

PEDIATRIC SPORTS INJURIES: KIDS ARE NOT LITTLE ADULTS

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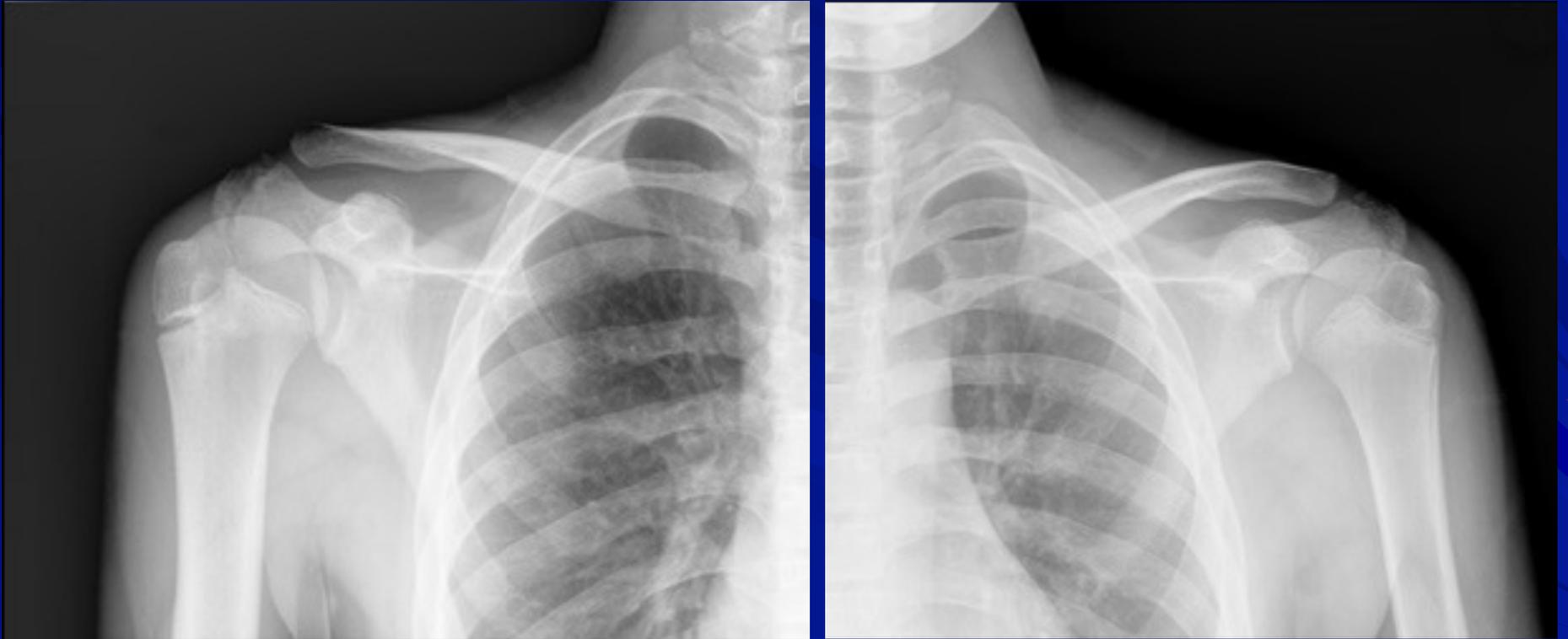
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CASE ONE

An eleven-year old little league baseball pitcher presents to your office complaining of right shoulder pain. In addition to pitching once weekly in games, he throws to his father every evening in the back yard. Physical examination reveals full range of motion, normal strength and a normal neurovascular exam. An AP radiograph is taken with a comparison view.

CASE ONE



CASE ONE

Your diagnosis is:

- A. Humeral physis fracture
- B. Compression fracture of the distal clavicle
- C. AC joint separation
- D. Compression fracture of the humeral head
- E. Acromial physis fracture

