Dx on the tip of my brain!
Lower Extremity
OMA Sport Med 2018
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Disclosures

- I have nothing to disclose.
Think Outside the Box

- If you don’t know what you don’t know…
- Rare/less common conditions but should be in your DDX
- Often imaging will be normal in some of these conditions so need a high level of clinical suspicion.
Case 1

25 y/o male with clicking/catching of the right knee & mild swelling, no injury, normal MRI
Plica of the Knee

- Synovial plica (Latin word for “fold”) is a normal structure found in many knees, embryonic remnant
- The most common symptomatic plica = medial
- Plica can become painful with an inciting event → inflammation → hypertrophy of plica tissue
- The plica may develop irregular edges and may snap/click over the femoral condyle when the knee is flexed to 90°
Plica of the Knee

- **Diagnosis:**
  - Physical exam/ROM can reveal the palpable click of the plica
  - X-rays Normal
  - MRI may show plica as low-signal-intensity bands/irritation but often reported as normal

- **Management:**
  - Treatment focuses on ↓inflammation of the synovial capsule (NSAIDs, physio)
  - Outcome of surgical treatment for well-selected patients with plica syndrome is very good
    - A clinical trial conducted by Johnson et al demonstrated a success rate of more than 80%
Case 2

32 y/o female presents with knee swelling, ↓ ROM with diffuse tenderness, no Hx of injury, normal Rheum work up, Xray shows joint effusion.
Pigmented Villonodular Synovitis (PVNS)

- PVNS is a rare, benign, locally aggressive joint tumor of knee or hip (rare malignant transformation)
- Proliferative condition of the joint characterized by inflammation & overgrowth of the joint lining
- Incidence 1.8 cases per 1 million population per year
- M=F, age 20-50 years
Pigmented Villonodular Synovitis (PVNS)

- Presentation:
  - Insidious onset and slow progression of symptoms
  - Symptoms might include: pain, swelling, limitation of movement, and locking of the joint
  - Diffuse discomfort rather than severe focal pain
  - Pain, loss of function, and eventual joint destruction may result

Figure 5. Shows the symptom of swelling, and if ignored will lead to destroyed cartilage and bone of the joint.
Pigmented Villonodular Synovitis (PVNS)

- **Diagnosis**
  - Often misdiagnosed as inflammatory arthritis, ligament instability or meniscal tears
  - X-rays demonstrate signs of joint effusion
  - Bone scans do not play a significant role
  - MRI findings are diagnostic in more than 95% of patients.
  - PVNS is confirmed by ortho with biopsy of the synovium

- **Management**
  - Open or arthroscopic surgical resection.
  - High rate of local recurrence (up to 45%)
  - Radiation can be considered in patients with previous adequate resection of disease who experience local relapse
Case 3

40 y/o male with many years of R>L lateral lower leg pain with a foot slap that develops within 10min of running but no pain at rest, Dx with shin splints, Tx with PT & activity modification
Chronic Exertional Compartment Syndrome

- **History**
  - No pain at rest
  - Onset of lower leg pain with continuous weight bearing exercise
  - Pressure, tightness, cramping, burning +/- numbness/tingling, foot slap or heaviness/lack of control of the foot
  - Pain subsides within minutes after stopping exercise
  - Bilateral symptoms common (75-95%)
Chronic Exertional Compartment Syndrome

Lower Leg Compartment:
- Anterior compartment (>85%)
- Lateral compartment
- Superficial posterior compartment
- Deep posterior compartment (calf pain)
Chronic Exertional Compartment Syndrome

- Physical Exam is often normal
  - Palpable generalized tightness of compartment
  - Reproducible SSx with repetitive DF/PF of ankle
  - Muscle herniation (20-60%)

Remember: Shin splints are never lateral!!
Chronic Exertional Compartment Syndrome

Diagnosis:

- Investigations/imaging are normal
- Definitive diagnosis with intracompartmental pressure testing after reproducing symptoms with exercise
- Guidelines 1 or more required:
  - >15 mmHg at rest
  - >30 mmHg one minute post exercise
  - >20 mmHg five minutes post exercise
  - Not returned to baseline after 10 minutes

Pedowitz AJSM 18:35-40(1990)
Chronic Exertional Compartment Syndrome

- Management
  - Activity modification (bike, swim, skate)
  - PT, ART, stretching
  - Gait Retraining (US military study)
  - Orthotics
  - Surgical fasciotomy of involved compartments
    - 60-90% successful
      - Full return to activity 6-8 weeks
Case 4

21 year old soccer player with bilateral calf pain when she plays, numbness into the feet & cramping sensation that resolves almost immediately with rest
Popliteal Artery Entrapment Syndrome

- Intermittent calf claudication or calf pain/ache/fatigue which intensifies during exertion
- History very similar to deep posterior CECS, symptoms tend to resolve faster with rest
- Most commonly found in young athletes (aged 20-40 years) with well-developed gastrocnemius muscles
- More common in activities that require repeated sudden & forceful contraction of the calf, which results in hypertrophy of the calf muscles
  - Soccer
  - Rugby
  - Basketball
  - Heavy Vehicle Drivers
- **Popliteal artery entrapment syndrome occurs when these conditions exist:**

1) Atypical course of the popliteal artery between medial & lateral head of the gastrocs causing compression
2) Hypertrophy of the musculotendinous structures; and
3) Repeated arterial compression upon exercise.

