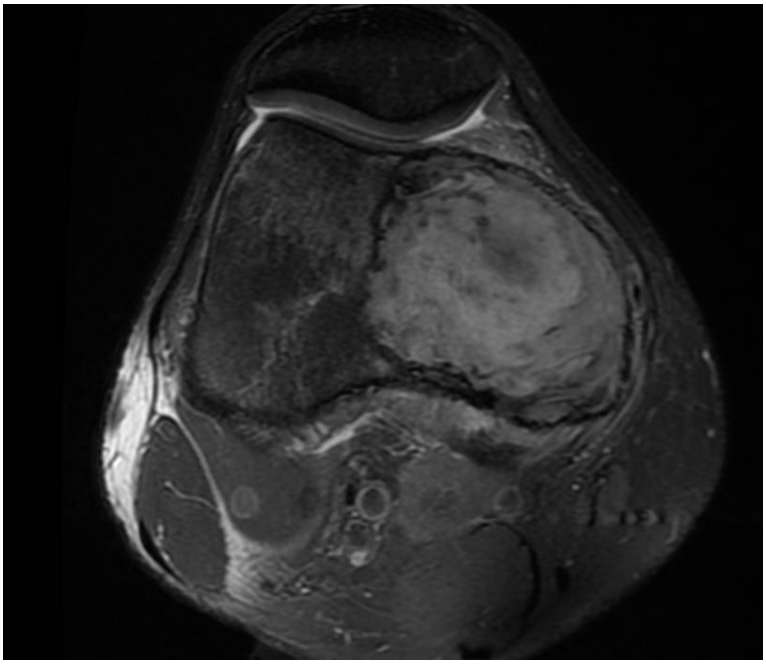
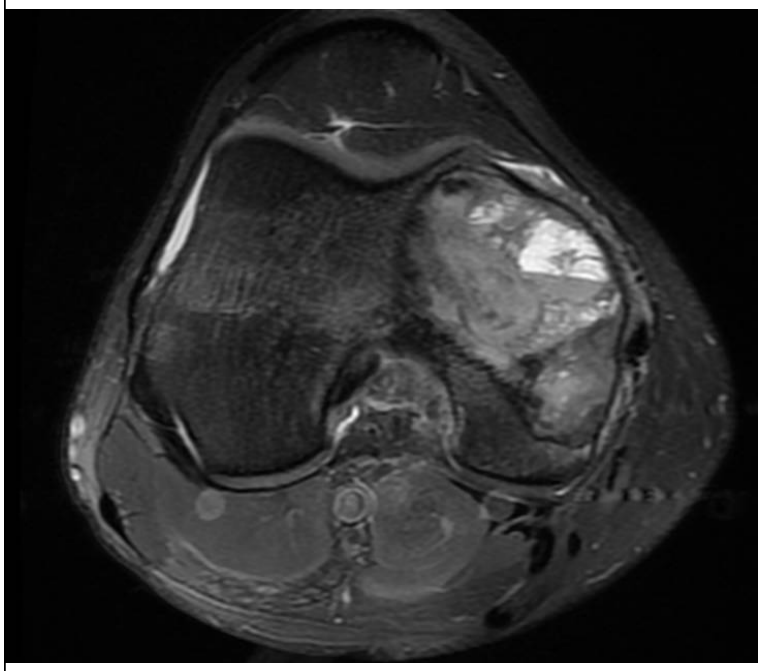


Giant Cell Tumor


Giant Cell
Tumor
Meniscus tear





IMAGING IMPRESSION

- Giant cell tumor with aneurysmal bone cyst characteristics.
- Cannot rule out sarcoma.

CASE TWO

- Refer the patient to an orthopedic oncologist.
- While waiting for the orthopedic oncology appointment, the patient attempted to move some furniture at his home on a Saturday and he heard a loud crack and had immediate pain.
- What happened?
- Patient called me and asked what should he do?

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CASE TWO

- Pt was advised to go to an ER now. He said he was near St. Jude Medical Center. Perfect, as St. Jude's Medical Center is a cancer center. Told the patient to go there now.
-
- ER physician called and said he has a pathologic fracture.
- Regretfully, he was given a knee sleeve and was not given crutches, and only given mild pain meds.

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CASE TWO

- Pain was significant over the weekend. Patient could not sleep due to the pain.
- Pt was seen by the orthopedic oncologist on Tuesday (not Monday as the surgeon was in the OR all day. He would not see, or admit, the patient until Tuesday). Pt is surviving on Tylenol.
- Pt was admitted into hospital on Tuesday.

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CASE TWO

- CT scan was performed to further evaluate the fracture.
- Pt was placed into a cast and given appropriate pain medication.
- Biopsy revealed the tumor to be a Giant Cell Tumor. Osteosarcoma was ruled out.

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CASE TWO

- Pt started on chemo to reduce the size of the Giant Cell Tumor. The medication slows osteoclastic activity.
- Had surgery (curettage) to remove the tumor and filled the space with bone cement (polymethyl methacrylate or PMMA).
- The bone cement is exothermic and the heat also kills remaining giant cell tumor cells.

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CASE TWO

- Patient lost much knee flexion after being in a cast for the pathologic fracture.
- We gained 92 deg of flexion with manual therapies.
- Then the patient had anterior scar tissue removed via open procedure and he was placed in a flexion brace.
- The patient then lost extension.

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CASE TWO

- Open surgery was performed in the popliteal region to remove scar tissue and he was placed in an extension brace. He lost flexion.
- He had both anterior and posterior surgery again to remove scar tissue.
- Tension on popliteal incision from extension brace would not let the wound close. Pt developed an infection.

CASE TWO

- Patient had repeat MR scan. Giant cell tumor returned. Much medial compartment articular cartilage damage. Likely secondary to infection.
- One option left: medial unicompartmental knee replacement. This will remove the medial femoral condyle and the giant cell tumor with it and will stop his pain and permit movement again.
- Successful partial knee replacement. In rehab now.

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CASE STUDY THREE

24-year-old, right-hand-dominant, male deputy recruit fell during training and landed on his right knee causing immediate anterior knee pain.

Pt cannot ambulate without assistance.

What are your differential diagnoses?

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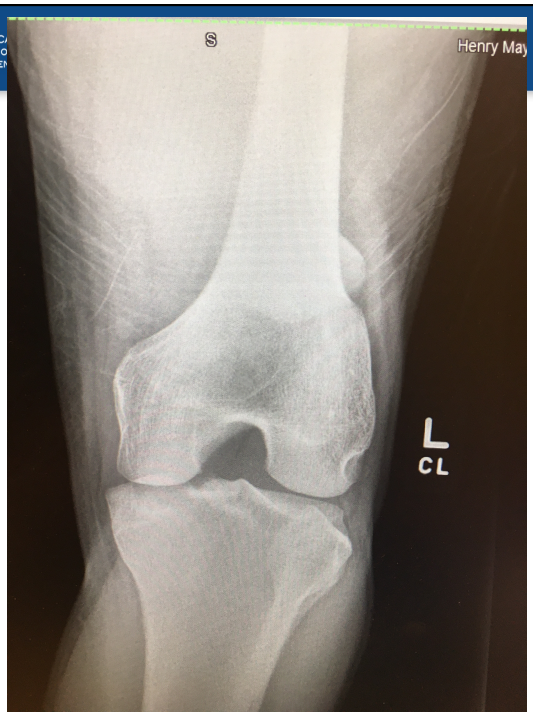
CASE STUDY THREE

Difficult to examine the knee.

What is the first thing you should probably do with this patient since he had trauma?

CASE STUDY



CASE STUDY THREE

What do you think?

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CASE STUDY THREE

What is the diagnosis?

What would give this appearance on x-ray?

What can you now do in your exam to confirm the diagnosis? Is there something you can ask the patient to do to confirm your diagnosis?

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CASE STUDY THREE

Ask the patient to perform an active SLR.

Or

Ask the patient to extend his knee.

Why?

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CASE STUDY THREE

Ask the patient to perform an active SLR. An active SLR is not possible without the rectus femoris. There can be hip flexion from the iliopsoas, but no active SLR.

Or

Ask the patient to extend his knee. There is no knee extension without the quadriceps femoris.

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CASE STUDY THREE

Patellar tendon grade III tear, midsubstance tear

Management?

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CASE STUDY

Management:

Refer for surgical repair of patellar tendon.

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CASE STUDY THREE

Management:

Refer for surgical repair of patellar tendon.

Patellar tendon repaired. Wound became infected.

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CASE STUDY THREE

Pt ambulated with bilateral axillary crutches at home. Pt tripped and fell.

Surgeon scheduled the patient to clean the infected incision and discovered the tendon tore a second time when the patient fell. Tendon needed to be repaired again.

Surgeon brought in an infectious disease specialist to help with the infection.

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CASE STUDY THREE

The tape on the bandages and on the skin caused the skin to blister and these blisters also became infected.

Ortho reached out to SCU Tactical Sports Medicine for help.

Pt was sent to an orthopedic infection specialist. Ortho ordered a spect CT scan (combination spect bone scan and CT scan) which revealed osteomyelitis and infected soft tissues.

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CASE STUDY THREE

Much time was required due to Workmen's Compensation limitations and restrictions. Request for surgery in March was finally approved in July.

Third surgery was to debride the infected soft tissues and bone. The orthopedic infection specialist thought he would need five surgical procedures to resolve the infection. Fortunately, only one surgery was required.

Wound finally closed
11 months later

Marked atrophy of
left quadriceps.

Normal right thigh.
No atrophy.

CASE STUDY THREE

Patient has had a very long journey beginning with manual therapy to regain ROM.

Active care began slowly. Pt continues to improve.

CASE FOUR

- 43-year-old, right-hand-dominant, LASD SEB deputy presents four days after a gunshot wound to the right leg.
- Gunshot wound occurred when executing a murder arrest warrant. The suspect struggled during the arrest creating difficulty applying handcuffs.