CASE ONE

CORRECT ANSWER

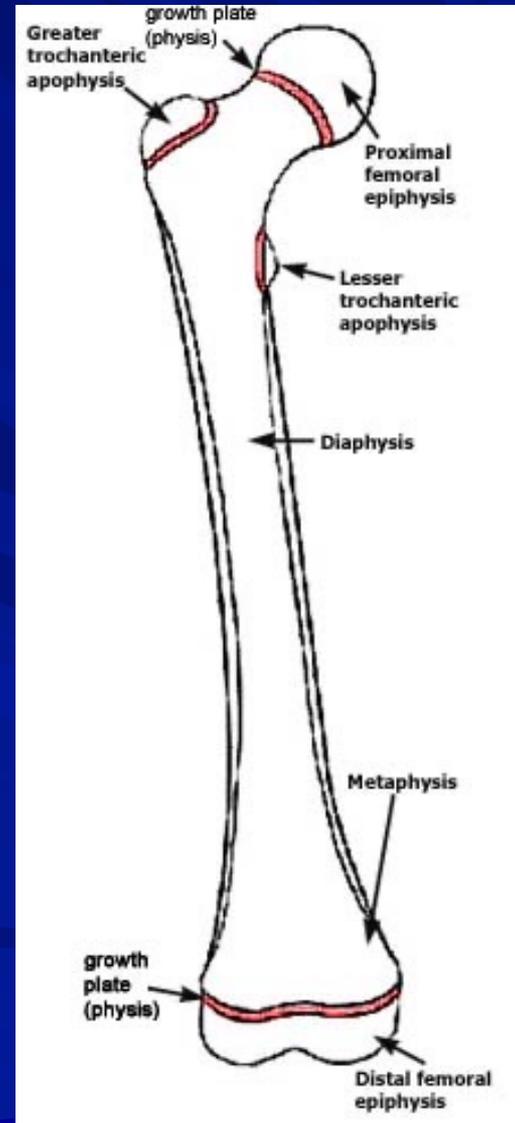
A. Humeral physis fracture

Children Are Not Young Adults!

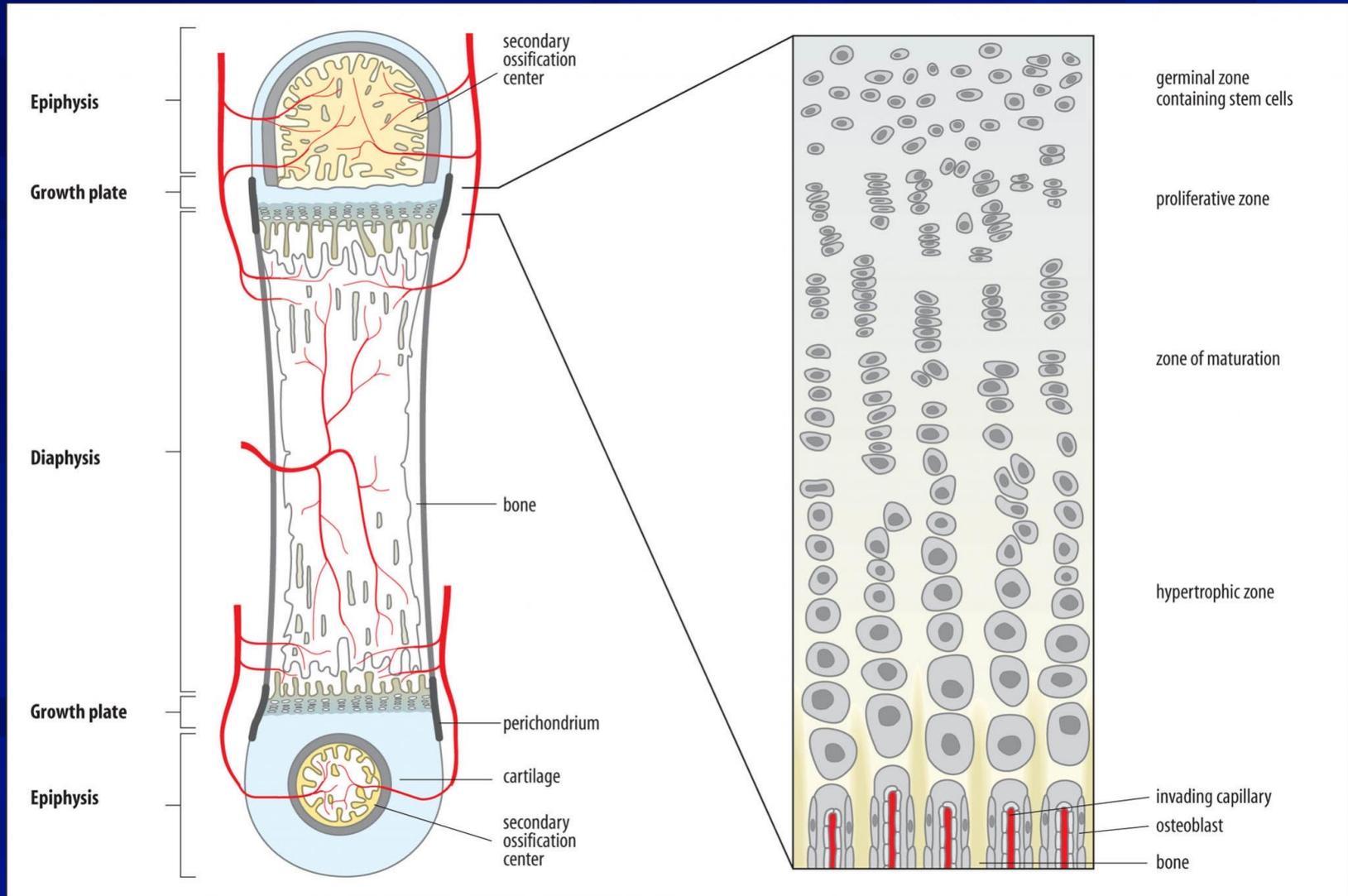
- They have growth plates.
- Their periosteum is thick and actively osteogenic.
- Their bone is more porous.
- Healing occurs rapidly.
- Post injury stiffness is unusual.

