Overuse Injuries in Pediatric Patients

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2023 SCIENTIFIC ASSEMBLY

NO disclosures!!!

- I have no financial disclosures relative to this talk… or orthopedics in general…

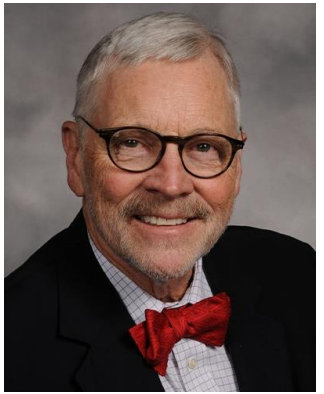
- I did however sell over 200 of these sweet t-shirts in a effort to change the name of Oklahoma Children's Hospital to OUCH!


Childrens

Children's Orthopedic Team






Oklahoma Children's Hospital at OU Health

Overuse Injuries in Pediatric Patients

AAOS
American Academy of Orthopaedic Surgeons

POSNA
Pediatric Orthopaedic Society of North America

OrthoInfo

Pediatric Sports Injury

Overuse/ chronic injury: 50+%

Acute: <50%

LE> UE (sport-dependent)

Risk Factors for Overuse Injury

Table 2. Potential Risk Factors Predisposing Pediatric Athletes to Overuse Injuries[a]

Growth-Related Factors	Intrinsic Factors	Extrinsic Factors
Cartilage at growth plate is more susceptible to injury	Previous injury	Training and recovery
Period of adolescent growth increases the risk of injury (eg, osteochondritis dissecans, apophysitis, physeal injuries)	Malalignment	Equipment
	Menstrual cycle	Poor technique
	Psychological issues	Psychological issues
	Muscle imbalances	Training errors
	Inflexibility	Environment
	Muscle weakness	Sport-acquired deficiencies
	Instability	Conditioning
	Level of play	
	Age	
	Height	
	Sex	
	Tanner stage	
	Laxity	
	Experience	

[a] From DiFiori[9] and O'Connor et al.[61]

McLeod, et al., *J of Athl Tr, 2011; 46(2): 206-220.*

Injury Prevention

TABLE 2. Categorization of Risk Factors for Overuse Injury

- Intrinsic Risk Factors
  - Growth-Related Factors
    - Susceptibility of growth cartilage to repetitive stress
    - Adolescent growth spurt
  - Previous injury
  - Previous level of conditioning
  - Anatomic factors
  - Menstrual dysfunction
  - Psychological and developmental factors—athlete specific
- Extrinsic Risk Factors
  - Training workload (rate, intensity, and progression)
  - Training and competition schedules
  - Equipment/footwear
  - Environment
  - Sport technique
  - Psychological factors—adult and peer influences

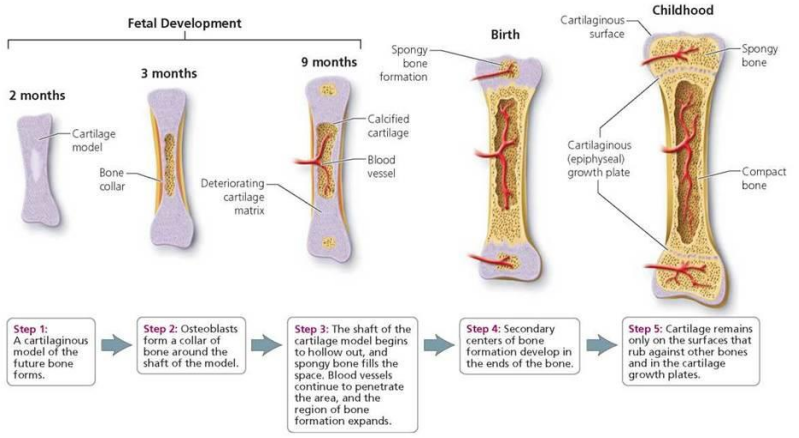
(Adapted from DiFiori JP. Evaluation of overuse injuries in children and adolescents. Curr Sports Rep. 2010;9:372–378.).

DiFiori, et al. *Clin J Sports Med*, 2014; 24:3-20.

Siesta!