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CASE FOUR

- Another SWAT deputy's 9mm weapon discharged during the struggle striking the patient.
- The bullet entered and exited the patient's right leg.

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CASE FOUR

- Pt was transported to an ER. CT scan revealed the tibia and fibula were not impacted by the bullet.
- Doppler US was declared normal per patient.
- Pt stated two neurologists stated he was neurologically intact.
- Pt was kept overnight for observation and given IV antibiotics and pain medication.

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CASE FOUR

- Pt was discharged the next day without clear follow-up instructions.
- Pt was referred to SCU Tactical Sports Medicine three days after being discharged from the hospital.
- Pt presented ambulating with bilateral axillary crutches NWB right.

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CASE FOUR

- Bandages did not appear to be as clean as expected. I told the patient "I don't like the way your bandages look." He replied, "Neither do I."

- Pt was advised that the wound will be dressed and the bandages will be changed after the physical exam.

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CASE FOUR

- Quadruple Verbal Analog Scale is:
  - 8/10 pain at its worst
  - 3/10 pain at its best
  - 5/10 average pain
  - 5/10 pain during the history

Pt stopped taking pain medication. This is common in the law enforcement population.

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CASE FOUR

- Entry wound is anterior mid leg and exit wound is in the distal posterior leg adjacent to the Achilles tendon.
- Any attempt to passively dorsiflex the ankle elicits tightness and burning pain at site of the exit wound.
- Same symptoms but worse with isolated passive dorsiflexion of the 1st MTPJ.

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CASE FOUR

- PE
- Dorsal foot is edematous. Ecchymosis on lateral and medial ankle.
- Pt's right foot is cold to palpation and normal color. Left foot is warm.
- Capillary refill is brisk, less than two seconds.
- Dorsalis pedis was difficult to palpate. Rated as 1+ as was the posterior tibial artery.

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CASE FOUR

- Manual muscle test of the
  - right anterior tibialis is minimal (3/5) and left is 5/5.
  - right posterior tibialis is 3/5 with pain.
  - right EHL is 1/5 and left is 5/5.
  - right FHL is 1/5 and left is 5/5.
  - gastrocnemius was 4-/5 right and 5/5 left.

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CASE FOUR

- Diminished distributions to light touch in the right foot.
- Passive dorsiflexion of the 1st MTPJ elicited burning pain near the exit wound.

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CASE FOUR

- I advised the pt that I need an MR scan to see the extent of the injury and the path of the bullet. We will try to have the MRI tonight.
- The pt was perplexed by the possibility of a same day MRI. He indicated he has a knee WC claim and has waited 3 years for a knee MRI and a shoulder claim in which he has waited one year for an MRI.
- Pt's leg and ankle were scanned 1.5 hours later.

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CASE FOUR

- After the physical examination, I asked Dr. Michael Fanning to change the dressing.
- Dr. Fanning has combat EMT training and had two tours in Iraq. He has certainly seen more gunshot wounds than I have. It is wise to use the best healthcare providers available for a specific task.

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CASE FOUR

- Before the bandages were removed, I advised the patient's wife that she may want to leave the room so she would not have to see the wounds.
- Even with a mask, I could see she smiled and then said to me, "I am a murder investigator. I go to murder scenes and autopsies routinely. But thank you for asking."

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CASE FOUR

Entry wound

Exit wound

CASE FOUR

- The tissue damage, cold foot, tightness and burning pain could be the start of complex regional pain syndrome.
- Or, these symptoms could simply be secondary to an acute gunshot wound. The gunshot wound may have caused arterial injuries resulting in coldness. There are unknown muscular and tendinous injuries.

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CASE FOUR

- **Working Diagnoses**
  1. gunshot wound
  2. anterior tibialis injury
  3. Posterior tibialis injury
  4. complex regional pain syndrome
  5. arterial injury – extent to be determined
  6. peroneal nerve injury

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CASE FOUR

- **MR report:**
- "1. Gunshot wound tract entering the anterior mid leg and extending posteriorly through the syndesmotic membrane to the anterior Achilles tendon at the myotendinous junction without an Achilles tendon tear.
- 2. Probable partial tear of the flexor hallucis longus without complete disruption.

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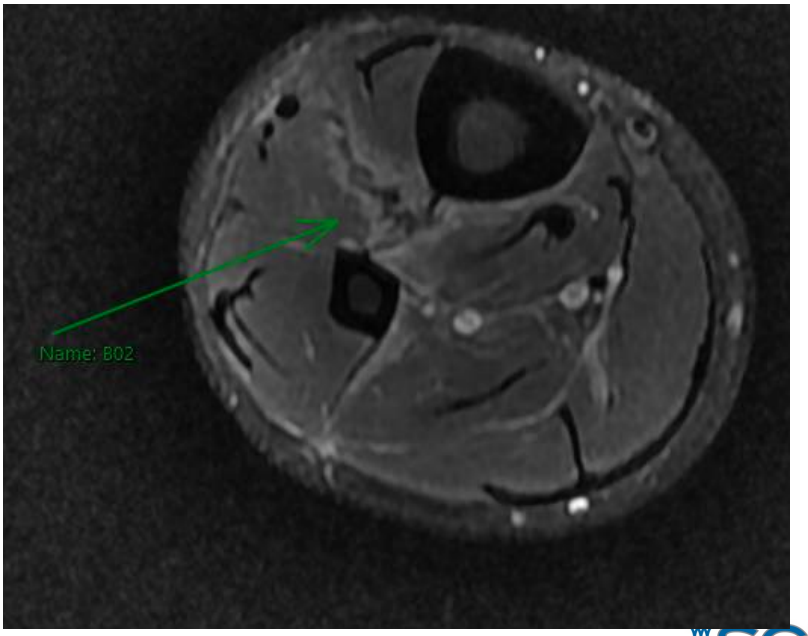
CASE FOUR

- **MR report**
- "3. Findings consistent with peroneal artery laceration and laceration of distal branch of the tibialis anterior versus the distal artery itself."

CASE FOUR

- Additionally, anteriorly the tract extends through the junction between the tibialis anterior muscle belly and EHL without tendon tears. There is muscle belly damage with muscle fiber tears along the tract.



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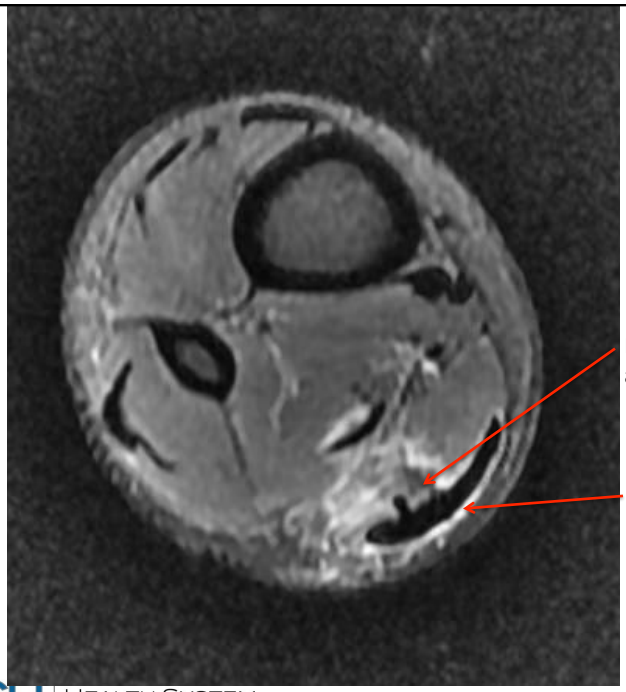

Path of bullet stopped at anterior Achilles.

Achilles tendon

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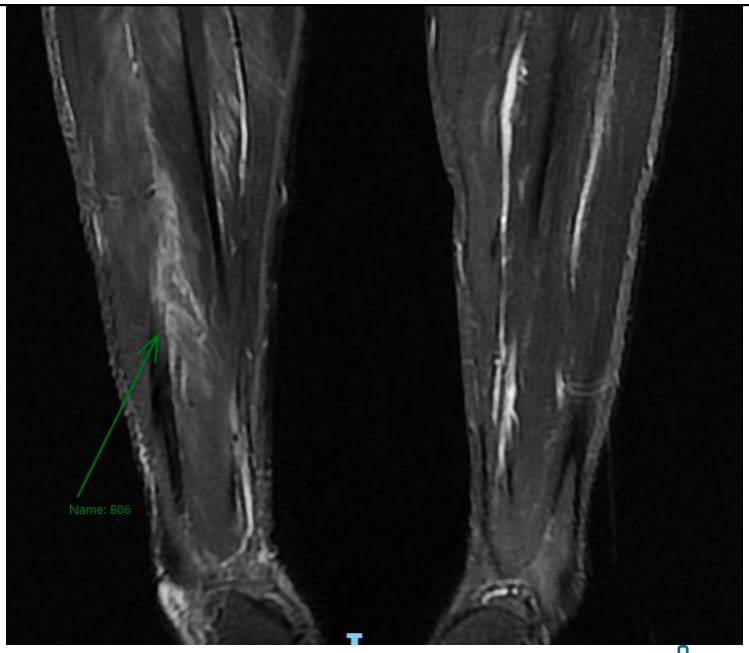

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CASE FOUR

- Concern for injury to two of three arteries to the foot, and lengthy discussions with the musculoskeletal and vascular radiologists, resulted in a recommendation for a CT angiogram over a repeat Doppler US exam.