Growth Plates

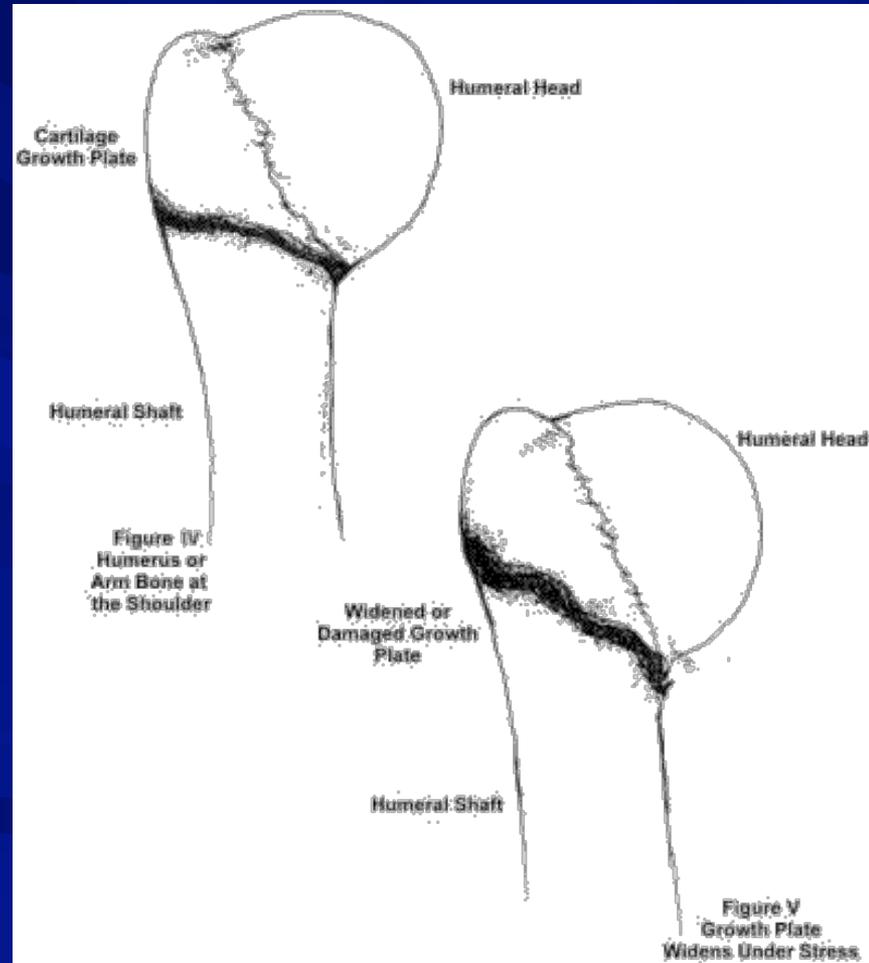
- Physes allow for longitudinal long bone growth
- Apophyses allow for appositional accommodation of muscle-tendon growth



PHYSEAL ANATOMY



Humeral Physis Fracture



Humeral Physis Fracture



CASE ONE

This injury is representative of a:

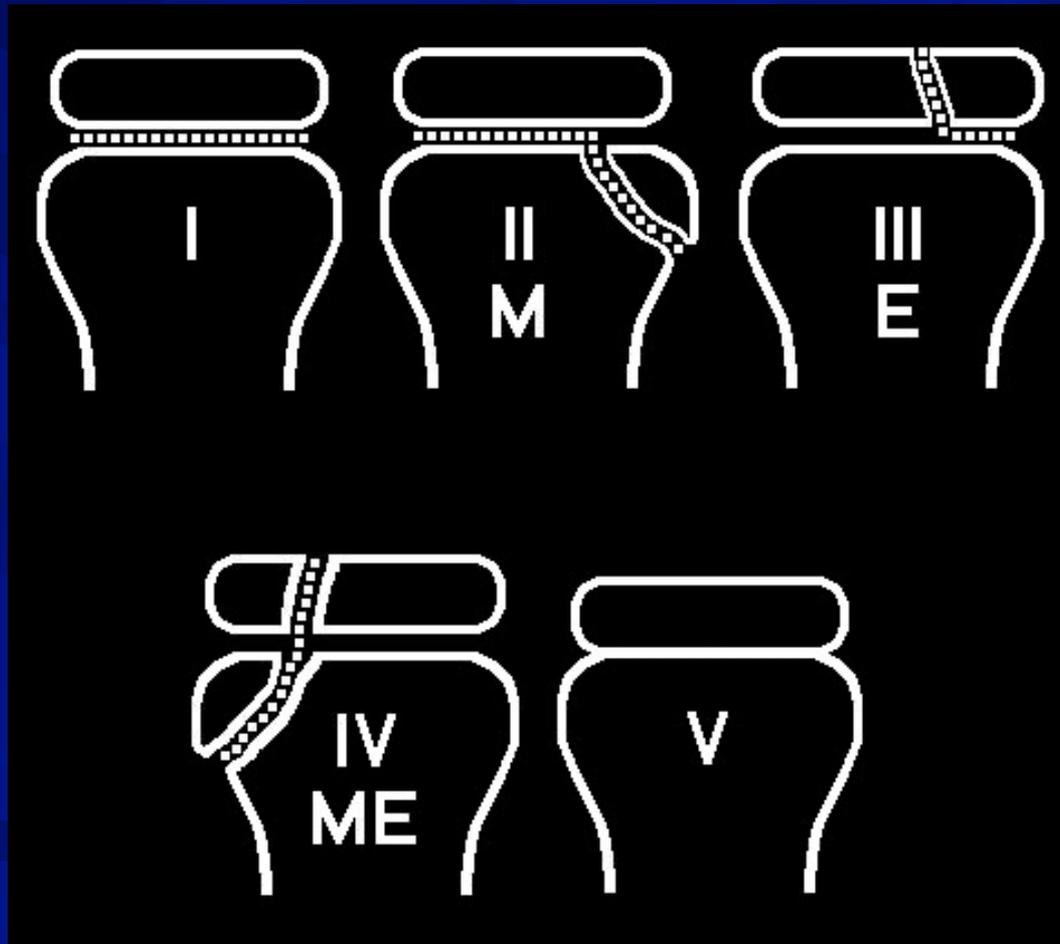
- A. Salter-Harris Type I injury
- B. Salter-Harris Type II injury
- C. Salter-Harris Type III injury
- D. Salter-Harris Type IV injury
- E. Salter-Harris Type V injury

CASE ONE

CORRECT ANSWER

A. Salter-Harris Type I injury

Salter-Harris Classification



CASE ONE

Appropriate initial management of this injury should include:

- A. Surgical fixation of the fracture
- B. Immobilization for one month
- C. Activity modification
- D. Use of NSAIDs
- E. Initiation of physical therapy

CASE ONE

CORRECT ANSWER

C. Activity modification

CASE TWO

A sixteen year old football player feels and hears an audible pop in his right hip when attempting to accelerate after receiving a hand-off. He falls and is able to limp off the field in obvious pain. He ices the hip immediately, but presents to your office the following morning because of persistent pain. Examination reveals limited ROM and pain on resisted flexion. You obtain a radiograph of the hip.

