

# Pediatric Sports Injuries

M Catherine Sargent, MD

Central Texas Pediatric Orthopaedics

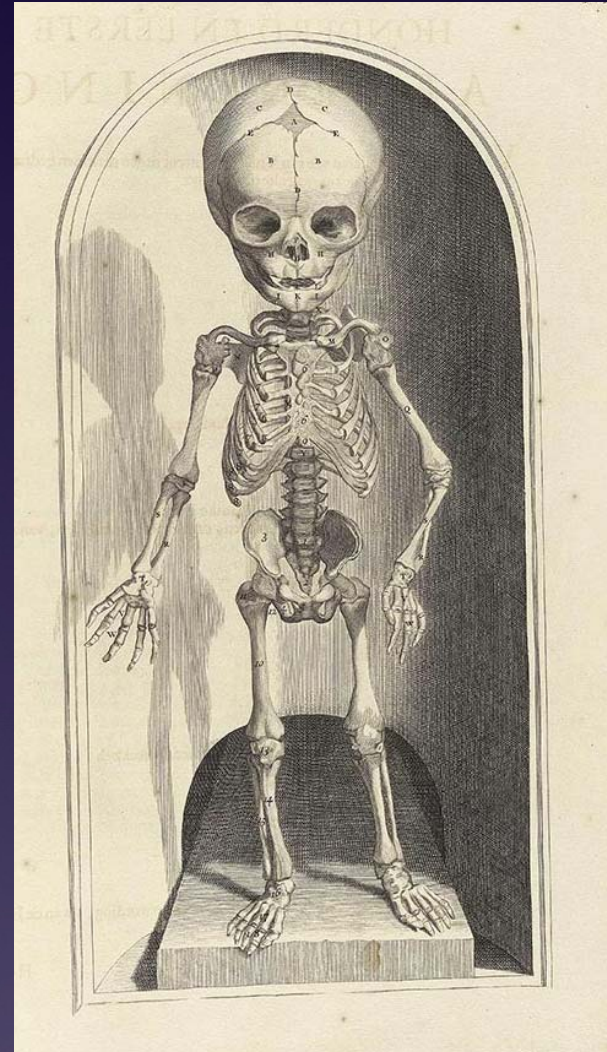
Austin, Texas

# Pediatric Sports Injuries

- \* 4.3 million boys & 3 million girls participate<sup>(2006)</sup>
- \* 36% of all childhood injuries
- \* 41% of injuries presenting to pediatric ERs
- \* 50% of elite competitive young athletes sustain one or more injuries per year
  - \* 13 days out of sport for acute injury
  - \* 20 days out of sport for overuse injuries

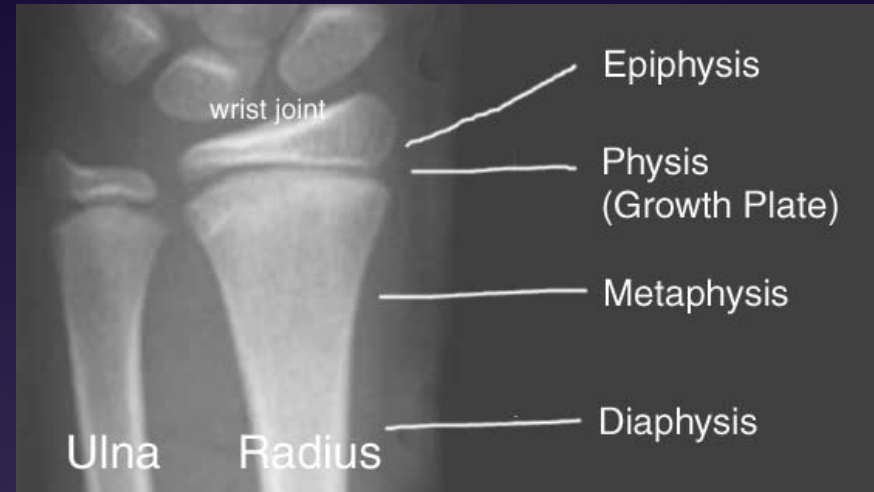
# What's Different about Pediatric Athletes?