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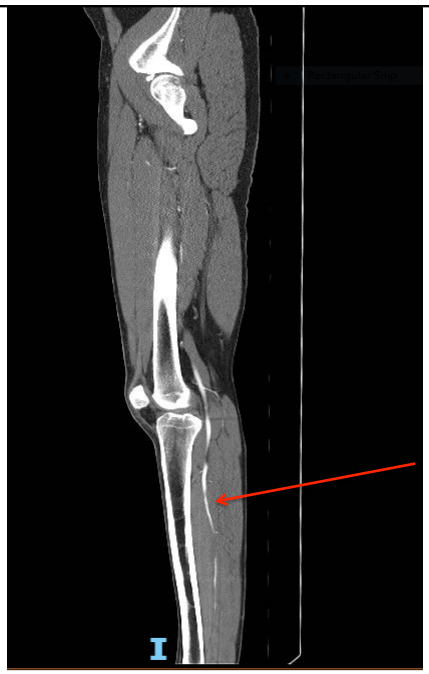
CASE FOUR

- CT angiogram was interpreted by a vascular radiologist. The findings included:
- "The right peroneal and right anterior tibial arteries occlude in the distal calf.
- The right posterior tibial artery is normal, and it is the only distal runoff seen in the right foot.
- The left leg has normal three-vessel runoff to the patient's foot."



Intact posterior tibial artery

CASE FOUR

- Dorsalis pedis derives from the anterior tibial artery.
- Posterior and anterior tibial artery branch off the popliteal artery.

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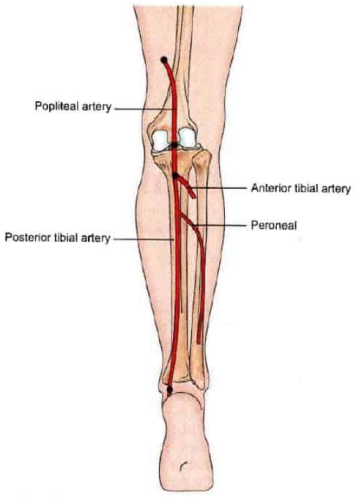
CASE FOUR



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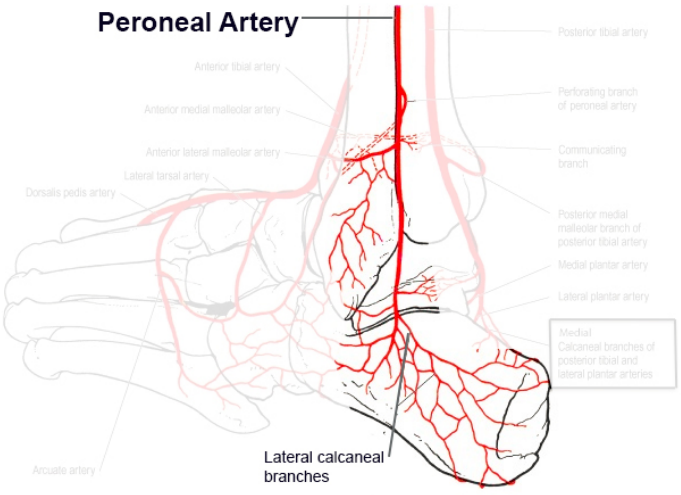
CASE FOUR



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CASE FOUR

- A vascular surgeon consultation was requested secondary to the occlusion of the peroneal artery and anterior tibial artery.
- Only one intact artery existed: posterior tibial artery. The foot is cold. If anything happens to the posterior tibial artery, the result could be amputation.

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CASE FOUR

- On a more conservative perspective, what effect will the loss of 2/3 of the arterial supply have on the wound and muscle healing.
- What effect will this arterial occlusion have on this deputies on-duty performance?

CASE FOUR

- The vascular surgeon examined the patient and reviewed the MR scans and CT angiogram.
- Of interest, his foot was now warm.
- The vascular surgeon was not able to palpate the dorsalis pedis or peroneal artery, nor find it with the Doppler US right or left side.

CASE FOUR

- Pt has peripheral artery anatomic variant.
- The vascular surgeon added young patients with trauma such as a gunshot or motorcycle accident may have significant arterial spasm which appears to occlude the artery. When the spasm subsides from the shock, the foot could warm.

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CASE FOUR

- The vascular surgeon stated he expected to see a hematoma from the arterial injuries but there are none.
- Of interest, one of the SCU UHC MAs who had three tours of Afghanistan as an Army paramedic said the heat of the bullet often cauterizes the tissue as is passes through and the entrance and exit wounds are typically clean.

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CASE FOUR

- The vascular surgeon requested an arterial duplex (US) to further evaluate the peroneal and anterior tibial arteries to determine if there is now arterial flow as the warmer foot suggests.
- The US revealed that flow now exists supporting the theory that trauma produced arterial myospasms occluding the arteries.

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CASE FOUR

- Nerve conduction velocity studies were requested secondary to the weakness in the foot and ankle.
- The PM&R physician suggested waiting two weeks for the initial trauma of the gunshot wound to reduce.
- Pt had the NCV 21 days later.

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CASE FOUR

- **Sensory nerve conduction (NCV)**

  Right sural n. lower leg 3.2ms

  Right superficial peroneal n. ankle 3.1ms

  Normal is <3.5 ms

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CASE FOUR

- **Motor nerve conduction (NCV)**
- Right peroneal n.

  ankle 4.9ms

  fibular head 3.0

  popliteal fossa 4.4 ms

  Normal is <5.8 ms

Minimal responses were obtained at the ankle when recording from the extensor digitorum brevis. Responses at the fibular head and popliteal fossa were from anterior tibialis.

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CASE FOUR

- **Motor nerve conduction (NCV)**
- Right tibial n.

  ankle 4.0ms

- Left peroneal n. for comparison

  ankle 4.0ms

  fibula (head) 12.6 ms (greater distance)

  Normal is <5.8 ms

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CASE FOUR

- **EMG**
- The pt expressed concern about his inability to actively dorsiflex the 1st MTPJ.
- The PM&R physician placed an EMG needle into the EHL and the response was normal.
- The conclusion from the PM&R is the patient is showing signs of disuse atrophy. The trauma is of course a factor.

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CASE FOUR

- In summary, a patient presented with significant lower extremity trauma and a variety of findings.
- Due to the extent of the injury, exam findings, and concern for timely clinical data to protect the tissue health of this patient, the diagnostic work-up was pushed with urgency.
- It was time to "drive the bus."

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CASE FOUR

- The patient received two MR scans, one CT angiogram, a vascular surgeon consultation (outside of the MPN), and electrodiagnostic studies in a 21-day span.
- Pathology is nearly fully identified.

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CASE FOUR

- Next, the pt is ambulating without crutches.

- Re-exam:
  - Foot is cool, not warm but much better.
  - MMT right anterior tibialis 4-/5, peronei 4/5, EHL 3/5, FHL 3/5 with mild pain.
  - No burning pain. Tightness remains.
  - Achilles tendon is nontender to palpation.
  - pain is much reduced.

CASE FOUR

- Treatment plan:

  Stage 1: reduce pain and allow wounds to heal. Resume upper body training.

  Stage 2: increase ROM with STM.

  Stage 3: early rehab – continue activity, balance.

  Stage 4: transition to TSAC to prepare the patient to return to duty.

  Returned to full duty.

CASE FIVE

- Pt is a 28-year-old male LASD recruit who reports to this facility on 02.10.21 with a c/o bilateral ankle pain left > right.
- Onset was performing running circuits in which calisthenics would be performed followed by running. This is addition to a high volume of running while in the Academy.

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CASE FIVE

- Pt points to the anterior and posterior tibiotalar joint and the pain “wraps around the ankle.”
- Quadruple VAS is 8/10 when running, 6/10 when walking after running, 4/10 when walking after sitting, and 2/10 during the history.
- Pain is described as sharp. No prior ankle injuries.

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CASE FIVE

- Pt c/o bilateral Achilles tendon pain.
- At the time of this injury, the LASD Academy was located at the Biscailuz Center in East LA and is on a hillside. The recruits often run the paved hills.

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CASE FIVE

- Vital exam is normal including temperature and O2 saturation.
- 2+ patellar, Achilles, biceps, brachioradialis, triceps reflexes. Ankle clonus not tested. Hoffman's reflex absent.
- No neural tension signs.
- No sensory deficits L2-S2 bilaterally.

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CASE FIVE

- Tibiotalar effusion visible and palpable – boggy joint.
- No lateral ankle ecchymosis or edema.
- Left ankle anterior drawer test elicited pain and crepitus. Anterior drawer test in medial and lateral tilt also elicited pain and crepitus.
- Inferior drawer test did not elicit pain.

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PHYSICAL EXAM

- Due to the likely diagnosis, the patient was fitted with bilateral axillary crutches and crutch trained and determined to be safe to ambulate on level surfaces and stairs.
- Pt was referred for an MRI.

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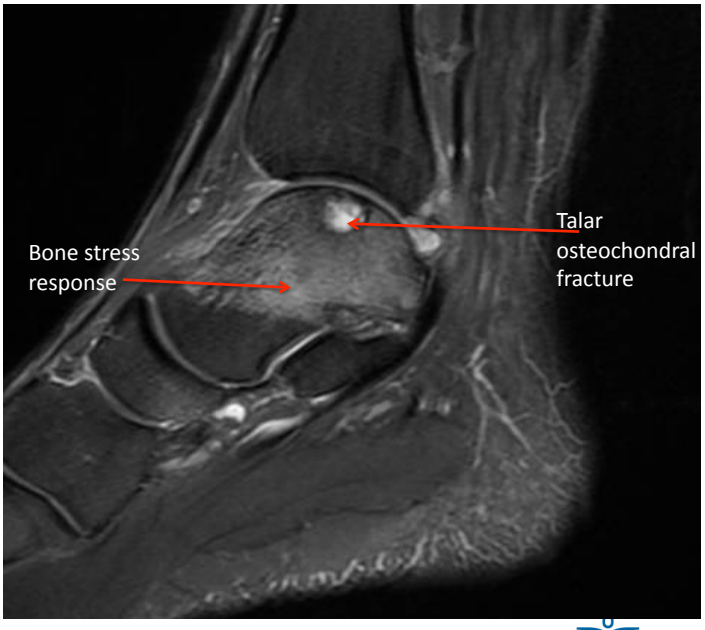