Children’s Orthopedics

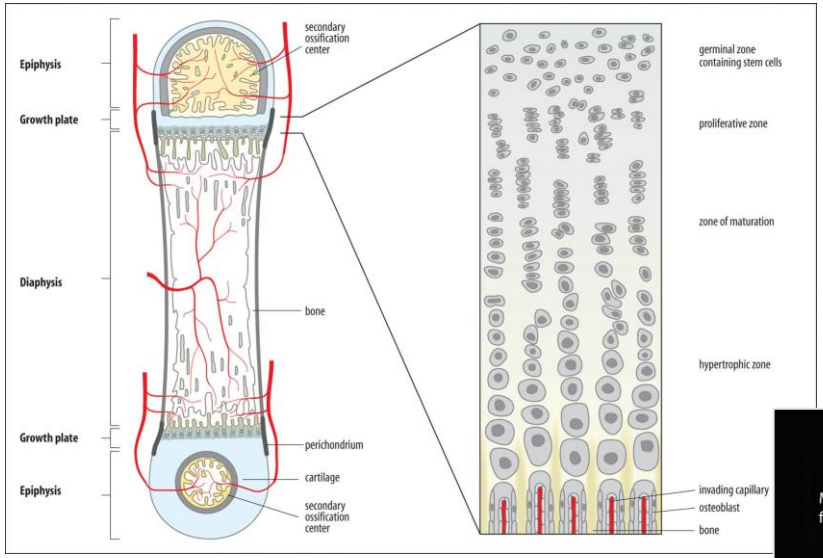
- Growth plate / Physis
- Fractures / Remodelling
- Common Conditions

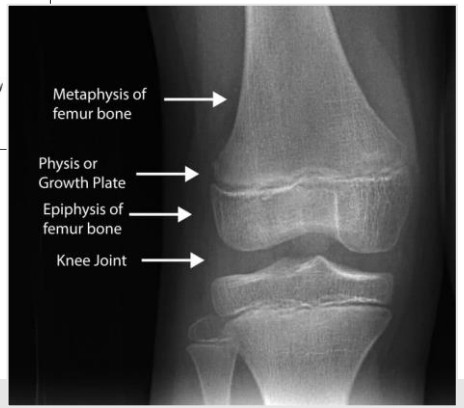


Physis – Growth plate (Placa de crecimiento)

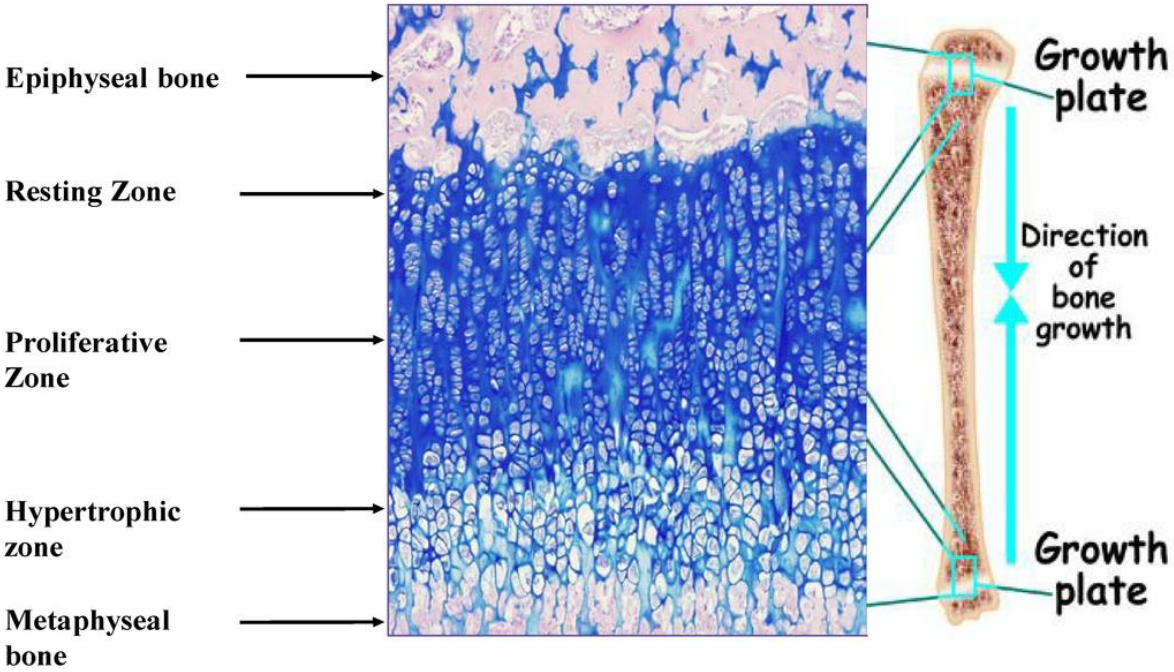
- Parts of the bone
  - Epiphysis
  - Physis
  - Metaphysis
  - Diaphysis

