PHYSIOHEALTH

(vic) Pty Ltd

Gymnastic Injuries

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Injury Statistics

18 month Australian study (artistic Gymnastics)

Kolt and Kirby 1999

3.3 injuries per 1000 hours (20hrs/week =~1000hrs)

ankle and foot 31%
knee 16.3
Lower Back 15.9%
elbow and forearm 12.4%
wrist and hand 9.8%
Growth Plate 12.3%

When do Injuries Occur?

Marshall et al 2007

16 year Review NCAA – College Age

6 x more likely to have Knee injury in competition
3 x more likely to have ankle injury in competition

70% injuries result from landing in floor exercises or dismounts

2:1 Injury rate Competition/practice

When do Injuries Occur?

APPARATUS	INJURY	%	WHEN
Floor	Ankle ligaments	25	Routine
	Knee	21	Routine
Uneven Bars	Knee	19	Dismount
	Elbow Dislocation	7	Routine
Balance Beam	Knee	15	Dismount
	Ankle	15	Dismount
Vault	Knee	22	Dismount
	Ankle	16	Dismount

Why do we get Injuries?

- Landing – 70%
- Overtraining – No. Hours
- Growth / immature skeleton
- Repetition of High Stress Movements – Growth Plates
- Landing Technique / Error
- Bone Fatigue – Stress Fracture
- Inadequate cross training/rest/recovery
- Stress
- Poor Concentration
- Diet ??

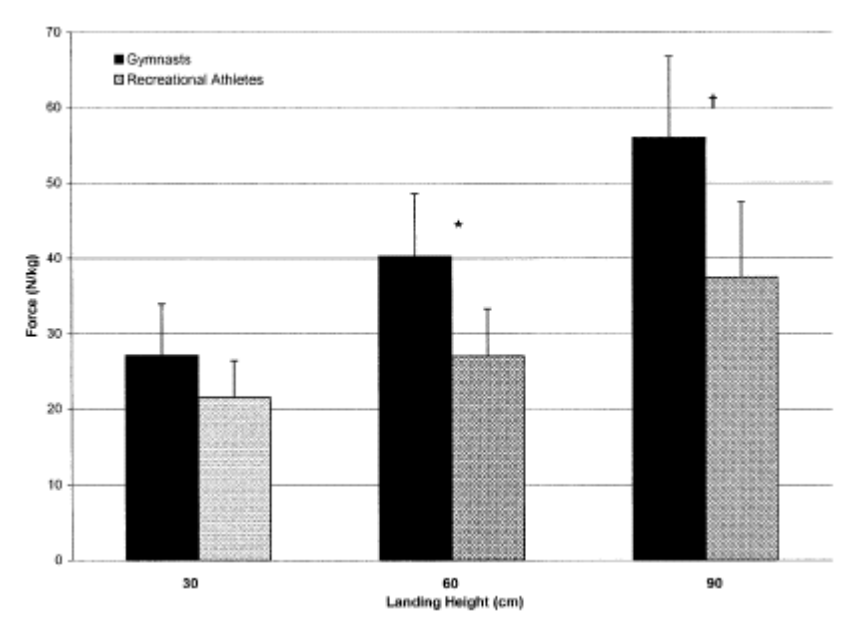
Overtraining - Hours

- Not just Gymnastics
- Be careful of sports with similar demands ie. Basketball, volleyball, athletics
- ? Modify training when school athletics/ hurdling etc to decrease load
- Encourage more cross training eg. Swimming
- Sleep – School Balance
- Sleep – Linked to Stress Fracture

Do Gymnasts land better than other athletes?

Seegmiller & McCaw 2003

- Compared Gymnasts with recreational athletes
- Measured Vertical GRF at 30cm/60cm/90cm
- Gymnastics landed with heavier technique at 60 and 90 cms