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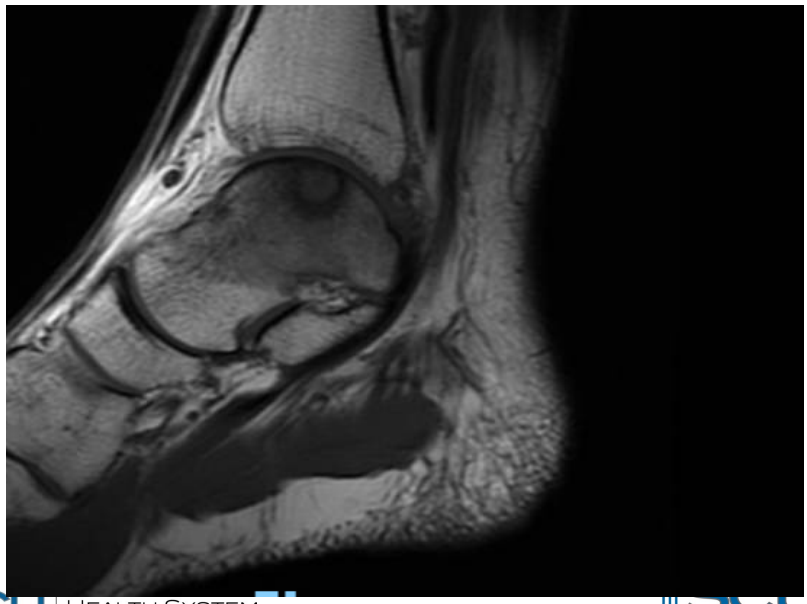

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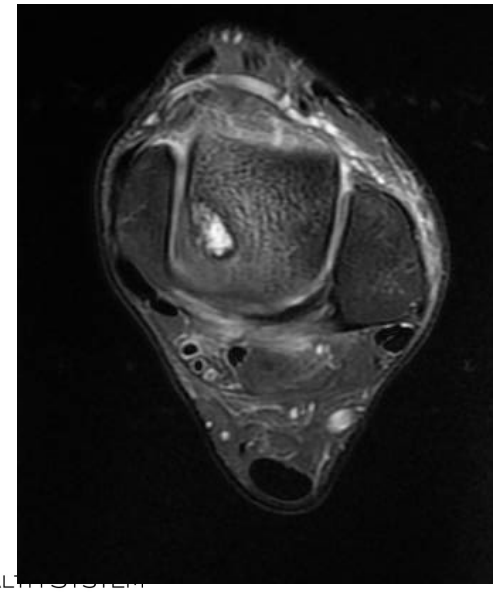
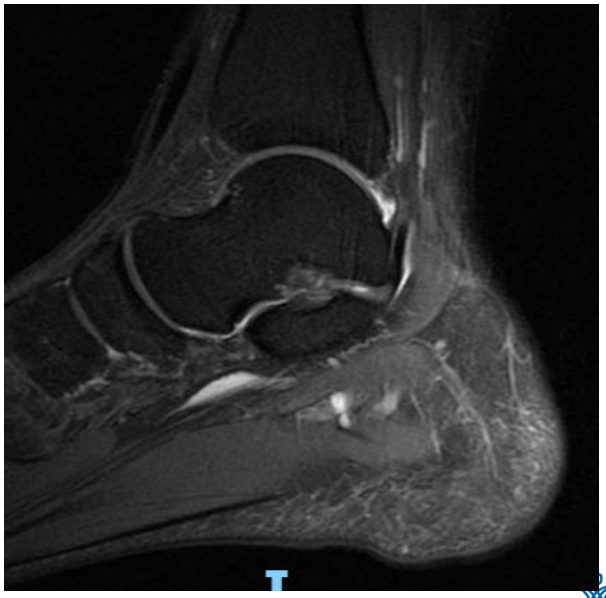


TALAR DOME INJURIES

- Talar articular cartilage is thinner than the hip and knee which makes it more susceptible to injury. The knee articular cartilage is 1.5 to 2.6mm while the talar articular cartilage is 0.7 to 1.2mm (Shepherd DE & Seedhom BB. Ann Rheum Dis. 1999. Google Scholar | Crossref | Medline | ISI).



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CASE FIVE

- **Left** medial talar dome osteochondral defect of 1.3cm AP x 1.2cm transverse diameter.
- Intense bone marrow edema throughout the talus.
- Tibiotalar and subtalar effusion.
- Very mild Achilles tendinosus.

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CASE FIVE

- No evidence of **right** talar dome osteochondral defect or fracture.
- Mild bone marrow edema at talar neck.
- Tibiotalar and subtalar effusion.
- Mild Achilles tendinosus.

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MRI GRADING SYSTEM

Mintz DA et. al. Arthroscopy 2003

STAGE	DEFINITION
0	Normal cartilage
I	Abnormal cartilage signs but intact
II	Fibrillation or fissures in cartilage not extending to bone
III	Cartilage flap present or bone exposed
IV	Loose nondisplaced osteochondral fragment
V	Displaced osteochondral fragment

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CASE FIVE

- Pt fitted with bilateral axillary crutches NWB left, as described.
- Referred to foot and ankle orthopedic surgeon for evaluation and care.
- Pt presented to SCU TSM on February 10, 2021.
- Due to Worker's Compensation delays, the patient did not have surgery until November 21, 2021.

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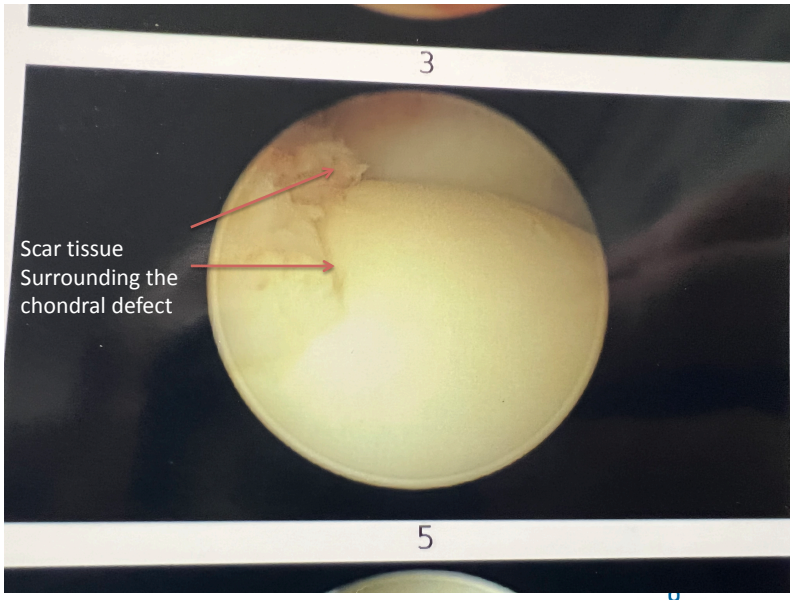

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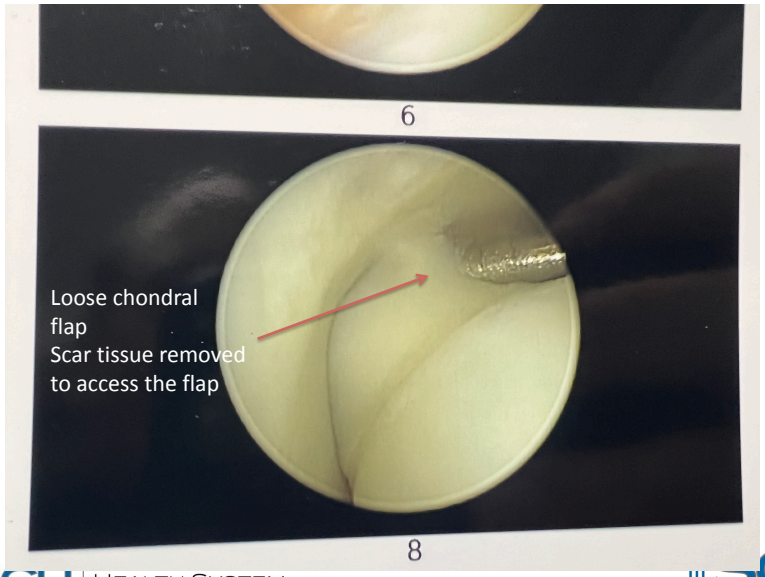