- \* Growing skeleton predisposes children to special injuries
- \* Growth spurts decrease flexibility & agility

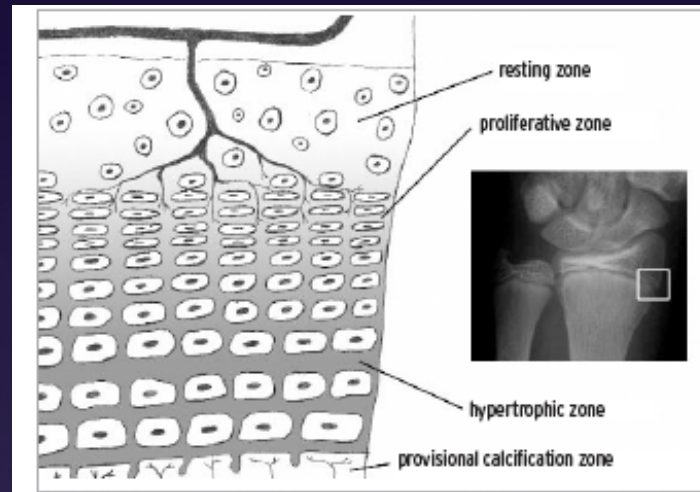


# The Physis

- \* Pressure epiphysis
  - \* Longitudinal growth
- \* Traction epiphysis
  - \* Apophysis of tendons
- \* Acute Injuries
  - \* Fractures, Avulsions
- \* Chronic Injuries
  - \* Physeal Stress Injury
  - \* Osteochondritis Dissecans



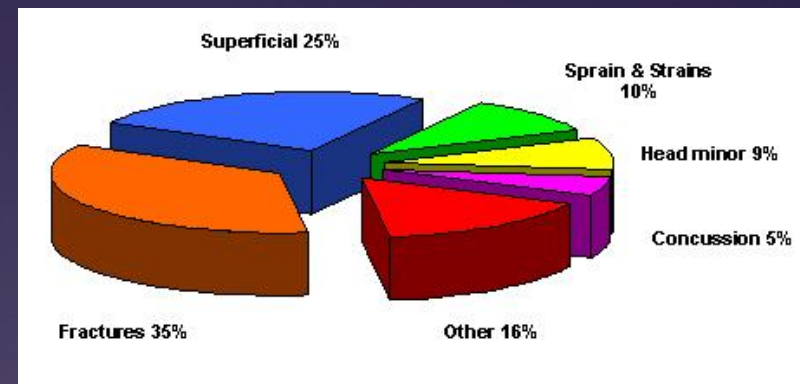
# Physis - The Growth Plate



- \* Enchondral ossification (Cartilage Plate)
- \* 2-5x Weaker than surrounding fibrous tissues
  - \* Weakest at time of peak height velocity
- \* Weak @hypertrophic & provisional  $\text{Ca}^{2+}$ Zones
- \* Susceptible to traumatic & overuse injury

# Acute Injuries

- \* 3.5 million pediatric sports injuries per year
  - \* Heat Illness and Stroke
  - \* Catastrophic Injuries
  - \* Fractures & Dislocations
  - \* Sprains & Strains
  
- \* Football: 10-35 injuries/1000 hrs played



# Fractures & Dislocations

- \* More common than sprains & strains

## Signs

- \* Pain
- \* Swelling
- \* Point tenderness
- \* Deformity



# Growth Plate Fractures

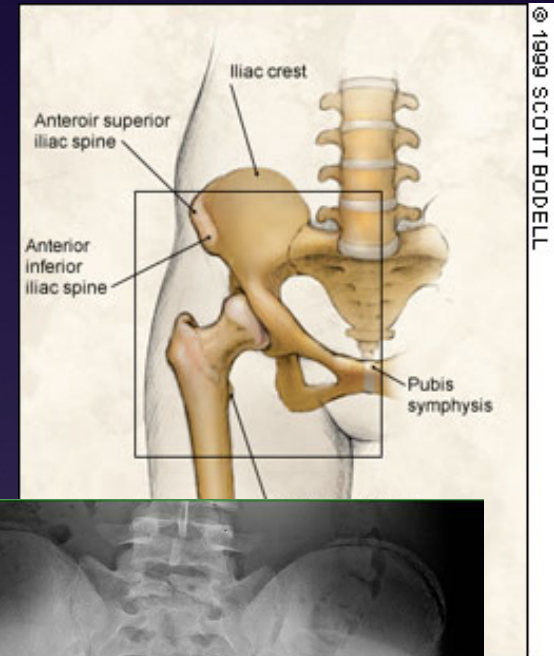
- \* 30% long bone fx
- \* Physeal Damage
- \* Growth Arrest
- \* Progressive Deformity
- \* LLD
- \* 6-8mo f/u