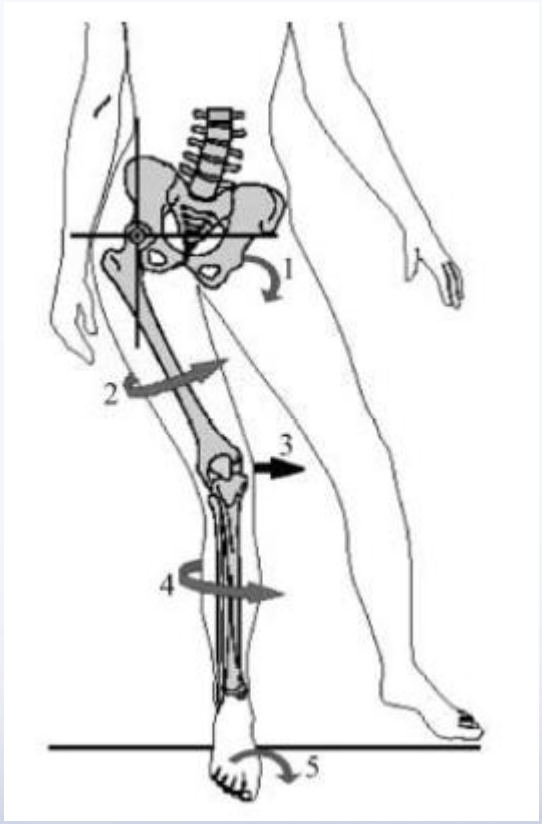


How to Land

- Correct Landing can cut ACL injury rate by 50%
- Always land on 2 feet where possible
- Avoid landing with a straight knee
- Avoid going “Knock kneed”
- Get stronger Hips, keep pelvis level
- Practice step downs – avoiding knock knees
- Practice jumps, hops, SPECIFIC landing technique
- Practice Balance