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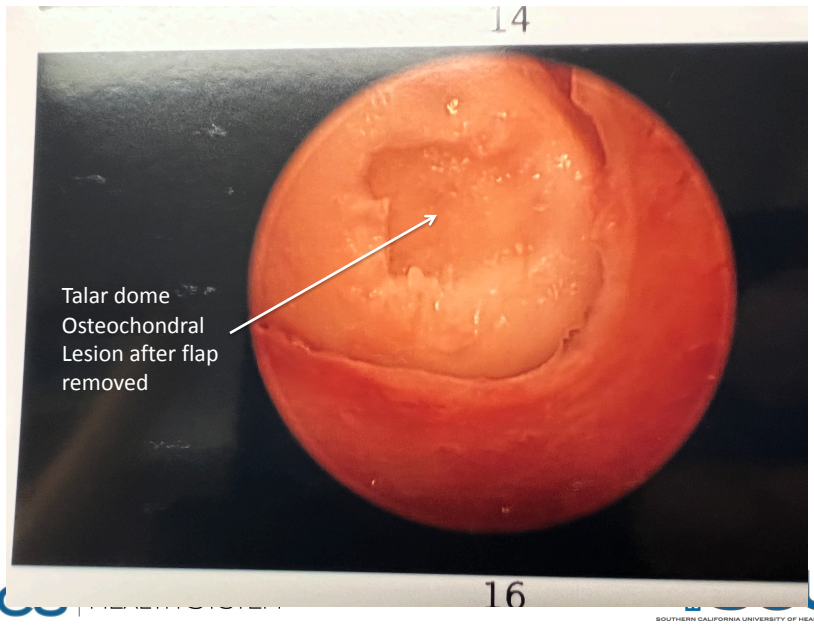
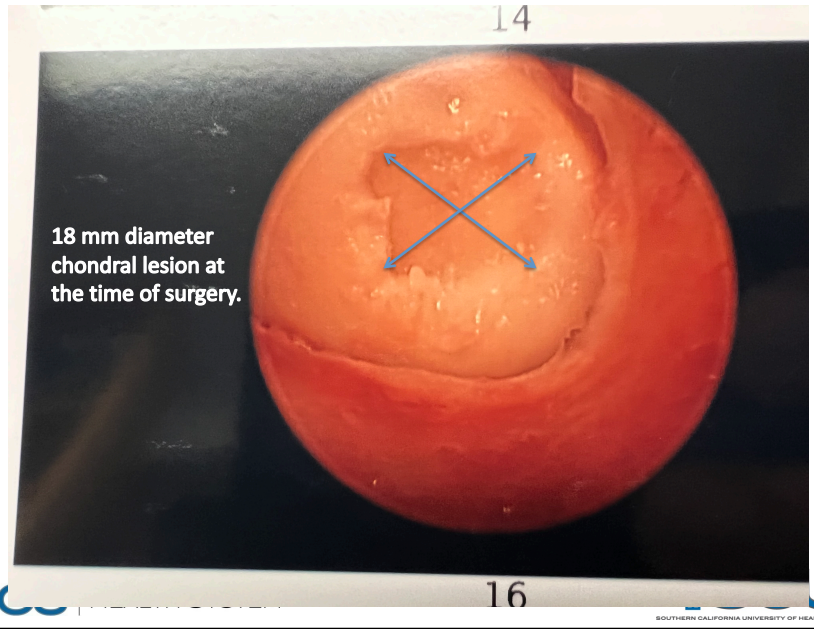
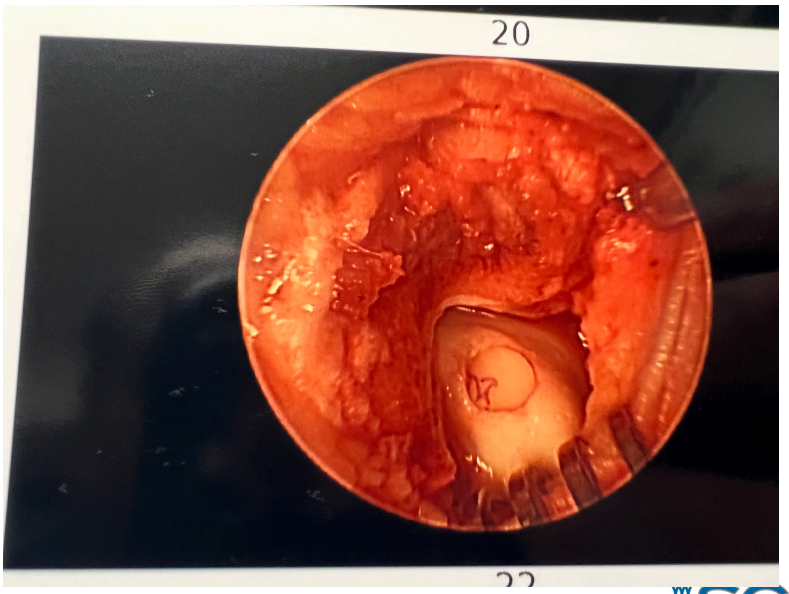

14
Talar dome
Osteochondral
Lesion after flap
removed
16


14
18 mm diameter
chondral lesion at
the time of surgery.
16



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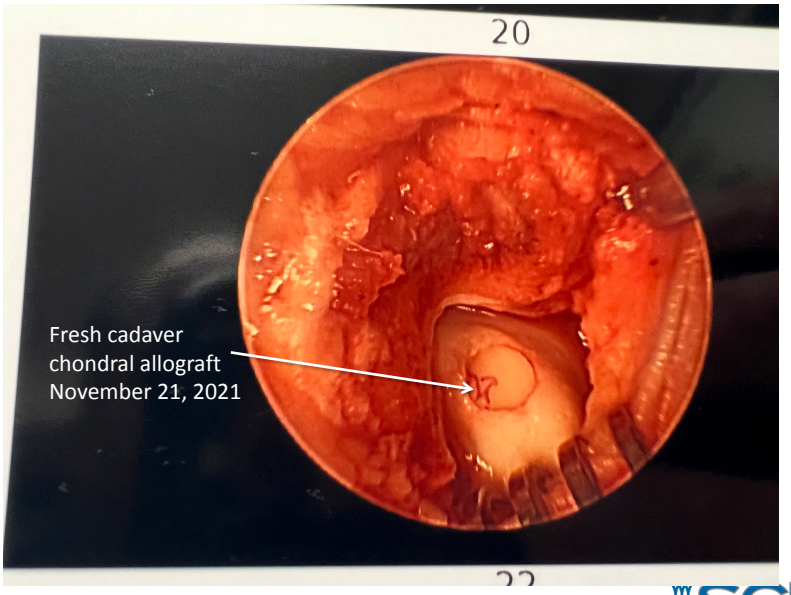

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CASE FIVE

- Cast x 6 weeks
- CAM walker/boot x 4 weeks
- Start STM after immobilization ends
- Ambulate with brace. ADL distance only.

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CASE FIVE

- Remove brace. Continue ADL ambulation distance only
- Gelsyn intra-articular injections x 3 (higher molecular weight hyaluronic acid than previous brands) at 4 months.
- Six months plus, post-op start active care
- Follow-up MRI planned

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MANUAL THERAPY

- Soft tissue mobilization to address the loss of ROM following surgery and subsequent immobilization.
- STM to anterior tibialis, extensor digitorum, EHL, peronei/fibularis, posterior tibialis, soleus, gastrocnemius, FHL, flexor digitorum.
- This was followed by passive stretching.

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TIMELINES

- The hyaluronic acid intra-articular injections needed time to help . . . months.
- No active care. No long walks.
- Once the six month point was reached, a re-evaluation extended this waiting period for another month.
- Active care began in early July, 2022.

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ACTIVE CARE

- Allowing longer walks.
- Orthopedic surgeon cleared the patient for ellipitical and flat treadmill. There was insufficient guidance with activity so the ankle became sore and the patient developed left plantar fasciitis and calcaneal pain and right lateral hip pain.
- The volume of the ellipitical and treadmill were cut by 60% to allow a more gradual adaptation of the deconditioned muscles.

ACTIVE CARE

- Weekly increase in walking & elliptical
- Balance work
- Balance while tossing and catching 10 lbs. medicine ball
- Farmer's walk w/20 lbs.
- Pt is still under care and active care is in very early stages

CASE STUDY SIX

- 41-year-old left hand dominant, male executive complains of LBP and right hip and leg pain, stiffness and tingling.
- "Twinge" in low back began one month ago. Improved.
- Continued to weight train and take Pilates classes
- Felt tightness wrap around anterior hip and low back pain.

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CASE SIX

- Pt played golf and felt much worse. LBP, pain and twitching in quadriceps.
- Pt sought acupuncture two days prior to initial visit. Pt stated acupuncture didn't help the first day, but by the second day, the twitching in the thigh stopped and the low back pain stopped.

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CASE SIX

- Pt has experiences weakness walking stairs particularly downstairs and difficulty standing out of a chair.
- Lower extremity symptoms have not improved and have perhaps slightly worsened.
- Pt is not sure what is happening and wants an answer.

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CASE SIX

- Vitals normal.
- Patellar, Achilles, biceps, brachioradialis, triceps reflexes 2+ B. Hoffman's reflex, ankle clonus absent B.
- Bechterew's (seated SLR) did not elicit pain in all 3 positions B.
- SLR did not elicit symptoms at 80 deg. Coupled dorsiflexion did not elicit symptoms.

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CASE SIX

- Femoral nerve traction/tension test elicits pain.
- MMT right quadriceps 4/5, left 5/5. AT, peronei, gastrocnemius, EHL, hamstrings, gluteus maximus, gluteus medius 5/5 B.
- L2-S2 dermatomes equal and normal to light touch.
- Yeoman's test did not elicit pain B.

CASE SIX

- Hip flexion does not have a lateral drift.
- FADIR test – no pain
- FABER test – no pain, no loss of ROM
- 90 deg hip flexion w/internal rotation – no pain, no loss ROM
- Circumduction of the hip – no pain or clicking
- Axial loading of the hip – no pain

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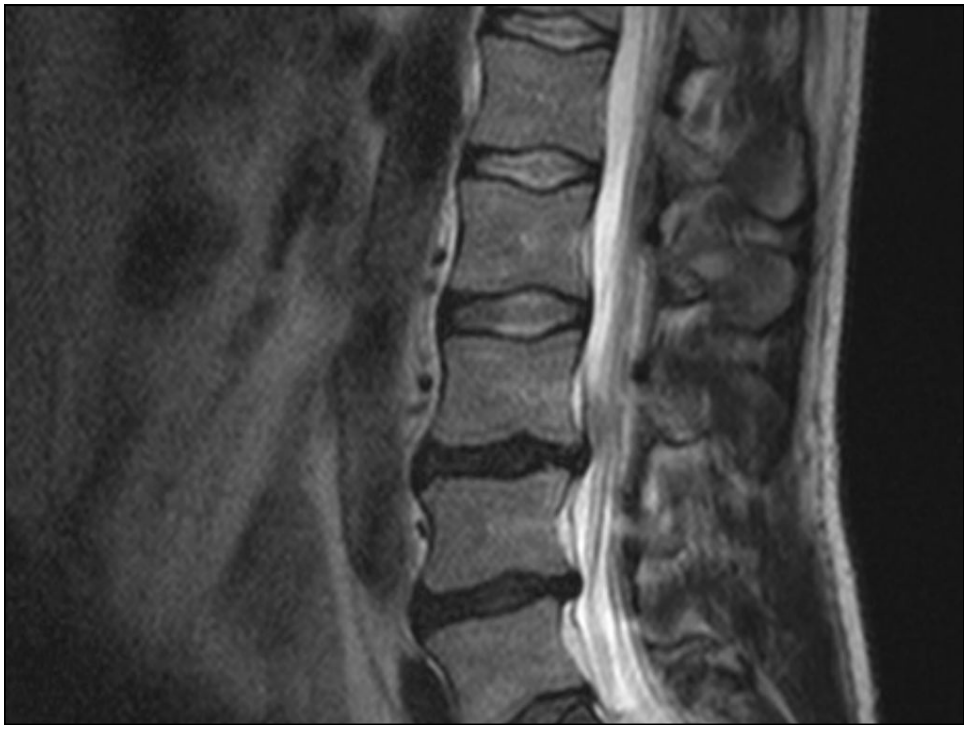