# Apophyseal Fractures

- \* Pelvic apophyseal Fx  
Non-Collision injury in Teenager
- \* External oblique - iliac crest
- \* Hamstrings - Ischium
- \* Rectus femoris - AIIS
- \* Sartorius - ASIS
- \* Psoas - Lesser Tuberosity

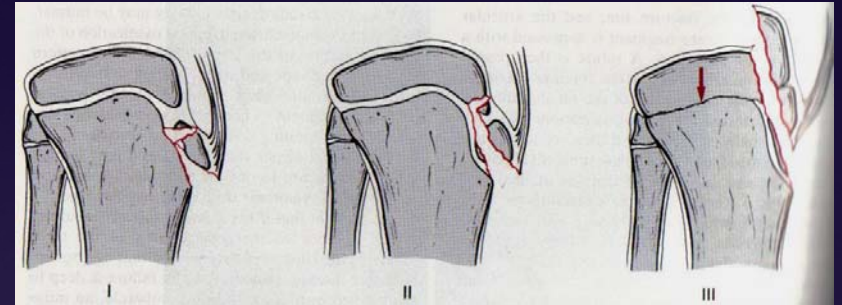
Mild displacement - MICE  
Return to play when pain free  
> 3cm ??? Repair ???



# Tibial Tubercle Fracture

Boys 13-16yo

Quad contraction (rebound)



Watson-Jones Classification

Type I: distal ossification center

Type II: both ossification centers

Type III: propagates into proximal epiphysis

Type IV: avulsion tuberosity *and* entire proximal epiphysis



# Tibial Tubercle Fracture

## Treatment Goal

Restore Extensor Mechanism

Type I w/ minimal displacement: CR, LLC

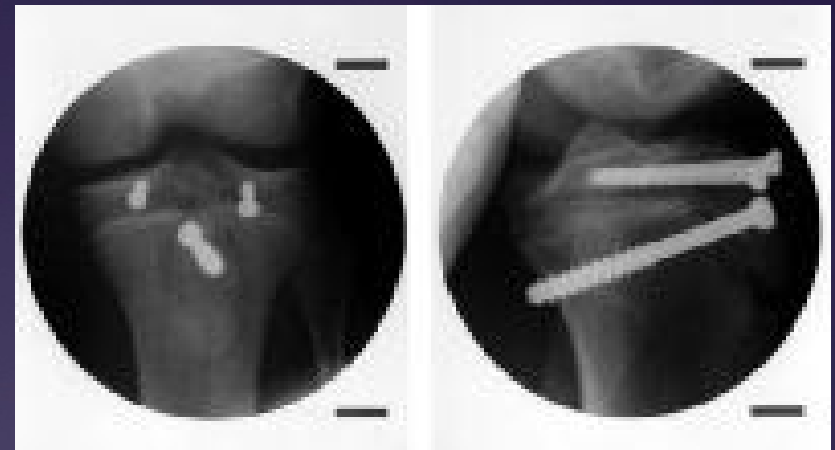
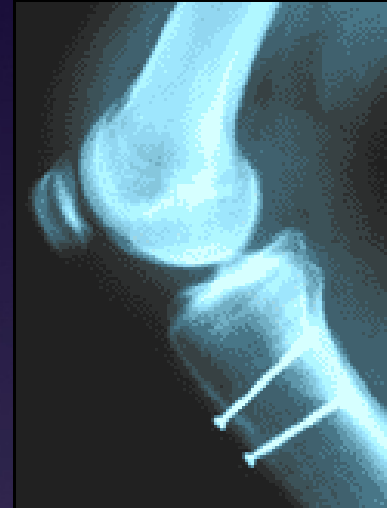
Displaced Type I, all Type II, III, & IV: ORIF