- Try to make it feel natural

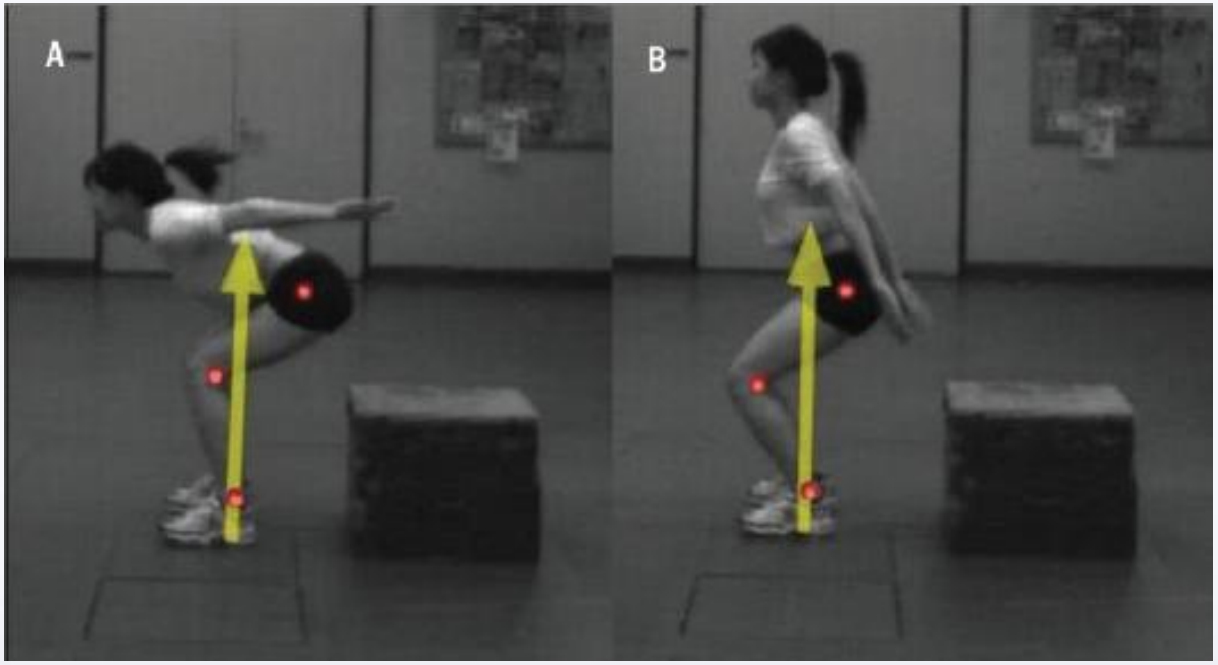
Landing – Frontal View



Side on Landing Technique

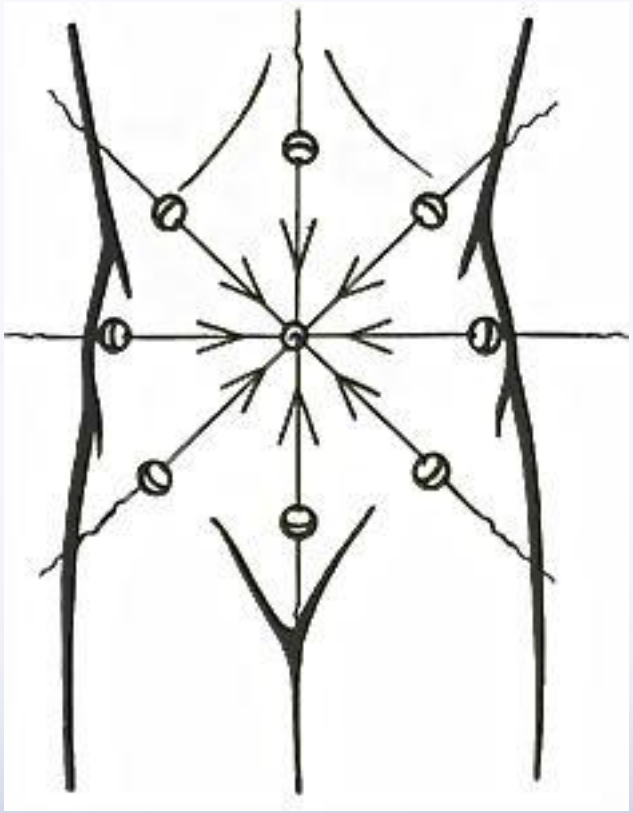
- adequate hip, knee and ankle flexion help absorb GRF
- By using gluteals and quadriceps athletes can minimise their GRF
- Landing with trunk flexion can reduce quads activity by 28%
- Females tend to underuse Gluts compared to males
- Females tend to land with knees “too straight”
- Increased load to knee – increased injury risk
  - ACL injury
  - INC PFJ loading

Side On Landing



- Which technique is better?
- Which technique loads the quadriceps more?

Core Strength



Core Strength

- Core strength does not mean strong Abs

Definition – the ability to dynamically stabilize and control your trunk on top of your legs whilst changing body position

- Includes – abdominals
  - pelvic floor and diaphragm
  - gluteals
  - Hip Flexors
  - Back extensor muscles

- Better core strength =
  - less likely to fall over
  - better alignment
  - helps prevent torsion of feet/ankle

Core Strength

Balance

- Gymnastics needs trunk control and stability to help minimize demands of foot and ankle
- Technique crucial