- Physeal zones
  - Germinal / resting zone
  - Proliferative
  - Maturation
  - Hypertrophic
  - Provisionsal Calcification
    - Death



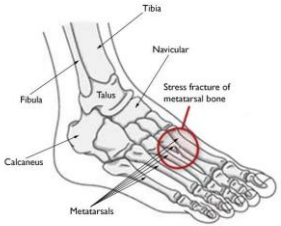


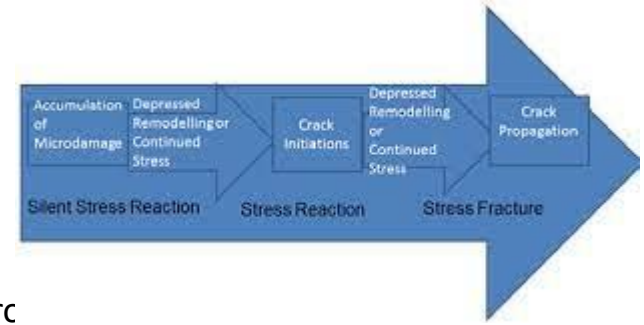
Physeal Histology (Zones)



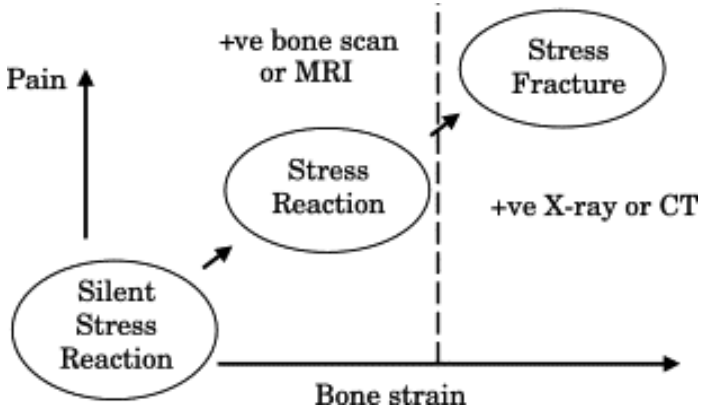
Stress Fractures

- Overload of stress to bones
  - Fatigue failure
  - Repetitive stress / force
- Bone stress >> bone healing
- Lower leg
  - Metatarsal shaft
  - Tibia
  - Femoral neck
    - Female triad: eating disorders, amenorrhea, osteoporc





Stress Fractures



Stress Fractures Treatment

- Limit activity
- Limit weight bearing
  - +/- immobilization
- Vitamin D / Calcium

Sever's "Disease"

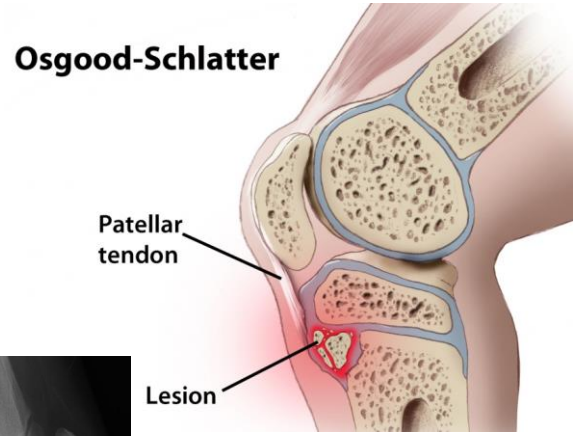
- Achilles tendonitis of the child
- Apophysitis
- Tight heel cords
- Flat / twisty shoes