CASE TWO



CASE TWO

The radiograph demonstrates an apophyseal avulsion fracture of the:

- A. Anterior Superior Iliac Spine
- B. Anterior Inferior Iliac Spine
- C. Ischial Tuberosity
- D. Iliac Crest
- E. Superior Pubic Ramus

CASE TWO

CORRECT ANSWER

A. Anterior Superior Iliac Spine

Apophyseal Fractures

- Growth in children does not occur at a continuous rate, but rather is greater at two peaks, which occur at approximately 6-7 years of age and at puberty.
- Growth is sequential with long bone growth occurring first, followed by growth of the trunk, and lastly an increase in muscle mass.

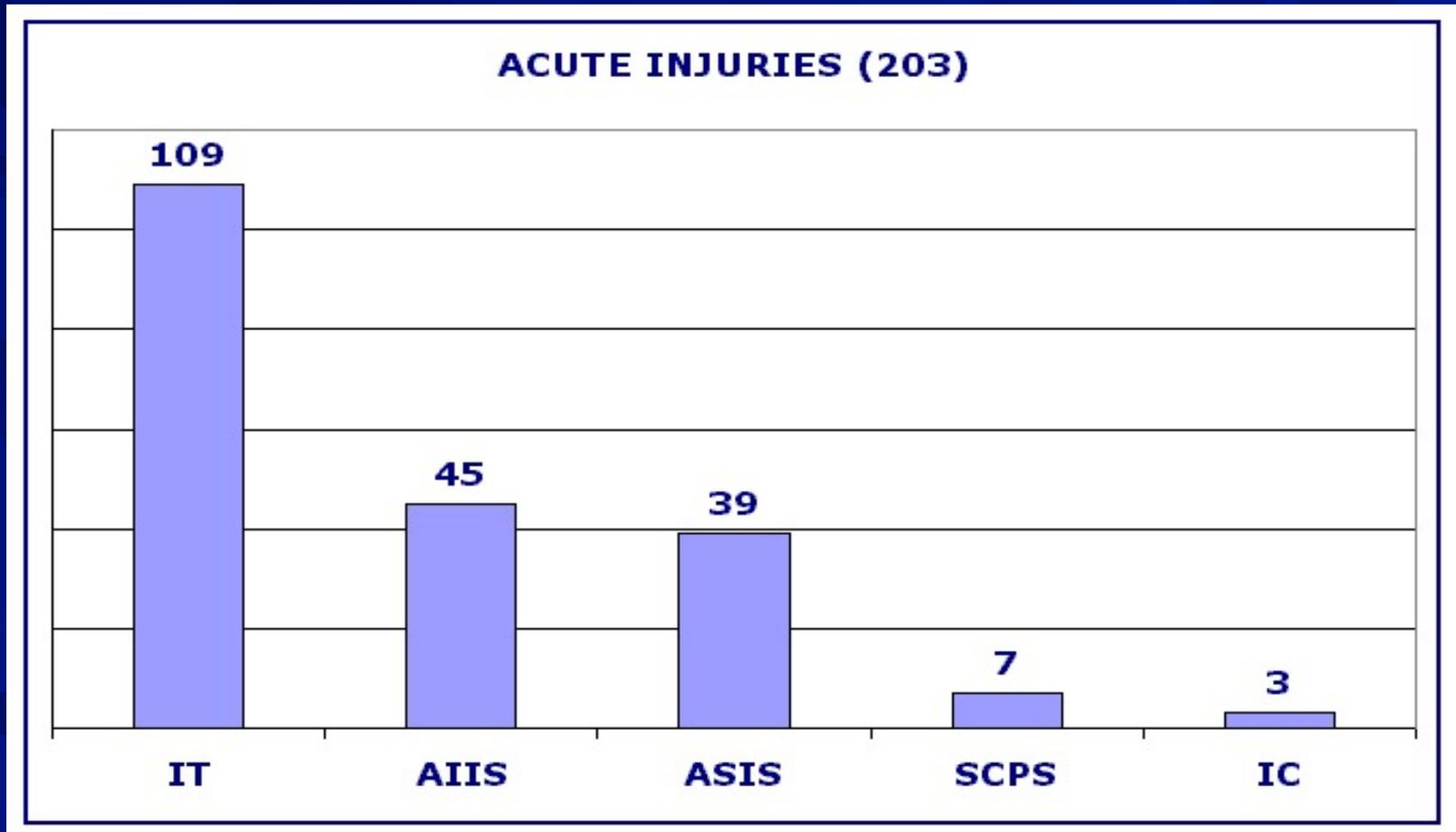
Apophyseal Avulsion Fractures of the Pelvis