- Scientifically

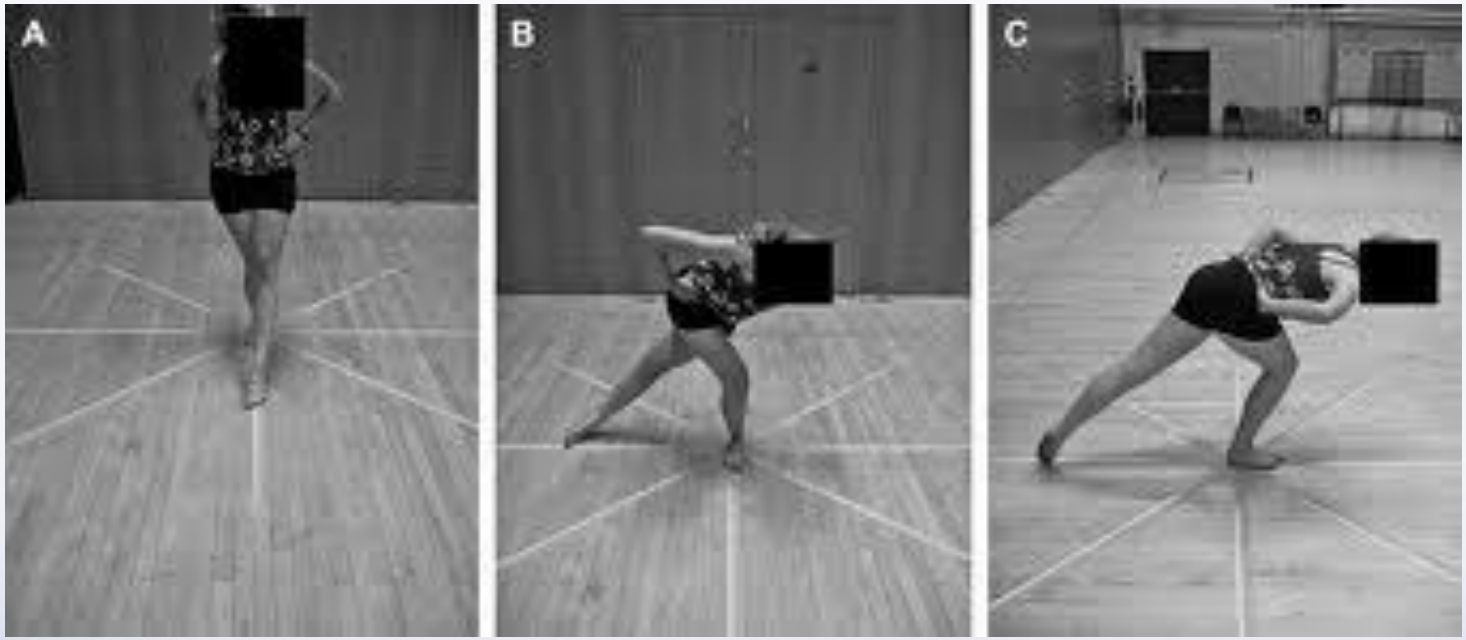
- people with reduced proprioception and poor postural sway get injured more often
- Balance training can prevent Ankle and Knee Injuries

- Previous history of injury = greater chance of injury reoccurring

- use balance as a training tool

-If injured do at home eg. Down ball, eyes closed, jumping, landing
-At training don’t waste time include it as part of your warm up

Star Excursion



Injuries

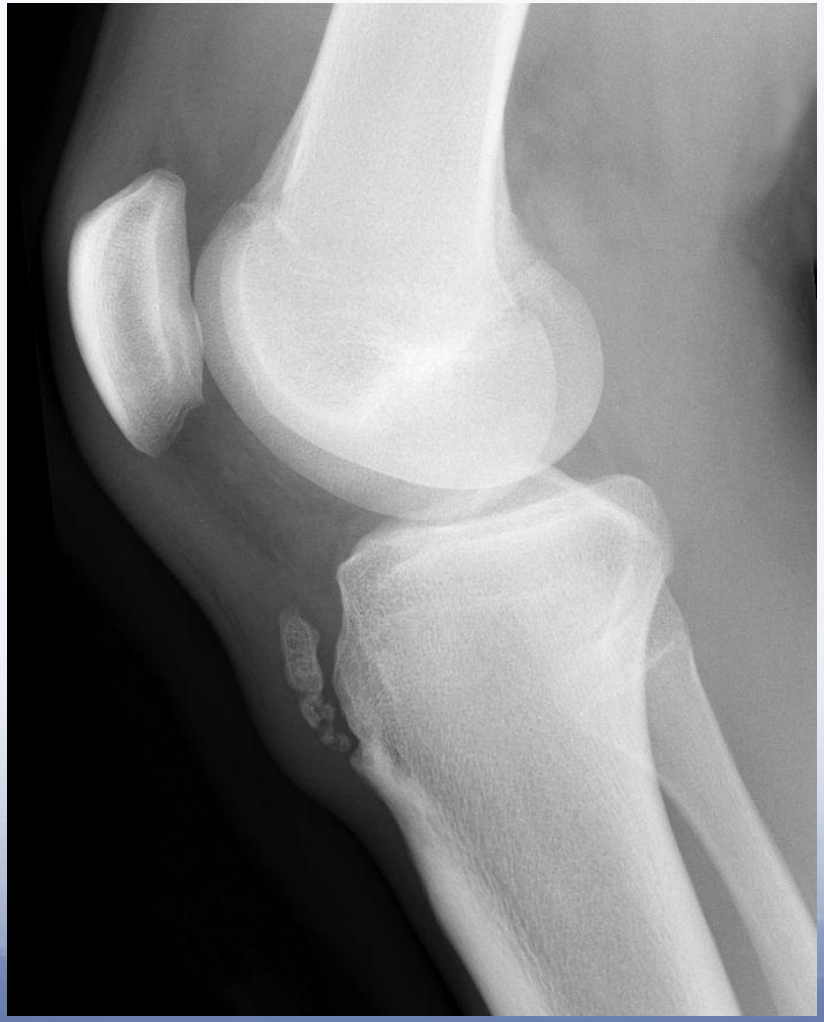
- Growth Plates
- Medial Tibial Stress Syndrome (Shin Splints)
- Acute Ankle Sprains
- High Ankle Sprains
- Chronic Ankle Sprains