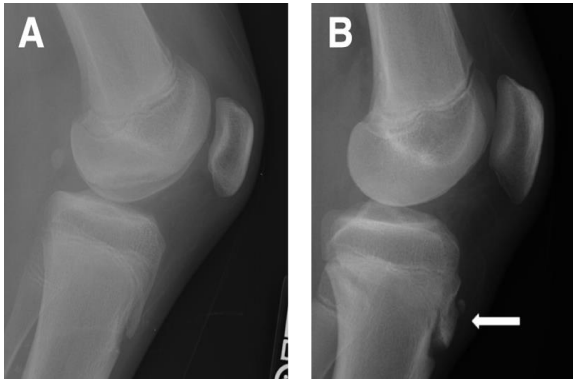
Sever's "Disease" Treatment

- R-I-C-E
- Stretching
- Gel heel cups
- Activity modification
- Night splint
- CAM Walker boot
- Cast

Osgood-Schlatter “Disease”

- Apophysitis
- Tibial tubercle
- Boys > girls: 10-15





Osgood-Schlatter Treatment

- R-I-C-E
- NSAIDs
- Topical anti-inflammatory
- Stretching
- Restrictive brace

- Surgical: ossicle excision

Jumper's Knee – (Sinding-Larsen-Johansson)

- Apophysitis
- Infrapatellar

- Tightness of surrounding muscles
- Patellar sleeve fx (acute)

Jumper's Knee – (Sinding-Larsen-Johansson)

A safe progression back to sports or high-level activities may happen when each of the following happens in this specific order:

- The lower kneecap is no longer tender and there is no swelling.
- The injured knee can be fully straightened and bent without pain.
- The knee and leg have regained normal strength compared to the uninjured knee and leg
- Ability to jog straight ahead without limping.
- Ability to sprint straight ahead without limping.
- Ability to do 45-degree cuts.
- Ability to do 90-degree cuts.
- Ability to do 20-yard figure-of-eight runs.
- Ability to do 10-yard figure-of-eight runs.
- Ability to jump on both legs without pain and hop on the injured leg without pain

- Crossley, K., et al., 'Physical Therapy for Patellofemoral Pain. A Randomised, Double-Blinded, Placebo-Controlled Trial', The American Journal of Sports Medicine, 2002, vol. 30, no. 6, p. 856-865. (Level of Evidence 1B)

Physeal Stress Reaction

- Pain / Widening

- Common Sports
  - Gymnastics
    - Wrist
    - Elbow
  - Overhand throwing
    - Shoulder
    - Elbow