2 Screws +/- tension band

Screws off midline,  
counter-sink

Physis nearing closure

Early motion



# Tibial Spine Fracture

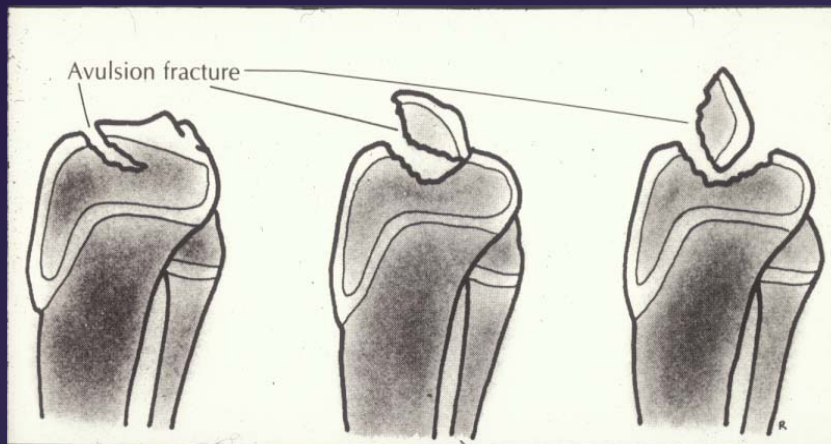


ACL Avulsion at insertion

Classification & mgmt  
based on displacement

Type I & II – CR LLC

Type III & irreducible II- Fix  
Scope vs. open  
Do not cross physis



# Knee Injuries

## \* ACL Rupture

- \* Plant & twist injury, non-contact

- \* "Pop", pain, ++effusion

- \* Complete tear

- \* Unable to walk

- \* Requires reconstruction

- \* Incomplete tear (sprain)

- \* May be able to walk

- \* May respond to rehab only if >50% maintained

- \* Acute mgmt: knee immobilizer, crutches

- \* Definitive mgmt: reconstruction, now? At skeletal maturity?



# Fractures & Dislocations: Evaluation & Treatment

- \* Check neurovascular status frequently
- \* Splint promptly to avoid ongoing injury
- \* Orthogonal x-rays
  - \* Include joint above & below injury site
- \* Refer for further management

# Acute Injuries: Management of Sprains & Strains



## Recommend MICE

- \* Modification of activities
- \* Ice
- \* Compression  
(comfort, not constriction)
- \* Elevation

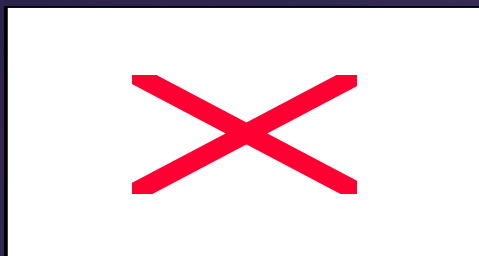
# Overtraining Issues



# Overuse & Overtraining Issues

- Year-round single sport, multiple teams /season
  - Soccer, baseball, and gymnastics
- <0.5% high school athletes play professionally
- Single-Sport Kids
  - More injuries
  - Play for a shorter time
- Multiple similar sports pose higher overuse risk
  - e.g. soccer, field hockey, lacrosse

# Apophysitis



Location	Medical Term	Area of pain
Knee	Osgood Schlatter's Disease Sinding Larssen Johanssen Syndrome	Proximal anterior shin Distal knee cap
Shoulder	Little League Shoulder (Proximal humerus apophysitis)	Proximal shoulder
Elbow	Little League Elbow (Medial elbow apophysitis)	Inside part of the elbow
Ankle/Heel	Sever's disease	Posterior heel pain
Foot	Iselin's disease	Base of the 5 <sup>th</sup> toe / outside part of the foot

# Osteochondritis Dissecans

- \* Elbow - compression
  - \* Pitchers
  - \* Gymnasts
  - \* Wrestlers
- \* Knee - micro-trauma
  - \* Jumping sports
  - \* Cutting sports
- \* Symptoms
  - \* Pain +/- Swelling
  - \* Loss of ROM
  - \* Late - locking/clicking, Loose body