Growth Plates

- Common source of pain
- Can remain open until 30 years of age
- Prevalent between ages 10-16
- Foot
- Achilles
- Knee
- Hip
- Present as “Tendonitis” or BONE type pain
- Xrays reveal growth plate BUT that does not always mean pain or pathology

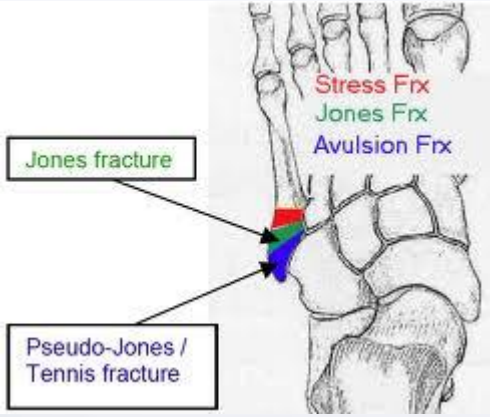
Sever's Disease

Osgood Sclatters



Inselin Disease-Peroneal Brevis

Jones/Dancer's Fracture



Kohler's Disease

Medial Epicondyle

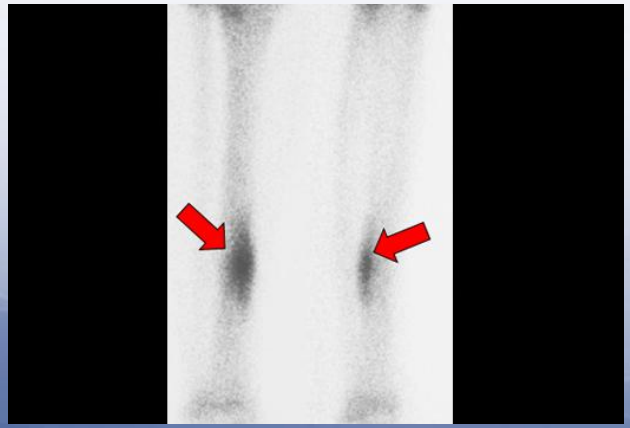
Normal

Widened growth plate plus distal segment fracture

Sesamoiditis

- Sesamoids located within flexor hallucis brevis tendons
- Traction and compression forces
- Look for Toe gripping, clawing
- Poor stability of foot or trunk
- AVOID
- Slow to heal
- Stress Fracture

Medial Tibial Stress Syndrome



- **Continuum**
- Muscular
- Tendon
- Teno-periosteal
- Bone Stress
- Fracture
- Muscle attachment
- ? Bone bending

