More than just growing pains-Apophyseal Injuries

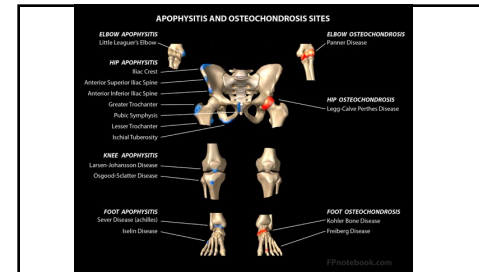Laura Nilan DO, MS, FAAP, CAQSM

1

Disclosures

- I have no financial disclosures
- I will not talk about any off label use of medications or medical devices

2

What is an apophyseal injury

-Growth center

-Attachment site of muscle or tendon

-may sites through out the body

-Fuse at different rates

-Can become avulsed or have chronic, repetitive injuries

-Injuries do not often cause long lasting problems (not a site of long bone growth)

-More common in periods of growth

-Physeal plate is the weak spot in the kinetic chain

3

4

Lower extremity Apophysis locations

Apophysis Location	Muscular/Tendon Attachment	Name of Apophysitis
Iliac Crest [1, 3]	Transverse Oblique Insertion	Iliac Crest Apophysitis
Anterior Inferior Iliac Spine [1]	Rectus Femoris Origin	
Anterior Superior Iliac Spine [3,4]	Sartorius Origin	
Ischeal Tuberosity [1,5,6,7]	Hamstring Origin	
Lesser Trochanter – Femur [1]	Psoas Insertion	
Greater Trochanter [1,8]	Gluteus Medius Insertion	
Proximal Patella [9]	Quadriceps Tendon	
Distal Patella [1, 2]	Patellar Tendon	Sinding-Larsen-JohanssonSyndrome
Tibial Tuberosity [1, 2,10]	Patellar Tendon	Osgoode-Schlatter Disease
Calcaneus [1,3]	Achilles tendon insertion	Sever Disease
5th Metatarsal [3,11]	Peroneal insertion	Iselin Disease

5

5th Metatarsal apophysitis-Iselin's

- Peroneal tendon insertion on 5th metatarsal
- Onset: Ages 8-13
- Diagnosis: pain over 5th metatarsal, +/- swelling, pain with resisted movement (P/D/E/I)
- Treatment: hard sole shoes, activity modification, ice
- DDx: 5th metatarsal fracture, peroneal tendonitis

6

Calcaneal Apophysitis-Sever's

- Achilles tendon inserting on the calcaneus
- Onset: around age 9 in Girls, 11 in boys
- Diagnosis: pain over the posterior calcaneus, sometimes swelling
- Treatment: Shoe modification-no cleats except at games, heel cups or heel lift in shoes, Ice after activity, Achilles stretching
- Differential diagnosis: osteomyelitis or infection, tumor or Achilles tendonitis (less common)

7

Sinding Larsen Johannson's

- Patellar insertion on the inferior patella
- Onset: 10-13
- Diagnosis: Pain over inferior pole of patella
- Treatment: Activity modification, Ice after activity, Posterior chain strengthening and stretching, patellar strap?
- Differential diagnosis: OSD, OCD, patellar sleeve fracture, patellar tendonitis, osteomyelitis or infection, tumor (less common)

8

Osgood Schlatter

- Patellar Tendon attachment to the Tibial Tubercle
- Onset: F 8-13, M 10-15
- Diagnosis: pain over anterior knee, some with swelling, worse with activity
- Treatment: activity modification, protective pad for activities with direct trauma, posterior chain strengthening, ice after activity
- DDx: SLJ, Tibial Plateau Avulsion Fracture, OCD, Bursitis, Hoffa's disease, infection

9

Medial epicondyle-Little League Elbow

- Medial epicondyle of elbow
- Attachment: pronator teres, Ulnar collateral ligament and common flexor tendon
- Symptoms: pain over the medial epicondyle, minimal swelling, pain with resisted flexion, pain with valgus stress
- Treatment: rest, slow return to activity once pain free, PT often helpful
- Prevention: follow pitch counts, good warm up, avoid pitcher-catcher combo
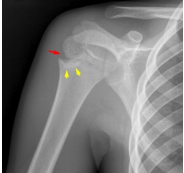
10

