Radiological Findings in Osgood-Schlatter’s Disease

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Agenda

- Define Osgood-Schlatter’s Disease (OSG)
- Learn Relevant Knee Anatomy
- Identify X-Ray Findings of OSG
- Discuss Complications of OSG
The Big Picture

Osgood Schlatter’s = An Osteochondrosis

• Predilection for immature skeletons
• Involvement of epiphyseal/apophyseal bone
• Radiologic picture includes collapse, fragmentation, sclerosis, and frequent reossification

Image courtesy of Ferris Hall, MD. BIDMC, Boston, MA.
Osgood-Schlatter’s Basics: A Non-articulating Osteochondrosis

Disorder of patellar ligament’s distal attachment at tibial tuberosity

- Results from chronic stress at site of weak attachment causing repeated microtrauma.
- Causes temporary or permanent change in chondrogenesis/osteogenesis.
- Involves no disruption to blood supply but significant soft tissue swelling and pain!
Normal Knee Anatomy


Apophyseal Growth

Normal Adolescent Knee

Image courtesy of Ferris Hall, MD. BIDMC, Boston, MA
Normal Adolescent Knee

Image courtesy of Ferris Hall, MD. BIDMC, Boston, MA
OSG: The Clinical Picture

- Adolescents
  - Boys (75%) 10-15yo
  - Girls (25%) 8-12yo
- Localized pain anterior to tibial tuberosity
- Pain worsens with activity
- Up to 50% have bilateral involvement
- Soft tissue swelling without synovial joint effusion
The Case of Adolescent X

Presented to Children’s Hospital

- 14 yo male
- occasional painful swelling over left tibial tuberosity
- active kid, soccer especially
- no known trauma to area
DDX

Unilateral Knee Pain over Tibial Tuberosity

- infection: osteomyelitis
- Malignancy or other mass: osteosarcoma, Ewing’s sarcoma, osteoid osteoma
- fracture: complete avulsion of tibial tubercle—includes apophysis itself
- patellar tendonitis = jumper’s knee
- Osgood-Schlatter’s disease

In this case they ordered an x-ray to r/o the big, the bad, and the ugly.
To X-Ray or Not To X-Ray?
The Age Old Question

- Age of patient?
- Unilateral?
- Other symptoms? e.g. fever, night sweats
- Other atypical features? e.g. hx of trauma
- Experience and type of clinician matters!
Adolescent X Films

- Soft tissue swelling anterior to tibial tuberosity
- Thickening of patellar ligament
- Indistinctness of infrapatellar fat pad
- Bony abnormalities
- Sclerosis

Left knee, lateral film

From Children’s Hospital Teaching File 4.535.
Adolescent X Films
Compared to Normal

Left knee, lateral film
Adolescent X

Lateral film, normal

From Children’s Hospital Teaching File 4.535.

Image courtesy of Ferris Hall, MD.
BIDMC, Boston, MA.
Adolescent X has classic plain film findings of Osgood-Schlatter’s Disease. Let's review some other causes for tibial tubercle pain.
Known Osteomyelitis vs. Adolescent X

Osteomyelitis

Diffuse involved region

Sclerosis

Cortical erosion

Adolescent X

From Children’s Hospital Teaching File 6.253

From Children’s Hospital Teaching File 4.535.
Known Osteosarcoma vs. Adolescent X

Diffuse, homogenously increased density of proximal tibia

From Children’s Hospital Teaching File 4.321. From Children’s Hospital Teaching File 4.535.
Classic X-Ray Findings in OSG: Some Practice

Indistinct patellar ligament and fat pad

Fragmentation and sclerosis

Some more practice…


Bony fragment within ligament

From: gait.aidi.udel.edu/res695/homepage/pd_ortho/educate/clincase/clcsimage/osgod1.jpg
Menu of Tests Used in Osgood-Schlatter’s Disease

- None
- X-ray: Standard frontal and lateral projections; consider special views
  --internal rotation views
  soft tissue density
  bone density
- CT and MRI: show changes at insertion of patellar tendon
- U/S: shows thickening of patellar tendon near insertion (increased echogenicity)

Don’t overexpose films!
Mild fragmentation of anterior tibial tubercle at insertion site of patellar ligament

From uhrad.com/msiarc/msi039.htm.
MRI Images

Decreased signal in region of tibial tuberosity at insertion of patellar ligament

From uhrad.com/msiarc/msi039.htm.
Complications of Osgood-Schlatter’s Disease

Usually resolves when apophysis fuses with tibial tuberosity.

May see:

• Persistent bony fragment/non-union pain—surgery
• Subluxation of patella from weakened distal insertion point of ligament
• Patellar ligament tear
• Scar tissue
Avulsion Injuries I

Old avulsion injury

Sclerosis


From Resnick and Niwayama. Diagnosis of Bone and Joint Disorders, 2\textsuperscript{nd} ed. WB Saunders Co, Philadelphia 1988; 5(84): 3315.
Avulsion Injuries II

Presentation:
- Irregular and fragmented tibial tuberosity
- Abnormally wide apophyseal plate

One year later:
- Prominent tibial tuberosity
- Bony fragment

Subluxation of patella

From http://www.medmedia.com/oo1/51.htm
Patellar ligament tear

From http://www.medmedia.com/oo1/238.htm

Image courtesy of Ferris Hall, MD. BIDMC, Boston, MA.
Related disorder of the Patellar Ligament: Sinding Larsen Johansen Syndrome (SLJS)

- d/o of proximal patellar ligament where it attaches to patella
- otherwise the same d/o as OSG!
  chronic stress leads to microtrauma and change in chondrogenesis/osteogenesis
Sinding Larsen Johansen Syndrome II

From Resnick and Niwayama. Diagnosis of Bone and Joint Disorders, 2nd ed. Publisher info! :3326.
Treatment of Osgood-Schlatter’s Disease

Rest and relax

no jumping
no pushing off
no squatting

Reality of Adolescence

Want teens to comply: give them control
Other Treatment Options

- NSAIDS
- Wraps--ace bandages, neoprene braces
- Removable immobilizers, restraints
- Cast--mid-thigh to mid-calf
- Quadriceps strengthening

Anterior knee strap
From [www.supports4u.com/osgood-schlatters.htm](http://www.supports4u.com/osgood-schlatters.htm)
Conclusions

• Osgood-Schlatter’s Disease is a non-articulating osteochondrosis that occurs in the accelerated growth phase of adolescence when distal attachment of patellar ligament is weakest.

• Disease usually disappears when apophysis fuses. Treatment depends on severity of symptoms.

• X-rays are the study of choice and usually reveal:
  - soft tissue swelling: indistinct patellar ligament, blurred fat pad, anterior tissue swelling
  - bony fragmentation
  - focal sclerosis
References

- Children’s Hospital Pediatric Radiology Teaching Files. The Children's Hospital, Boston, MA.
- Web Resources:
  - www.uhrad.com
  - http://gait.aids.udel.edu
  - www.medmedia.com/oa2
  - www.alldoctors.com
  - www.allkids.org/Epstein/Articles/Adolescence.html
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