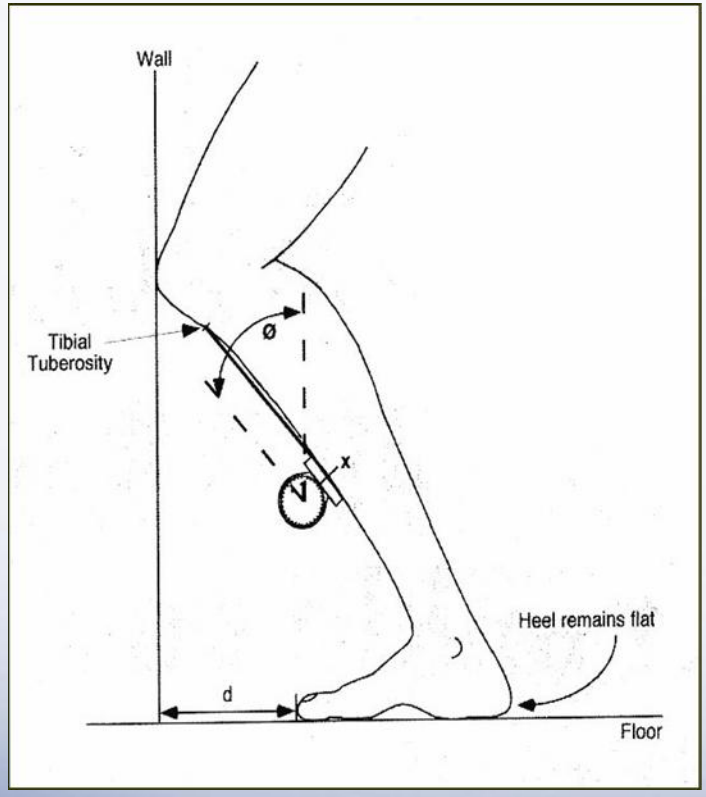
Shin pain

- Can be avoided
- Calf Endurance Important
- Load Management – too many sports, too much training
- Inadequate rest and recovery
- Bone Fatigue
- Shin Splints/Stress Fractures
  - Israeli Army
    - $Millions on shoes
    - $Millions on orthotics
    - Strength/stretching Programs
    - Nothing worked
    - SLEEP 8 hours Day

Calf Strength

- Calf raises
- Good technique up onto “On Toe” – demi pointe
- Good control
- Good endurance – up to 40 reps
- Important to reduce Shin pain
- Helps reduce loading stress

ANKLE ROM



- Reduced dorsiflexion
- Important for shock absorption when you run or land
- Linked to knee, ankle, back and hip injuries
- Minimum 12 cm
- Ice bucket ex

Ankle Sprains

Not all ankle sprains are the same

- Can improve quickly
- Isolated ATFL ruptures often don't appear to be severely injured
- Often results in "laxity"
- High recurrence

Not all ankle sprains are the same

High Ankle Sprain - Syndesmosis

- Usually rotation mechanism
- Higher force
- More difficult to WB
- Stricter immobilisation
- Longer Rehab

Medial Ankle Sprain

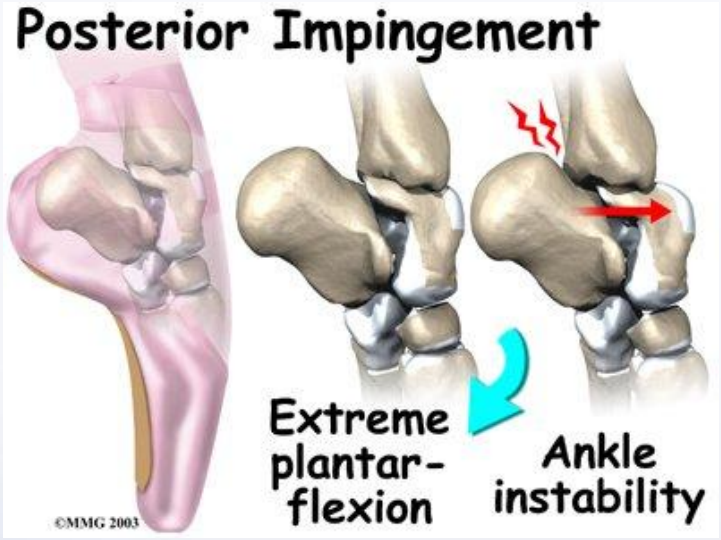
- Eversion mechanism
- Usually higher force
- Usually longer rehab
- Less recurrence