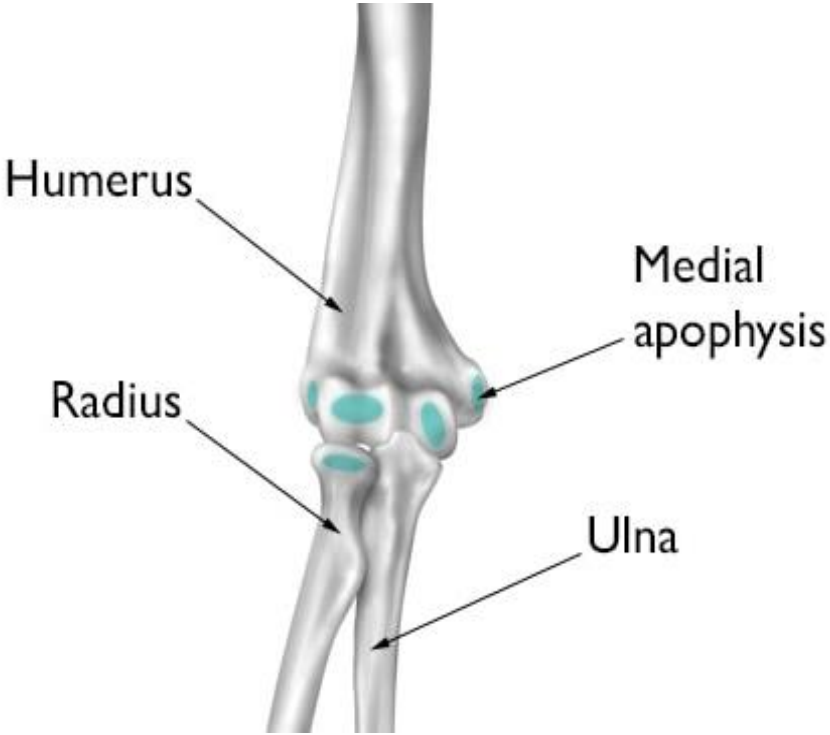
- Rest x 3months

Gymnast’s Wrist (Distal Radial Epiphysitis)

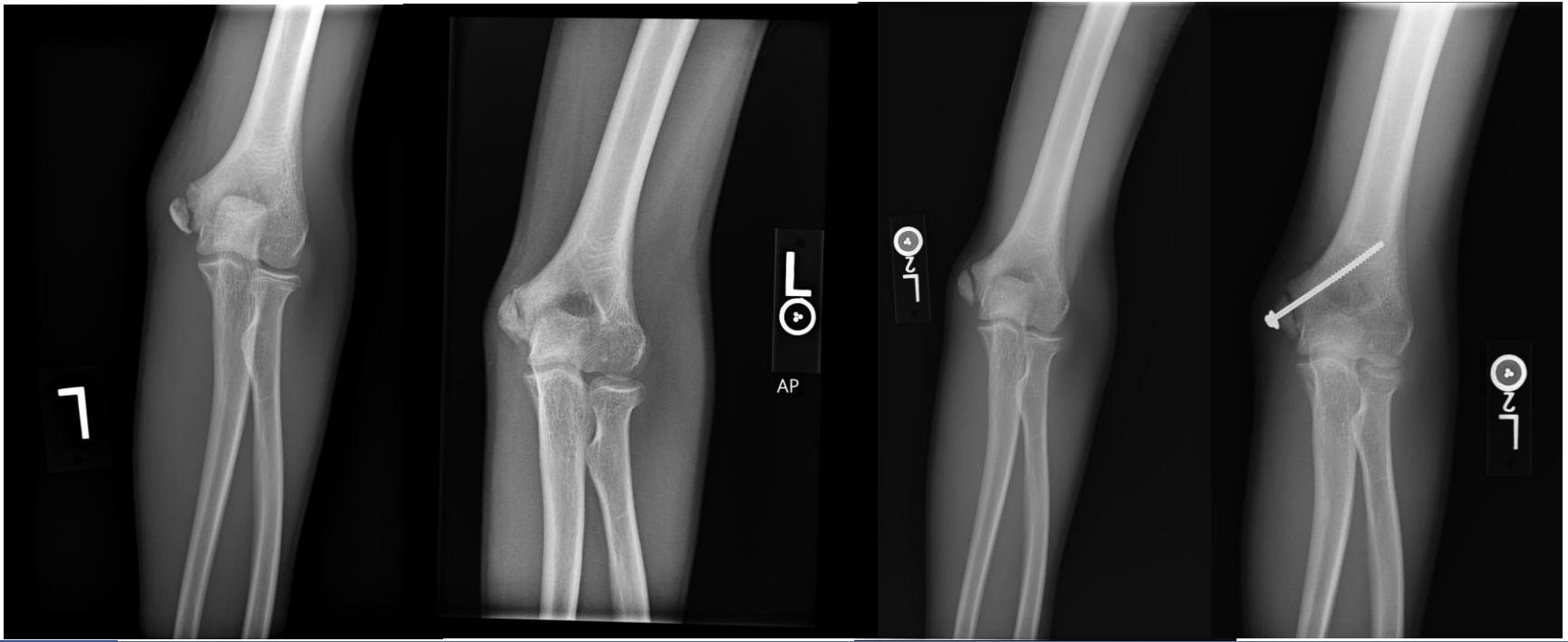
Throwing Injuries

- Medial epicondylitis (Apophysitis)

- Osteochondritis Dissecans
  - Capitellum
  - Repetitive compression
  - Cartilage / bone lesion
    - Stable / Unstable