# Osteochondritis Dessicans

- Knee X-rays: 4 (include Tunnel)
  - 70% Medial Femoral Condyle
  - 20% Lateral Femoral Condyle
  - 10% Patella (distal 1/2)
- MRI
  - Subchondral bone viability
  - Articular cartilage integrity
  - Open v. Closed
  - Stable v. Unstable



# Osteochondritis Dessicans

## Good Prognosis

- Open Physes (Juvenile)
- Stable, closed lesions

## Poor Prognosis

- Closed Physes (Adult)
- Unstable, open lesions (loose body)



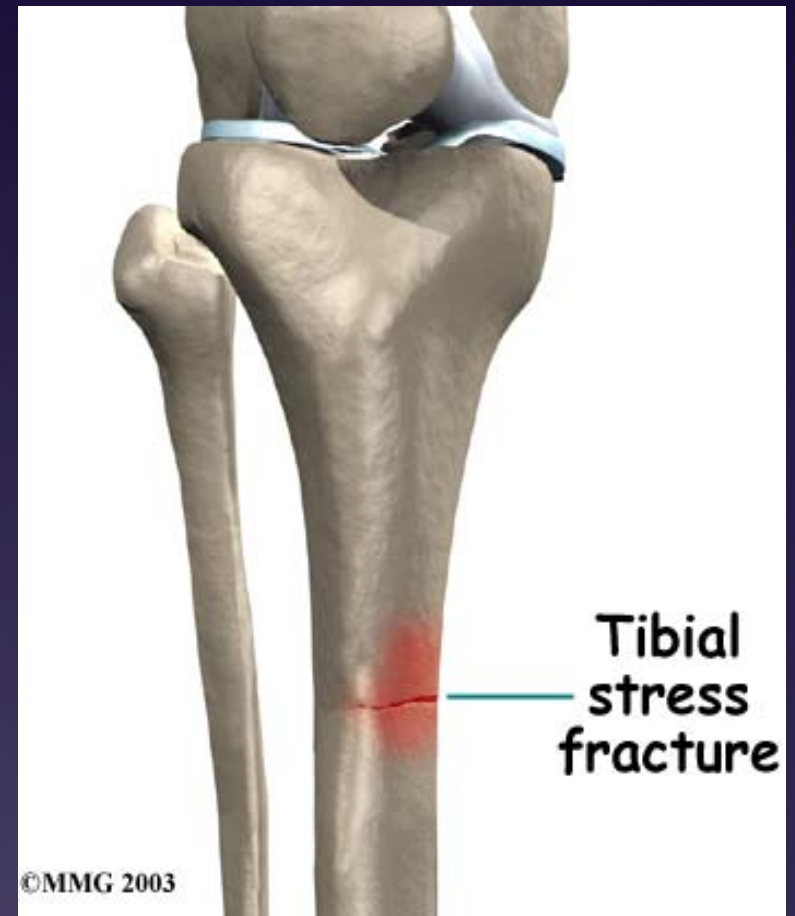
# OCD Treatment

- \* Stable lesions
  - \* Rest: 3-6months minimum !
- \* Unstable lesions
  - \* ATS Drilling
  - \* +/- Fixation
  - \* +/- Bone grafting,
  - \* Excision, OC grafting/  
microfracture



# Stress Fractures

- \* Runners, esp. females; military recruits
- \* Tibia, Femoral Neck, 2nd Metatarsal
- \* X-ray: negative early, later "black line"
- \* MRI study of choice
- \* Tx: stop activity! 6-8 weeks rest
  - \* May require fixation
  - \* Depending on stage of Fx



# Female Athletic Triad



- \* Over training &/or under eating
- \* Amenorrhea (missed or irregular)
- \* Disordered eating
- \* Stress fractures due to osteoporosis

# Overuse & Overtraining Issues

- 1 team per season is recommended.
- A minimum of 1 day off per week, 2-3 mo off/ yr
- Maximum 10% increase/wk in time, reps, or distance.
- Children should NOT play through pain.
- Return to play should be delayed until full recovery.

# Conclusions

- \* Sports participation & training entails risk
- \* Pre-participation physicals yearly
- \* Education of patients, family & coaches
  - \* Injury prevention
  - \* Signs of overtraining/ over use
  - \* Treatment
- \* Inactivity also entails risks, probably greater
  - \* Obesity
  - \* De-conditioning

Thank You