Little League Elbow Imaging

11

Proximal Humerus-Little League Shoulder

- Onset 11-18 (can be up to 21)
- Symptoms: pain at the proximal humerus, worse with throwing overhand
- Imaging: x-ray may show widening at the growth plate
- Treatment: Absolute rest, slow return to throw, Physical therapy
- DDX: Fracture, bicep strain, rotator cuff tendinopathy
- Prevention: pitch counts, posterior chain strengthening

12

Little League shoulder

Widening of the growth plate
Sclerosis and fragmentation of
the adjoining bone

13

To Image or Not to Image

- For classic cases, I often do not image
- If there is any concerning symptoms
  - Warmth, fevers, pain at night, significant swelling, no in the usual age rage, significant injury
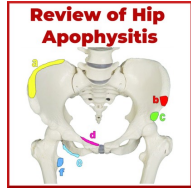- If you are unsure of diagnosis

14

Less Common Apophysitis

15

Hip

- Multiple attachment sites
  - Iliac Crest- Abdominal muscles (A)
  - ASIS-Satorius, Tensor Fasciae latae (B)
  - AIIS- Rectus Femoris ©
  - Ischial Tuberosity-Hamstring (E)
  - Lesser Trochanter- psoas (F)
  - Greater Trochanter- Gluteus Medius
  - Pubic Symphysis-rectus abdominus (D)

Review of Hip Apophysitis

16

Hip Apophysitis

- Mechanism-running, kicking, dancing
- Onset: 12-18
- Exam: tenderness over the attachment site, usually minimal/no swelling
- Treatment: relative rest, NSAIDs
- DDX: Avulsion fracture, muscle strain

17

Spine

- Spinous Process
- Symptoms- middle of the back pain, worse with extension, tender along the spinous process
- More common in extension based sports (gymnastics, dance), poor physical conditioning and exaggerated lordosis at baseline
- Attachment for Multifidius, interspinalis, erector spinae, rotatores
- DDX: spondylolysis, muscle strain

18

Osteonecrosis at Growth Plate

19

Freiberg's Disease

- Avascular necrosis of the 2nd metatarsal head
  - Rarely the little toe
- 5:1 female:male, age 13-18
- Symptoms: pain over metatarsal head, worse with walking
- Weightbearing x-rays: deformation, sclerosis flattening of metatarsal head
  - Can take 3-6 weeks for imaging to show abnormality
- MRI can be helpful early on
- Treatment: NSAIDS, walking boot, metatarsal pad
- Occasionally surgical treatment indicated for loose body or deformed metatarsal head
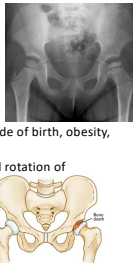
20

Kohler

- Avascular necrosis of navicular
- Age less than 10
- Symptoms: midfoot tenderness and swelling, antalgic gait
- X-ray shows flattening sclerosis and fragmentation of navicular
- Treatment: rest, ice and immobilization in boot for 6 weeks
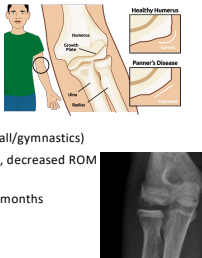- Can take 1-3 years to resolve

21

Legg-Calve-Perthes

- Avascular necrosis of the femoral head
- Incidence: 10.8:100000, ages 4-8
- 5:1 male:female
- Risk factors: short stature, hyperactivity, low latitude of birth, obesity, low birthweight and smoke exposure
- Symptoms: groin pain, referred knee pain, internal rotation of affected leg
- Imaging: pelvis x-ray with frog leg,
  - can confirm with MRI
- Treatment: rest, offloading joint

22

Panner

- Capitellum of elbow
- Childrens under 10 years old
- 90% male
- Repetative valgus or axial stress (baseball/gymnastics)
- Symptoms: lateral elbow pain, stiffness, decreased ROM
- Imaging: MRI
- Treatment: NSAIDS, rest, monitor for 6 months

23

Reference

- Images
  - Radiopedia
  - Ortho Bullets

24