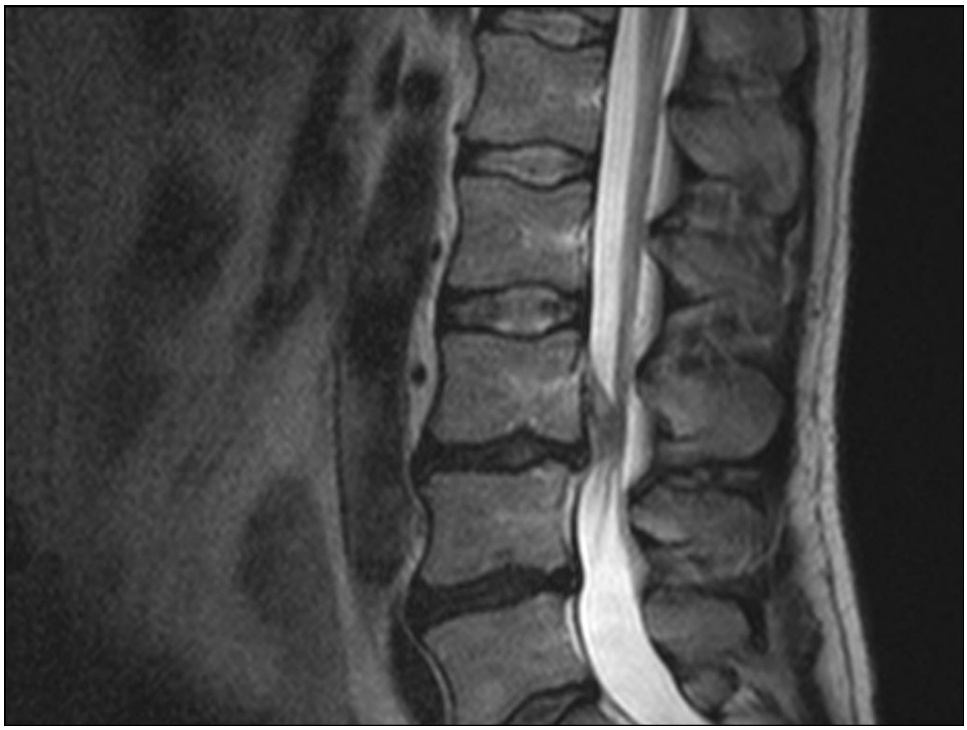

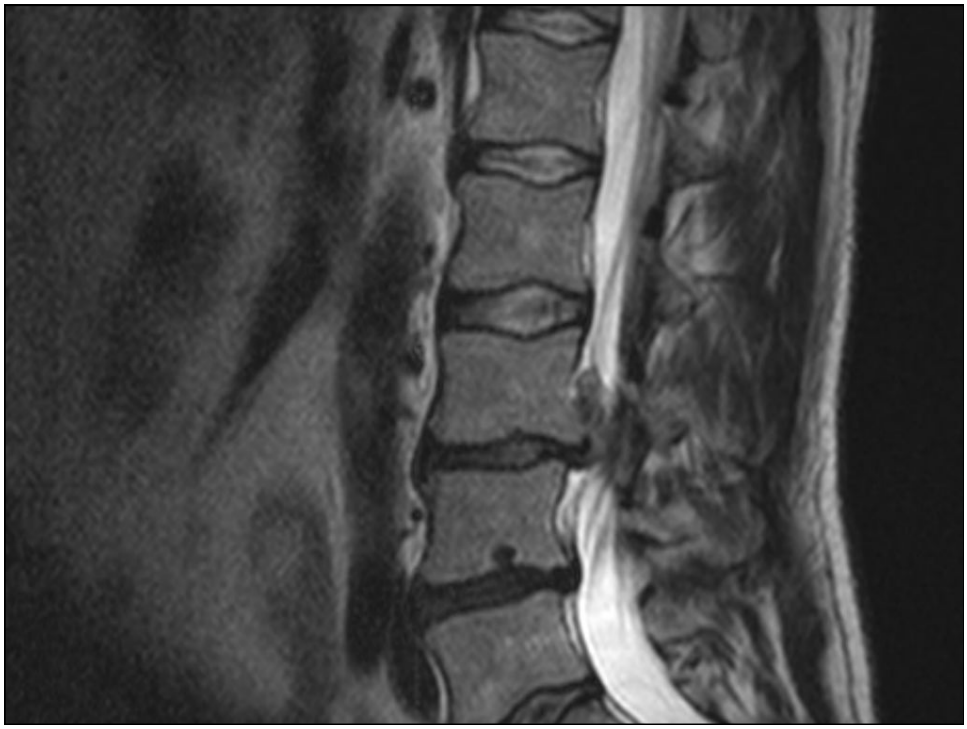

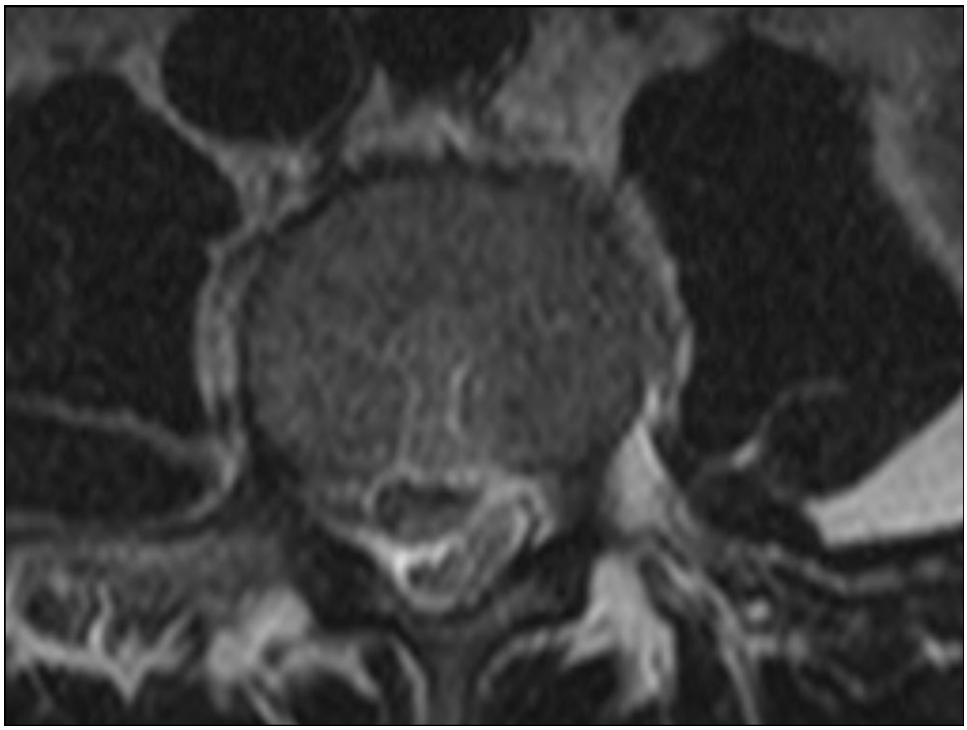

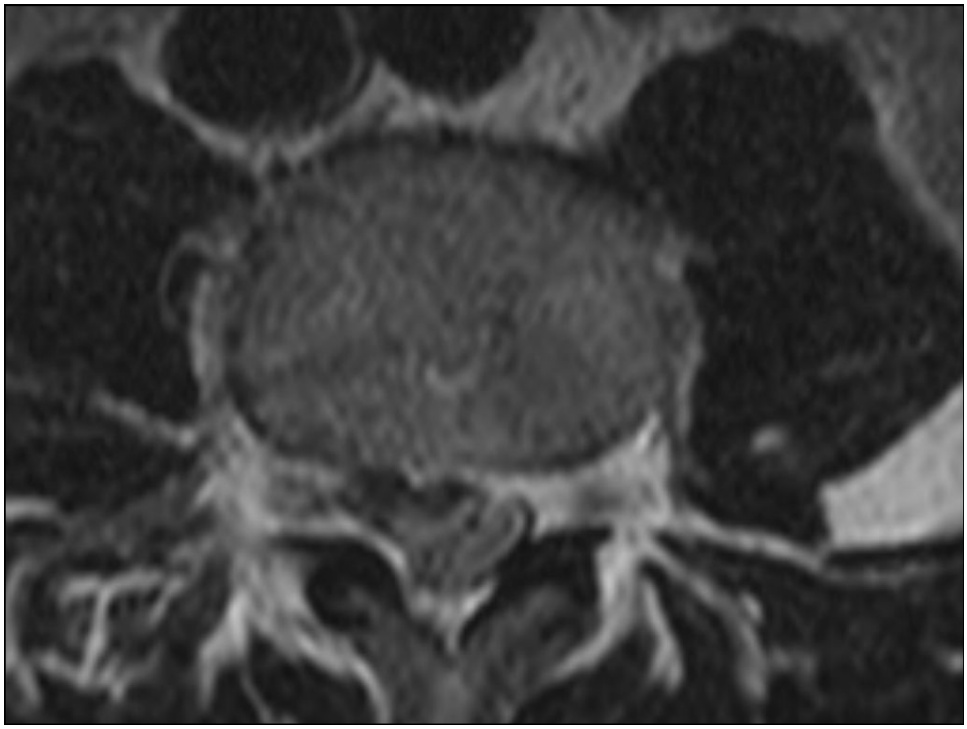

CASE STUDY SIX

- L3-4 sequestered disc with 23mm x 11m fragment
- L3 radiculopathy
- L4-5 disc protrusion

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CASE STUDY SEVEN

- 14 y.o. right hand dominant, high school student and national class high jumper c/o LBP
- History of elite age-group track and field.
- Ran the 200m in 29.2 seconds at 9-years of age.
- As a freshman, saw the high jump and decided to try it too. “It looks like fun.”