- Account for 13% to 40% of pediatric fractures
- More common in males
- More common during adolescence
- Results from sudden, violent concentric or eccentric muscular contraction without direct trauma
- Can result from sudden excessive passive lengthening of the muscle

Ischial Tuberosity Fracture



Apophyseal Avulsion Fractures of the Pelvis



CASE TWO

Which muscle attaches to the ASIS:

- A. Straight head of the rectus femoris
- B. Hamstring
- C. Transverse abdominis
- D. Rectus abdominis
- E. Sartorius

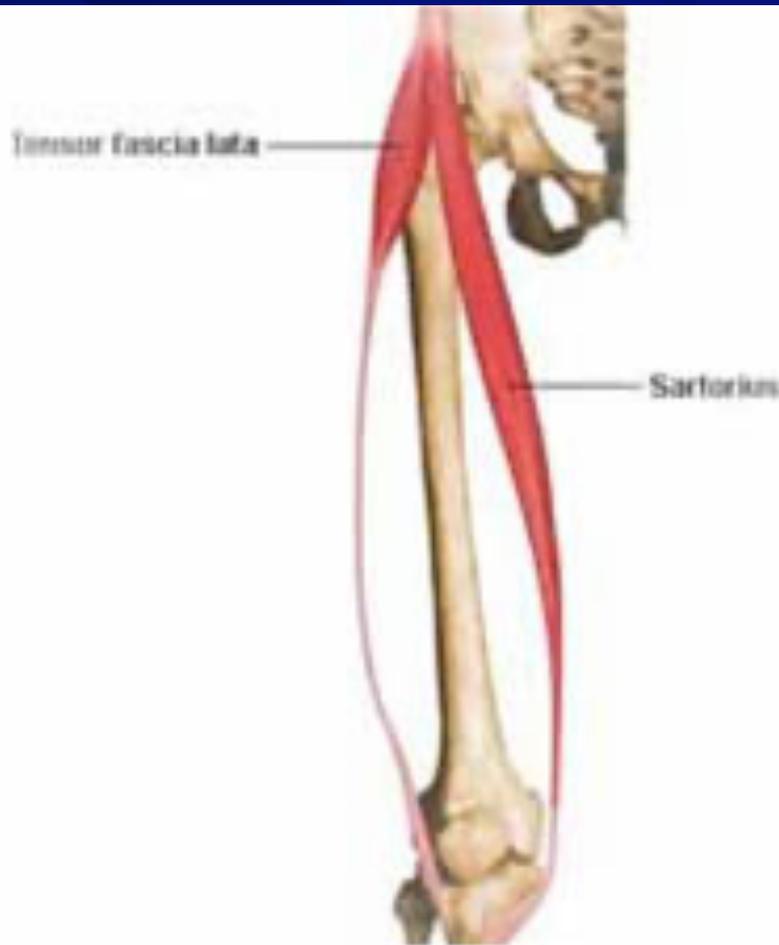
CASE TWO

CORRECT ANSWER

E. Sartorius

ANTERIOR SUPERIOR ILIAC SPINE

Anatomy



SARTORIUS

ORIGIN:

anterior superior spine of ilium

INSERTION:

medial aspect of tibial tuberosity

ACTION:

flexes hip and knee, rotates femur medially, rotates tibia laterally

Apophyseal Avulsion Fractures of the Pelvis

- Anterior Superior Iliac Spine – Sartorius
- Anterior Inferior Iliac Spine – Straight Head of the Rectus Femoris
- Ischial Tuberosity – Hamstring
- Iliac Crest – Transverse Abdominis
- Superior Pubic Ramus – Rectus Abdominis

CASE TWO

Definitive management of this injury should consist of:

- A. Open reduction and internal fixation
- B. Non-weight bearing for one month
- C. Crutches and touch-down weight bearing as tolerated
- D. Immediate initiation of physical therapy

CASE TWO

CORRECT ANSWER

C. Crutches and touch-down weight bearing
as tolerated

ASIS APOPHYSEAL AVULSION

Treatment

- Ice
- Analgesics
- Rest
- Initial non-weight bearing with progressive weight bearing as tolerated
- Open reduction and internal fixation for markedly displaced avulsions (>2 cm)

ASIS APOPHYSEAL AVULSION

Rehabilitation

- Active and passive motion of sartorius as tolerated until full hip range of motion
- Isolated progressive resistance exercises for the sartorius as tolerated
- Progression to integrated hip and pelvic stabilization and sport specific exercises
- Return to play – 4-6 weeks

CASE THREE

A 12 year old gymnast presents to your office with the complaint of wrist pain. Range of motion is full, but pain can be elicited on palpation of the distal radius and is exacerbated with dorsiflexion of the wrist and pushing off of the chair from a sitting position to stand. Radiographs are obtained.