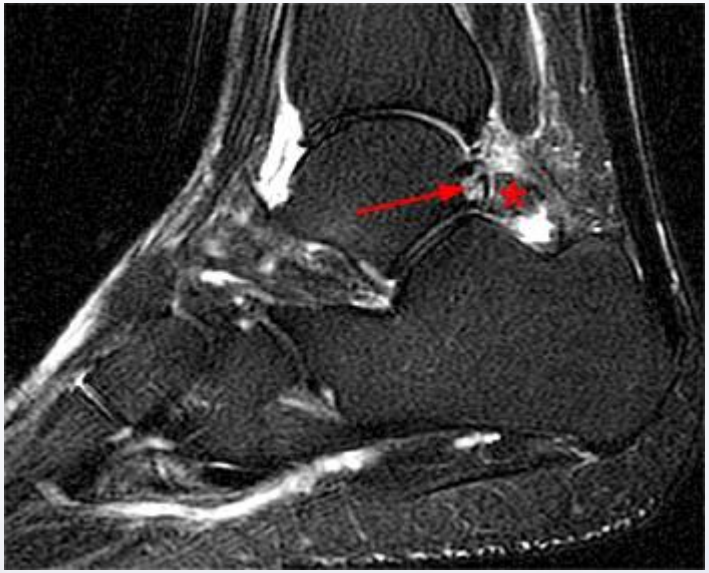
Not all ankle sprains are the same

- PLUS THE ASSOCIATED COLLATERAL DAMAGE
- BONE DAMAGE
    - BONE FRACTURES - AVULSIONS
    - TALAR DOME LESIONS
    - OSTEOCHONDRAL DAMAGE
- IMPINGEMENTS
    - ANTERO-LATERAL
    - MEDIAL
    - POSTERIOR – Cant Jump/Hop/Vault