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CASE STUDY SEVEN

- Onset of symptoms from high jump training.
- The coach had athlete use 5-step approach instead of traditional 10-step apart in this phase of her training. This was March.
- Low back pain started and lasted for one month before seeking care. Verbal Pain Scale 2/10 at rest and 8/10 with jumping/running.

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CASE STUDY SEVEN

- Pt traditionally responded well to treatment. Pt is not improving this time.
- Pain localized to L/S only.
- No radiating pain.
- No numbness.
- No tingling.
- No Valsalva effect.

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CASE STUDY SEVEN

- PE
- SLR elicits dull low back pain at 80 deg.
- No Bragard's sign.
- Kemp's test elicits lumbar pain.
- Patellar, Achilles, biceps, brachioradialis, triceps reflexes 2+ bilaterally. Pathologic reflexes absent.
- No L2-S2 dermatome deficits
- No motor deficits: AT, peronei, EHL, hamstring, gastrocnemius, gluteus maximus, gluteus medius were all 5/5 bilaterally.

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CASE STUDY SEVEN

- What is the likely diagnosis?
- Why?

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CASE STUDY SEVEN

- Do you want to do anything at this point?
- Why?
- Why not?

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CASE STUDY SEVEN

- MRI is the tool of choice to visualize bone edema from chronic overuse (bone stress response) or acute setting (impaction fracture).
- The edema is blood from trabecular microfractures. X-ray will not reveal this finding.
- However, the edema will appear bright on T2 weighted images.

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CASE STUDY SEVEN

- DIAGNOSIS

  extensive bone stress response bilateral pars

Radiologist called and stated, “She will fracture any minute.”

What do you do now?

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CASE STUDY SEVEN

- What is your management plan?

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CASE STUDY SEVEN

- Rest is the solution.
- Positive nitrogen balance.
- She knew her freshman track season would not occur.
- Few months later, permitted the patient to be in a pool.
- Must have a repeat MRI to determine if all of the edema has resolved. It resolved.
- Resumed training in September for the Spring track season.

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CASE EIGHT

- 17-year-old, right-hand-dominant, male student/cross-country and track athlete complains of hip pain in January.
- The pt had hip pain during x-country in the fall. The hip pain progressed as the volume of running increased (up to 60 miles/week).

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CASE EIGHT

- Pt competed in state championships in x-country (with hip pain).
- Pt took December off to heal and pain stopped.
- Pt resumed training in January and hip pain returned. Pt ran 25 miles the first week.

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CASE EIGHT

- Pt was supposed to run 30 miles the second week, but had to stop at 22 miles secondary to hip pain.
- Pt now seeking your opinion. Pt has 22 major Division I scholarship offers.
- What questions do you have for this pt?

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CASE EIGHT

- Quality of pain?
- Location of pain?
- Clicking and popping in hip?
- What makes the pain worse, other than running?
- What makes the pain better?
- Radiating pain, numbness or tingling in the lower extremity?

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CASE EIGHT

- Quality of pain? SHARP AND ACHE
- Location of pain? THROUGHOUT HIP
- Clicking and popping in hip? NO
- What makes the pain worse, other than running? ONLY RUNNING
- What makes the pain better? REST
- Radiating pain, numbness or tingling in the lower extremity? NO

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CASE EIGHT

- DDx's?

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CASE EIGHT

- What do you want to do now?
- Design a treatment plan? Modalities, rest, nutrition, manipulation, soft tissue mobilization, sports psychology?
- X-rays?
- Electrodiagnostics?
- MRI?
- MR arthrogram?
- CT scan

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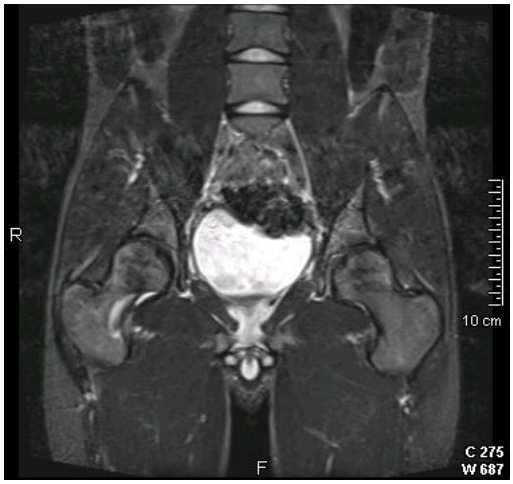
CASE EIGHT



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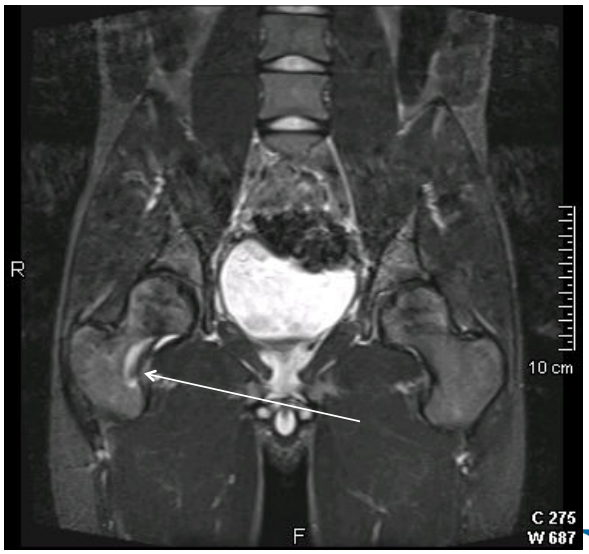
CASE EIGHT



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CASE EIGHT

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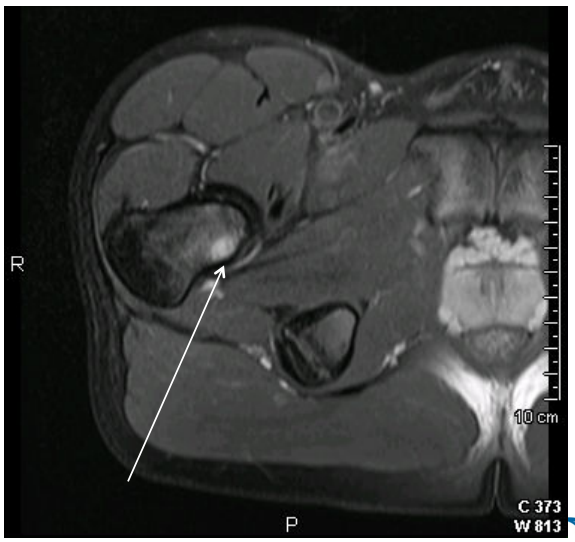
CASE EIGHT



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CASE EIGHT

- Dx = femoral neck stress fracture
- What is your plan?

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CASE EIGHT

- Dx = femoral neck stress fracture
- Plan = B axillary crutches, non weight bearing 15 – 20 days, then start walking.
- He will lose his senior track season. Difficult for pt as he is a major college recruit and this may effect his recruiting potential.

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CASE NINE

- 25 year-old recruit in a defensive tactics course. Pt was sparring. Another pair of recruits were sparring behind the patient. One was kicked and fell backwards into the patient falling into his knees from behind.
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- The pt fell backwards over the body of the falling recruit. The pt tried to get up quickly while the other recruit was laying across his posterior legs. He felt immediate lateral knee pain.

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CASE NINE

- The pt was seen by occupational medicine workmen's compensation clinic. Dx was a knee sprain.
- Pt reported to SCU weeks later. Delays over a week occurred before any imaging occurred. Fibular head fracture was found on MRI. But the pt stated his lateral knee pain had reduced but now his pain was "deep inside the knee" as he pointed to the anterolateral knee.

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CASE NINE

- PE
- Lachman's has definite translation
- Pt is laying supine and the involved knee appears to have a depressed patellar tendon. What is this indicative of?

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CASE NINE

- PE
- Posterior sag sign at 90 deg –
- Anterior drawer moderate
- Dial sign – no end feel
- McMurray's –
- Joint line tenderness –
- Valgus normal
- Varus normal

CASE NINE

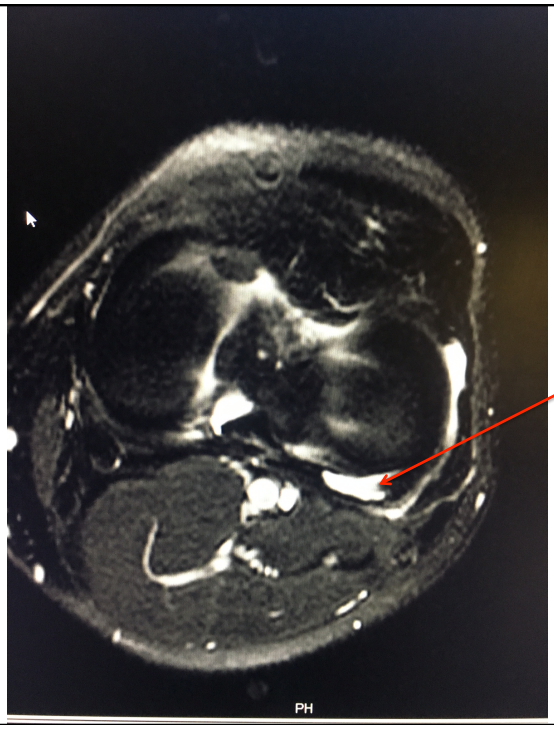
- Review of MRI.
- Called the radiologist (I didn't know this radiologist). He stated the pt had a fibular head fracture. When asked directly about the remainder of the knee, he said it was normal and the patient had knee pain because he has a fibular head fracture.
- The patient said the pain is different now.
- What do you do?