CASE THREE



CASE THREE

The findings in the radiograph can potentially lead to which of the following problems?

- A. Negative Ulnar Variance
- B. Positive Ulnar Variance
- C. Schapholunate Disassociation
- D. Osteonecrosis of the Scaphoid

CASE THREE

CORRECT ANSWER

B. Positive Ulnar Variance

Positive Ulnar Variance



Repetitive Impact



CASE THREE



CASE THREE

Positive ulnar variance can lead to which of the following conditions?

- A. Kienboch's Disease
- B. Osteonecrosis of the Scaphoid
- C. Scapholunate Disassociation
- D. Ulnar Impaction Syndrome

CASE THREE

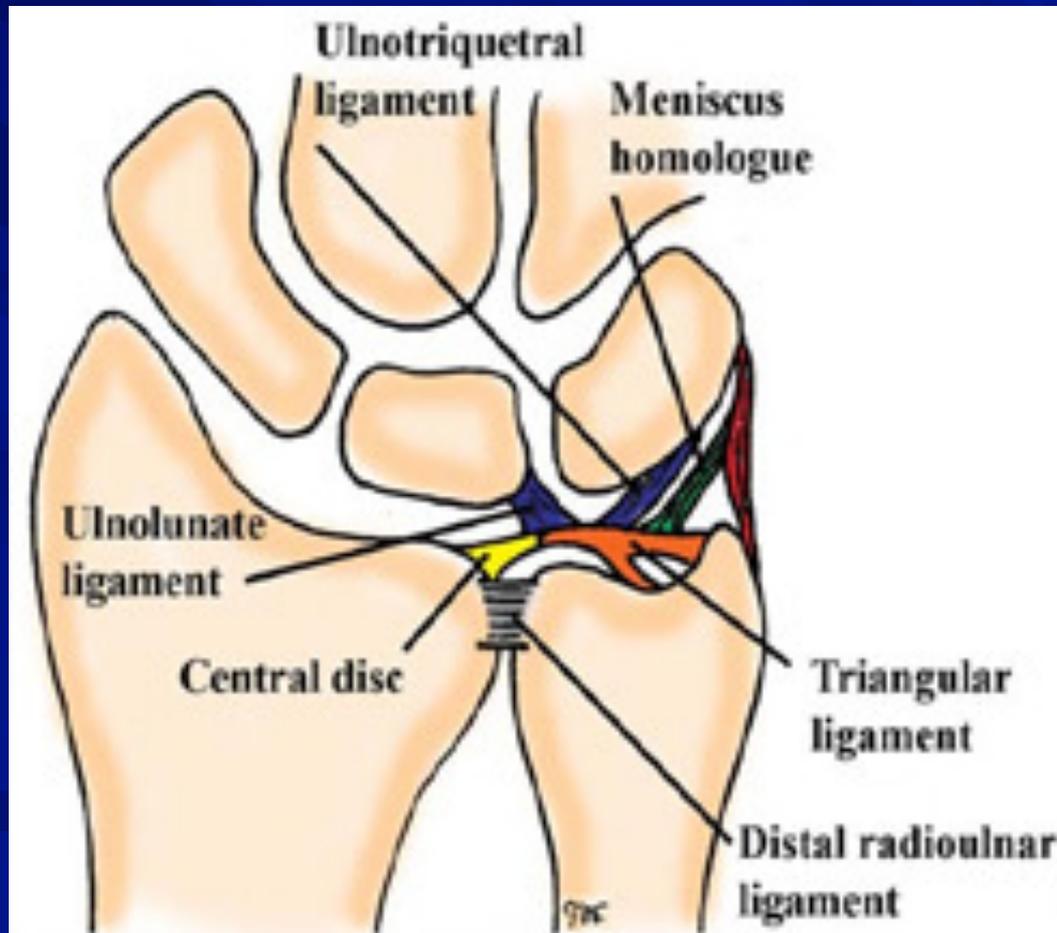
CORRECT ANSWER

D. Ulnar Impaction Syndrome

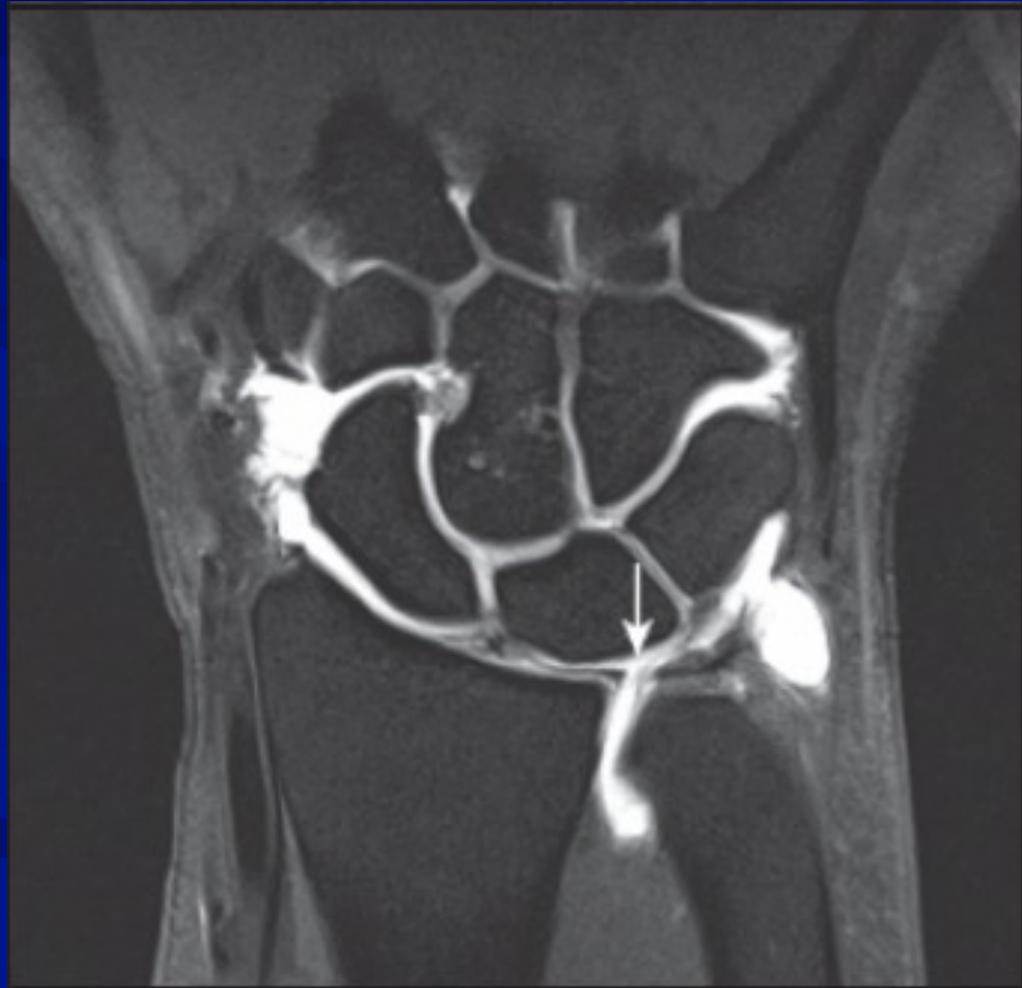
Ulnar Impaction Syndrome



TFCC Anatomy



TFCC Tear



CASE FOUR

An 11 year old basketball player presents to your office complaining of right heel pain of two weeks duration. The pain is aggravated by running and lessens after activity.

Physical examination reveals tenderness at the posterior aspect of the calcaneus. A radiograph is obtained.

CASE FOUR



CASE FOUR

This history, physical examination and radiograph are most consistent with a diagnosis of:

- A. Sever's Disease
- B. Osgood-Schlatter's Disease
- C. Sinding-Larson-Johansson Syndrome
- D. Freiberg's Disease

CASE FOUR

CORRECT ANSWER

A. Sever's Disease

Sever's Disease

Differential Diagnosis

- Achilles Tendonitis
- Infection
- Malignancy
- Unicameral Bone Cyst
- Stress Fracture

CASE FOUR

Which of the following management strategies would you employ to treat this young athlete?

- A. Activity Modification
- B. Heel Lift in Shoe
- C. Achilles Tendon Stretching
- D. Icing After Activity
- E. All of the Above

CASE FOUR

CORRECT ANSWER

E. All of the Above