Not all ankle sprains are the same

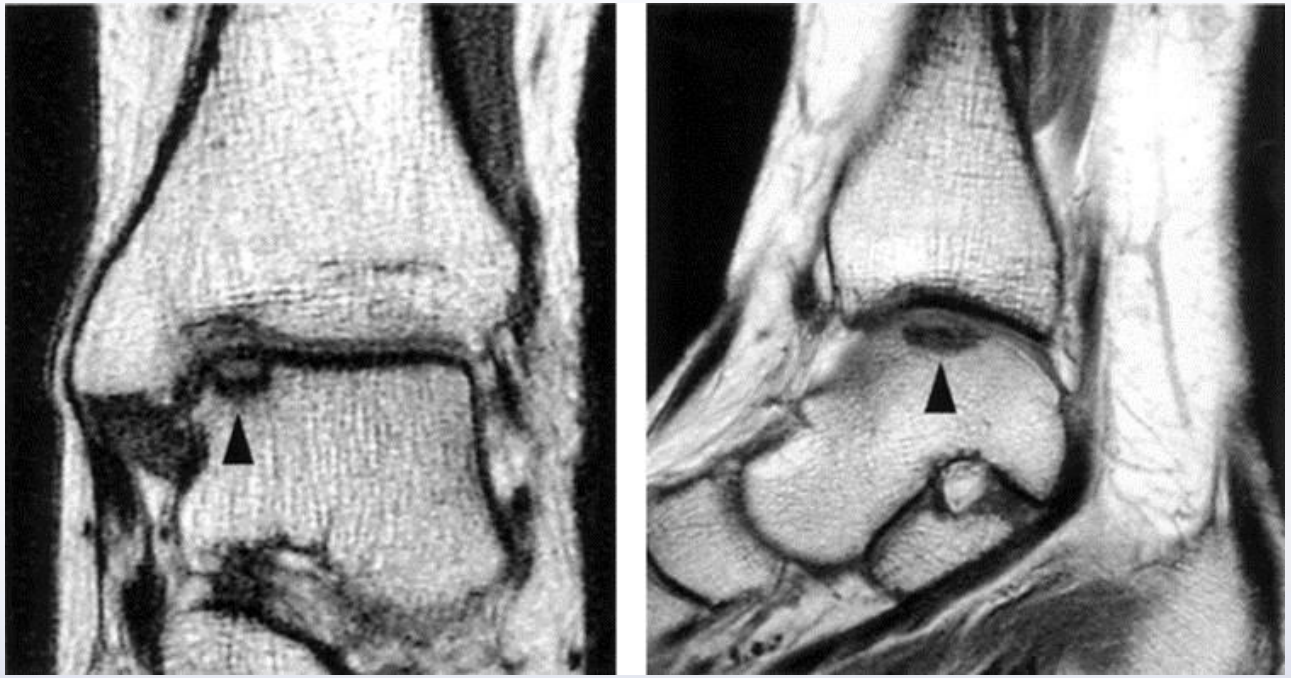
Posterior Impingement





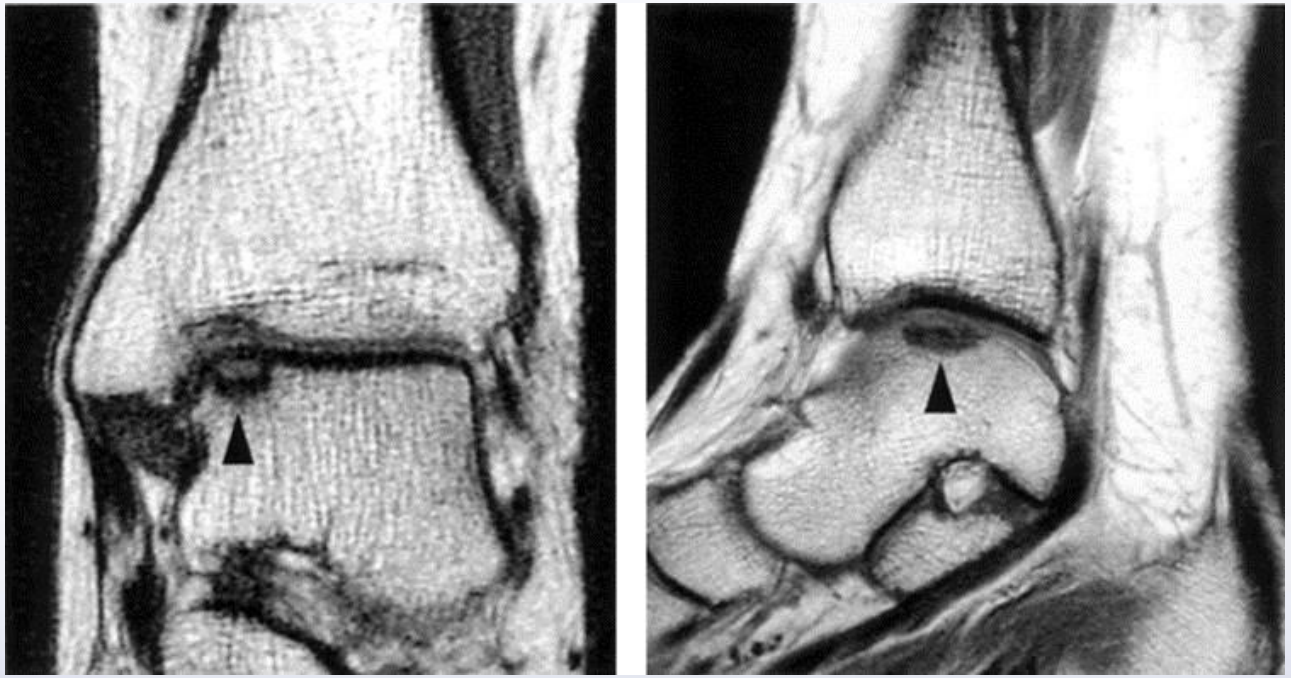
Not all ankle sprains are the same

Osteo-chondral Fracture



Not all ankle sprains are the same

Osteo-chondral Fracture



Not all ankle sprains are the same

Osteo-chondral Fracture plus loose body

Recovery

- Start Immediately once injury identified
- PRICER
  - Protect
  - Rest – relative rest where possible
  - Ice
  - Compression
  - Elevation
  - Referral
- Sleep – important for bone
- Rest
- Don’t overtrain – basketball, other sports etc

Rehabilitation

- Ankle Sprain
- Initial Management crucial
- Ice and compress until swelling goes
- Ice Bucket regime to get mobility back
- Balance

- Opinion – Sprain = Torn Ligaments

- Return to sport when ready full hop, jump, full lunge
- Completed 2 training sessions

Prevention Of Injuries

- Warm Up
- Landing Technique
- Stretching
- Calf Strength and Endurance
- Ankle DF Range
- Overload
- Monitor Hot Spots
- Recovery
- Rehabilitation

Warm up

- Crucial to warm muscle, improve flexibility
- Helps “cue in” balance systems
- Teachers – stress importance
- Discipline esp with junior instructors
- Make functional
- Use Dynamic/Functional Movements
- Incorporate balance

- Static Stretching – Do at Home

Stretching

- Stretching
  - Do away from formal training sessions
  - Can be important if you are a stiff jointed person
  - Not essential if you are naturally flexible
  - Regular stretching on non-training days may actually increase strength of connective tissue