Medial Epicondylitis

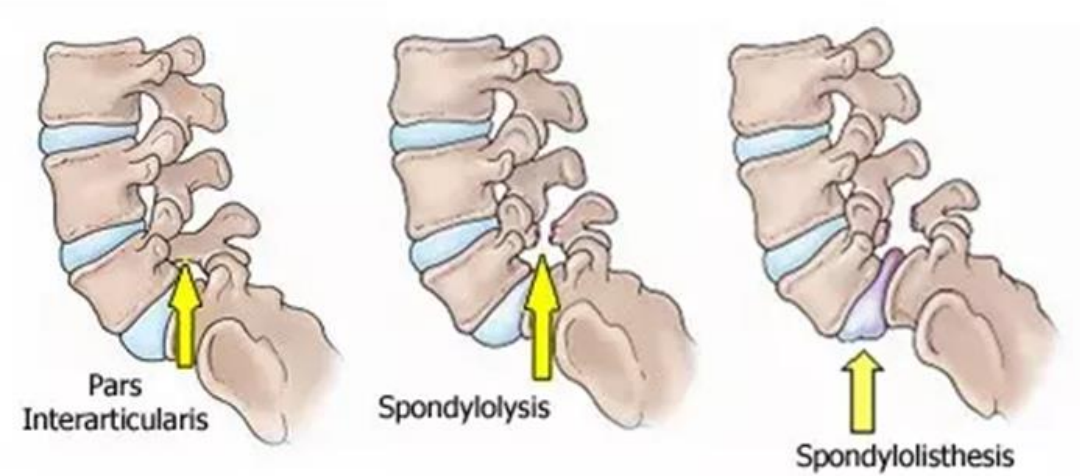


Capitellar Osteochondritis Dissecans (OCD)

Pars Defect / Spondylolysis

Spectrum of Pathology

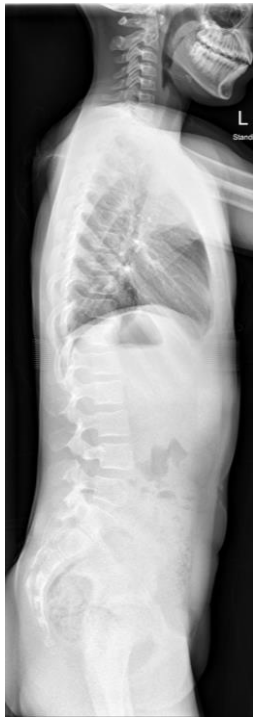
- Pars Stress Reaction
- Spondylolysis
- Spondylolisthesis



Pars Defect / Spondylolysis

Nov 2018

January 2019



March 2021

How did we get here?

- Parental demand for “professional” coaches
- Early sport specialization
- Year ‘round play
- Loss of PE in schools
- Loss of free play?
- Get that college scholarship

Injury Prevention

- Limit participation time, repetitive mvts (pitch count) : B
- Careful monitoring of workload during adolescent growth spurt: B
- Preseason conditioning may decrease injury rates in youth athletes: B
- Prepractice neuromuscular training can reduce lower extremity injuries: B

DiFiori, et al. *Clin J Sports Med*, 2014; 24:3-20.

Overuse Injury Prevention Recommendations

- Overuse injuries are under-reported in the literature: B
- Pre-participation screening may identify prior injury and sport readiness: C
- Prior injury is a risk factor for overuse injury: A
- Adolescent female athletes should be screened for menstrual dysfunction as potential risk factor for overuse injury: B
- Early specialization may not lead to long- term success and may lead to increased risk for overuse and burnout: C
- Essential to address underlying cause in case of overuse injury: C
- Overuse injuries are not all benign: A

DiFiori, et al. *Clin J Sports Med*, 2014; 24:3-20.

Burnout Prevention

- Emphasis on skill development over competition and winning: C

DiFiori, et al. *Clin J Sports Med*, 2014; 24:3-20.

Prevention

- Cross-training / Cross-playing
- Rest between seasons
  - Time between seasons
- Avoid multiple teams during a single season
- Proper form
- “Listen to your body”

- https://ncys.org/safety/stop-sports-injuries


Oklahoma
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Questions ??


Thank you !!!