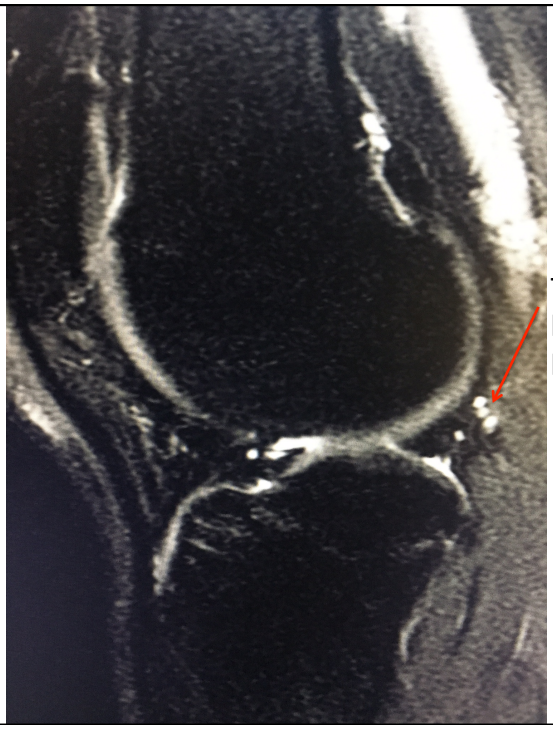
Edema in posterolateral band of ACL

Edema in PLC

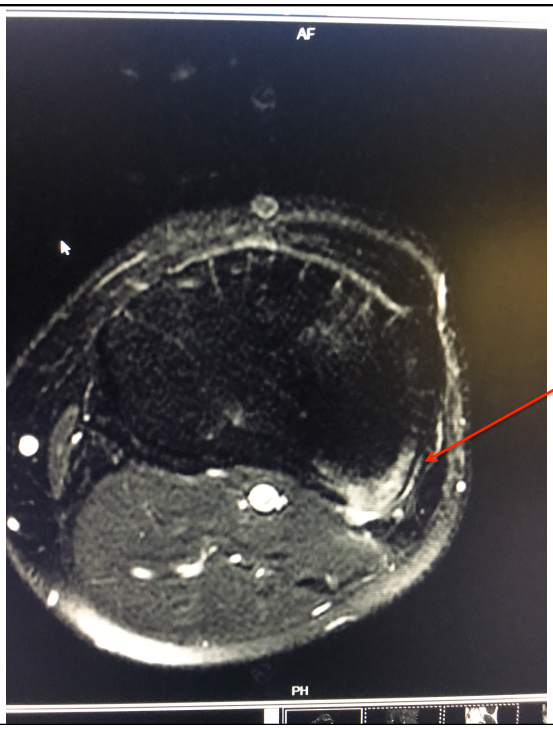
Fibular head fracture


Gutter sign

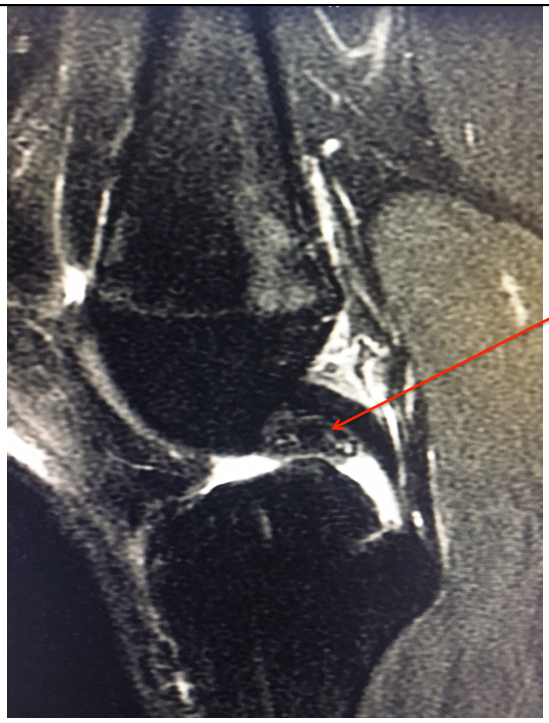

Tear and edema
in PLC
PH



Tears of fascicles between capsule and lateral meniscus



Bone impaction edema



Space occupying lesion. Most likely a torn fragment of infrapatellar fat pad

CASE NINE

- **Diagnosis:**
- Fibular head fracture
- Posterolateral corner instability (edema in posterolateral capsule, edema in rotation band of ACL, tearing of fasicles between lateral meniscus and lateral meniscus).
- Tibial bone impaction edema

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CASE TEN

- 27-year-old, female recruit with a complaint of deep hip pain, primarily anterior hip pain.
- Onset of pain is during the Academy.
- Running increases the pain. Walking hurts but less than running. Rest reduces the pain the most.
- The pain is progressively becoming worse.

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CASE TEN

- PE
- Vital exam normal.
- Patellar, Achilles, biceps, brachioradialis, triceps 2+ B. Hofman's absent. Ankle clonus absent.
- No neural tension signs.
- No motor deficits in LE. Iliopsoas MMT elicits hip pain.
- No sensory deficits in LE.
- No pain with end-range loading or Kemp's test.

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CASE TEN

- PE
- FADIR + pain
- 90 deg flex with internal rotation + pain
- FABER + pain
- Circumduction + pain, no clicking
- Posterior impingement + pain
- Axial loading + pain
- Distraction + pain
- All reproduce the reporting symptoms

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CASE TEN

- Dx?
- Why?
- Is there anything you want to do?

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CASE TEN

- MRI of the hip for a bone stress response or a stress fracture.

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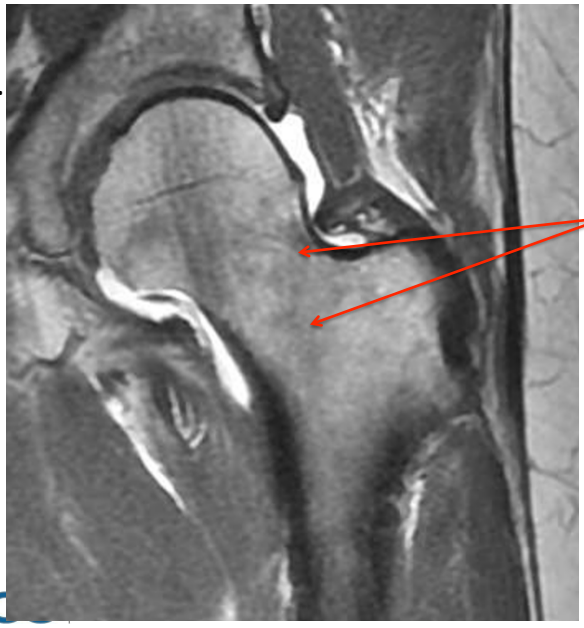

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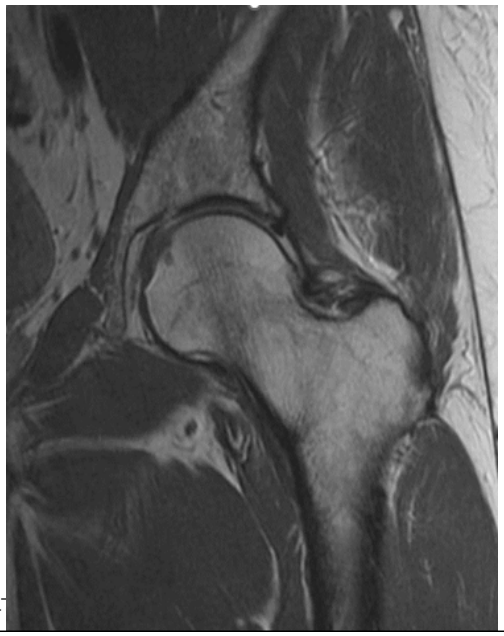

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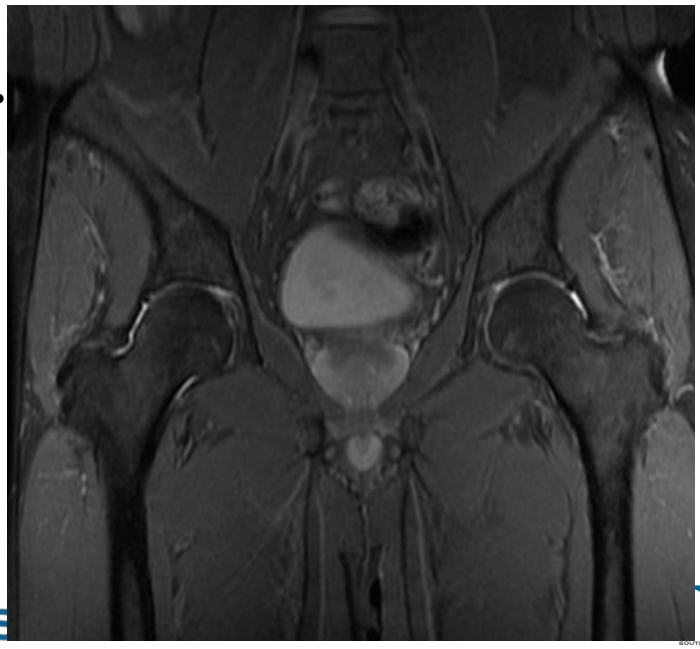

CASE TEN

- Dx: femoral stress fracture
- Patient placed on bilateral axillary crutches, NWB
- Positive nitrogen balance
- Rehab after healing (proven by resolution of bone edema on repeat MRI).

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CASE TEN

- Strengthening to further increase the load on the bone (Wolfe's Law).
- Pt was recycled and graduated from the LASD Academy.
- Pt is now an LASD deputy.

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