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**Popliteal Artery Entrapment Syndrome**

*Figure 6.* Illustration of the normal anatomy and the various types of popliteal artery entrapment syndrome according to the modified classification of Delaney and González.
### Diagnosis
- Normal physical exam
- Normal deep post intracompartmental pressure
- MRI to evaluate popliteal anatomy/course
- MR or CT Angiography
- Exercise or PF/DF vascular studies

### Treatment
- Activity Modification
- Vascular surgery technique involves releasing of the vessel by extracting the muscle that causes entrapment, and reconstructing the narrowed lumen by endarterectomy or by-pass grafting.
Case 5

30 y/o cyclist with right thigh pain with intense cycling, “dead leg”, loss of power, no injury, no pain at rest, normal MRI of hip & back, normal EMG/NCS, no improvement with PT
External Iliac Endofibrosis

- Thigh pain/fatigue, cramping during near maximal exercise
- Transient ischemic symptoms in well-trained athletes, predominantly in cyclists
- The reported level of cycling is 8000km–35,000 km per year
Pathophysiology

- External iliac artery is stretched upon hip flexion and the aerodynamic position adopted by cyclists.
- When cyclists pull up on the pedals the hip flexors become hypertrophied which compresses the iliac arteries.
- Supra-physiological blood flow generated in the iliac arteries leads to endothelial dysfunction and injury that leads to endofibrosis.
- Fibrotic intimal thickening distinct from atherosclerosis.
- Kinking of the external iliac artery exacerbates kinking of the vessel upon hip flexion.
External Iliac Endofibrosis

- **Diagnosis**
  - ABI at rest and after exercise (at least 0.4 of difference)
  - Ultrasound & Doppler normal
  - CT angiography performed in a ‘racing’ hyperflexed posture reveals stenosis or arterial lumen narrowing
  - MR-angiography (with flexed & extended hip) may reveal arterial kinking
External Iliac Endofibrosis

- Treatment
  - Modify cycling posture and bike setup
  - Reducing the level of exercise/intensity
  - Balloon angioplasty may only provide short-term durability and symptom relief
  - Surgical Arterial Release or Endarterectomy
Case 6

48 y/o male with left ankle pain and a burning sensation, numbness & tingling on the sole of the foot, aggravated by prolonged standing or walking, relieved by sitting/rest, normal X-rays of the ankle
Tarsal Tunnel Syndrome

- A neuropathic entrapment of the tibial nerve on the medial side of the ankle
- Symptoms include pain, numbness, burning pain radiating into the arch of the foot, heel & sometimes the toes.
- Pain worse with walking/running or standing for long periods of time and often worse at night.
- Often mistaken for plantar fasciitis
- People with severe pronation at increased risk
Tarsal Tunnel Syndrome

- **Diagnosis**
  - The diagnosis is largely clinical
  - Tinel's Test = radiating pain with nerve percussion behind medial malleolus
  - Manual compression of the tibial nerve for 30 seconds may also reproduce symptoms
  - EMG/NCS may be helpful in confirming the diagnosis
  - MRI to identify any underlying lesions and the specific site of compression (lipoma, ganglion, scar tissue, tenosynovitis).
Tarsal Tunnel Syndrome

- Management
  - Physiotherapy, Orthotics
  - NSAIDs & steroid injections may be helpful
  - Surgical release improves or resolves symptoms of tarsal tunnel syndrome in 44% to 93% of cases
25 y/o female banker with chronic, vague, activity-related right forefoot pain, feels like she is walking on a pebble, no trauma
Frieberg’s Disease

- A form of avascular necrosis in the metatarsal bone of the foot.
- Atypical AVN: Not associated with infection, steroid use, alcoholism, or smoking
- Generally develops in the 2nd metatarsal, but can occur in any metatarsal.
- Bilateral involvement <10% of patients
- Male-to-Female ratio of approximately 1:5
Frieberg’s Disease

- **History:**
  - Vague, poorly localized, activity related forefoot pain
  - Sensation of a small, hard object under the foot (pebble)

- **Physical Exam:**
  - Limited ROM, swelling, and tenderness with direct palpation of the MTP joint.
  - In later stages, crepitus or deformity
  - A skin callus may be seen on the plantar surface of the affected metatarsal head.
Frieberg’s Disease

- Imaging:
  - Depending on the stage of disease (I-V), x-ray may show only sclerosis and widening of the joint space (early)
  - Complete collapse of the metatarsal head or OCD occurs later
  - MRI is helpful in detecting early Freiberg disease not visualized on plain radiographs
  - 3D CT can assist with surgical planning
Frieberg’s Disease

Management:
- A trial of conservative management/PT
- Consider Aircast boot 4-6 weeks if severe pain
- Orthotics, metatarsal pad, rocker bottom shoe
- Stage I-III may resolve spontaneously
- Failed conservative measures or stage IV-V lesions may require surgery
  - debridement, bone grafting, osteotomy, arthroplasty
Case 8

19 y/o female dancer with posterior ankle pain and ↓PF of the left ankle, Tx as Achilles tendinopathy with PT with no improvement
Os Trigonum Syndrome

- Posterior ankle impingement caused by accessory ossicle
- The forceful PF of ballet or running downhill, produces compression on the posterior aspect of the ankle joint
- Stiffness, weakness & swelling can be observed
- Passive forced PF test: repetitive quick and passive hyperplantarflexion movements in a neutral position causes post ankle pain
Os Trigonum Syndrome

- **Diagnosis**
  - Weight-bearing Lateral X-ray with the foot in full PF
  - Bone scan may show increased uptake in the region of the os trigonum.
  - CT/MRI to establish the size of the ossicle, coexisting pathologies, soft tissue/bone damage.

- **Management**
  - PT, activity modification, ice/NSAIDs
  - Surgical removal of the ossicle
Questions?

- Plica
- PVNS
- Exertional Compartment Syndrome
- Popliteal Artery Entrapment
- External Iliac Endofibrosis
- Tarsal Tunnel Syndrome
- Frieberg’s Disease
- Os Trigonom