Lower Extremity Sports Injuries

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Disclosures

• I have no relevant disclosures
14 YEAR OLD MALE HEARD “POP” WHILE PLAYING BASKETBALL
Proximal Tibia

• Two ossification centers
  – Primary – proximal tibial physis
  – Secondary – tibial tubercle physis or apophysis

• Physeal closure from posterior to anterior and proximal to distal
  – distal secondary center at greater risk of injury in older children
  – extensor mechanism can exert great force at secondary ossification center
Type IVb Tibial Tubercle Fracture

- **Incidence**
  - males >> females
  - ages 12 - 15

- **Mechanism**
  - Eccentric quadriceps contraction, such as coming down from a jump with knee flexed
  - basketball players, football players, and sprinters

- **Prognosis**
  - High rate of return to sports when appropriately treated
  - low incidence of leg length discrepancy
12 YEAR OLD PAIN AFTER FOOTBALL INJURY
Medial collateral ligament anatomy

• Superficial layer and deep layer of the MCL arise from the distal femoral epiphysis

• Superficial layer inserts on tibial metaphysis, deep layer inserts into perichondrium of the tibial epiphysis
Perichondrium

• Fibrocartilaginous structure surrounding the main physeal cartilage necessary for the circumferential growth of the bone
  – most prominent in the newborn and young infant
MCL Tear with Perichondrial Tear

- Treated conservatively and healed well
COMPANION CASE – 5 YEAR OLD MALE SLEDDING INJURY
Companion case
Companion Case
Perichondrium

• Continuous with the periosteum
  – Perichondrium is tightly tethered to the physis
  – Acts as a barrier to the longitudinal spread of subperiosteal disease
Companion Case
12 YEAR OLD CHEERLEADER WITH LEFT MEDIAL GROIN PAIN
Myositis Ossificans

• Heterotopic ossification
  – pseudomalignant osseous tumor of soft tissue, extrasosseous localized nonneoplastic bone and cartilage formation, myositis ossificans circumscripta, pseudomalignant myositis ossificans

• Benign, solitary, self-limiting, ossifying soft-tissue mass
Myositis Ossificans - Imaging

• Classic appearance: Mature bone formation within soft tissues, seen in later stages of disease

• Earlier stages are confusing: Bone is amorphous and appears similar to tumor bone formation
Myositis Ossificans - Imaging

• 0-2 weeks
  – Soft tissue mass with indistinct surrounding soft tissue planes

• 3-4 weeks
  – Amorphous osteoid forms within mass; adjacent periosteal reaction may be seen

• 6-8 weeks
  – Sharper cortex begins to form about lacy central osseous mass

• 5-6 months
  – Mature bone formation
Myositis Ossificans - Imaging

• During 2-6 month period
  – Classic zoning pattern diagnostic of MO: Mature cortical bone peripherally, less mature bone centrally

• Size may begin to decrease

• Trabeculae may be seen enclosed by mature cortex
Myositis Ossificans - Imaging

- **CT**
  - Peripheral rim of organized mineralization seen early by 4-6 weeks

- **MR**
  - Appearance relates to age of lesion, paralleling other imaging
  - May show marrow edema, periosteal reaction, and peripheral edema at any stage
Myositis Ossificans - Pathology

• Histologic evolution parallels that of imaging, with progression and similar zoning phenomenon
Myositis Ossificans Summary

- History of trauma and timing relative to imaging are crucial to diagnosis, though trauma may be denied.
- Must avoid biopsy during early stages to avoid misdiagnosis of tumor.
- Radiologist, oncologic surgeon, and pathologist must work as team to avoid misdiagnosis.
20 YEAR OLD FEMALE DIRECT FALL ONE MONTH PRIOR WITH SWELLING
COMPANION CASE: 19 YEAR OLD MALE WITH RIGHT KNEE PAIN AFTER FALLING
COMPANION CASE: 16 YEAR OLD MALE TWISTING INJURY WITH HYPERFLEXION
Morel-Lavallée Lesion

• Closed degloving injury of deep subcutaneous fat at interface with fascia, often overlying bony protuberance
• Results in chronic fluid collection (blood, lymph, fat)
Morel-Lavallée Lesion

- Classically occurs at hip/proximal thigh over greater trochanter
  - Abdominal wall, lumbar spine, buttock, sacrum, thigh, knee, lower leg, scapula, scalp
Morel-Lavallée Lesion - Imaging

• Appearance depends on timing of imaging & complications

• Acute/subacute
  – Elongated with irregular margins & internal heterogeneity

• Chronic
  – Elongated & smooth; ↓ heterogeneity
  – Angular margins at periphery of shear plane suggestive
Morel-Lavallée Lesion - Imaging

- MR
  - Collection ultimately follows fluid signal intensity internally except for fat nodules, blood products
  - Fibrous pseudocapsule
  - Nodular enhancement, typically peripheral, may be seen with granulation tissue, inflammation, or infection
Morel-Lavallée Lesion - Imaging

• Ultrasound
  – Ultimately hypoechoic to anechoic internally (due to ↓ complexity over time)
  – Echogenic fat nodules characteristic
  – Compressible with swirling of internal debris
  – No internal color Doppler flow
Morel-Lavallée Lesion - Treatment

- Conservative treatment with compression for small acute lesions that have no capsule
- Capsule suggests that conservative or percutaneous treatment will be unsuccessful
  - Lesion will recur if not treated Surgically
- Percutaneous drainage and sclerodesis with doxycycline has been effective
- Open debridement with delayed closure or closure by secondary intention
- Infection is a potential complication, necessitating the use of antibiotics
References