The Limping Child

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Causes of Gait Abnormalities

- The hip region
  - Developmental dysplasia of the hip (DDH)
  - Transient synovitis of the hip
  - Perthes disease
  - Slipped upper femoral epiphysis (SUFE)

- The knee region
  - Benign genu varum of toddlers
  - Benign genu valgum of childhood
  - Osgood-Schlatter’s disease
  - Sinding-Larsen-Johansson’s disease
  - Osteochondritis dissecans
  - Patella dislocation
  - Patella tracking dysfunction
  - Primitive reflex retention
Transient (Toxic) Synovitis of the Hip

- Commonest cause of limping in children
- 3-10 years old boys 4:1
- Often presents with low grade fever
- Possible viral aetiology
- **Sign**- often limits internal rotation and abduction
- Lasts 1-2 (up to 6) weeks, can happen recurrently
- **ddx** septic arthritis, Perthes, SUFE
- Tests US, X-ray, FBC, CRP, ESR Gicquel et al Rev Pract 2006 Jan31;56(2):172-8
- **Clinically often associated with an anterior femur subluxation**
Anterior Femur Correction
DDX Septic Hip or Transient Synovitis

• Kocher’s guideline-
  1 Hx of fever
  2 Non weight bearing
  3 ESR >40mm/h
  4 serum wbc count >12,000 cells/mm³

• Predicted probability of septic hip 3% when 1 criteria is present rising to 99% when all 4 are present  
Perthes’ Disease

- Osteochondritis of the femoral head
- 5-10 years old boys more often affected
- Commoner in low birth wt children
- **Sign- classically looses external rotation**
- Crescent sign- pathologic # on frog leg view and jt space widening on x-ray
Perthes’ Disease

- Prognosis is age dependent
- The earlier the child is affected the better the long term outcome (under 6 years the prognosis is excellent)
- Permanent deformity usually results in secondary arthritis later in life (40+)
- Prognosis is better if only part of the epiphysis is affected
Slipped Upper Femoral Epiphysis (SUFE)

Slipped Upper Femoral Epiphysis

• More common in boys

• Age 13-16 boys, 11-14 girls

• Commoner in obesity and/or height above 90th centile

• Pain in groin with stiffness and limp, poss just knee px

• Signs-Limited internal rotation-passive internal rotation may be painful, external rotation increases with hip flexion

Johns and Tavarez StatPearls Pub 2019Jun4
SUFE

• Epiphysis displace post/inf best visualised by frog leg
• The junction between the capital epiphysis and the neck of the femur loosens
• With downward pressure of weight bearing and the upward pull of the muscles on the femur
• The epiphysis is displaced down and backwards
• Prohibit weight bearing if suspicious until imaging
• 12 year old boy presented at hospital casualty 3 times with knee pain
• Examination and imaging of knees NAD
Clinical complications include

- Avascular necrosis of the femoral head
- Slipping of the opposite side which occurs in at least 20% of cases
- Coxa vara
- Femoral retroversion, due to the head slipping backwards leading to external rotation of the lower limb
- Shortening of the femur by 1-2cm
- Osteoarthritis later in life
The Knee

- Benign genu varum of toddlers
- Benign genu valgum of childhood
- Osgood-Schlatter’s disease
- Sinding-Larsen-Johansson’s disease
- Osteochondritis dissecans
- Patella dislocation
- Patella tracking dysfunction
The Knee

- It is fairly rare to see acute ligamentous injuries in children due to the elasticity of their connective tissue structures.
- If the young person presents with knee pain that
  - doesn’t have an obvious cause
  - Is worse at night (non-mechanical pain)
  - And/or is increasing
- Imaging and blood tests should be considered – ddx inflammation/infection/tumour
Benign Genu Varum of Infancy

- Very common
- Seldom serious
- Mild degree of outward bowing of knees
- Considered ‘normal’ between 1-3 years old
- In the absence of underlying pathology it usually self corrects by age 3
  - Diseases: Vitamin C or D deficiency; Blount’s disease; growth disorders
- Monitor by bringing the child’s ankles together and measuring the distance between the medial epicondyles of the knee

Blount’s disease
Benign Genu Valgum of Childhood

- Very common and seldom serious
- Considered ‘normal’ between 3-5 years old
- In the absence of underlying pathology it usually self corrects by age 6
- Monitor by bringing the child's knees together & measure the distance between the medial malleoli. Up to 10cm is acceptable at the age of 4 when the deformity is greatest
Benign Genu Valgum of Childhood

Medical treatment

• If it persists beyond 10 years old, a surgical treatment can be performed to retard the growth of the bone on one side of the tibia
• Severe foot pronation is a major causes of genu valgum
• Rx adjust mid-foot, tape and exercise and maybe and use orthotics
Osgood-Schlatter

Traction apophysitis 10-14

• Presentation
  • A painful limp with the patient able to accurately localise the pain to the tibial tubercle which.. 
  • Appears swollen and sometimes reddened and is tender

• Aggravated by
  • Kneeling on the area
  • Active use of the quadriceps (running, stair climbing, bicycle riding)
  • Strongly contracting the quadriceps against resistance with the knee held straight
Osgood-Schlatter’s Disease

- Diagnosis is a clinical one: made by age, activity, location of pain, and aggravating factors
- Relieved by rest
- Medical treatment: generally not required; avoidance of aggravating activities, ice may help
Osgood-Schlatter’s disease – Dx

• Specifically investigate for the anterior tibial subluxation complex triad of-
  1. Tenderness/swelling of tibial tubercle
  2. Decreased A-P drawer sign
  3. Weakness of the tibialis anterior in knee extension which strengthens with P-A stress on tibia
Osgood-Schlatter’s disease - Rx

- Anterior tibia adjustment

- Clinical experience suggests that the pain over the tuberosity will respond symptomatically more quickly with chiropractic care

- Many patients are able to continue participating in sport without pain following care

- The use of a patella strap/tape may be necessary
Sinding-Larsen-Johansson’s disease

- Is a traction apophysitis similar to OSD
- Occurs in active 10-14 year olds
- Patients having both SLJ and OSD is not unusual
- Is due to traction of the patella tendon on the inferior pole of the patella
- Aggravated by running, jumping, ascending stairs
- Is a clinical diagnosis, which usually responds to similar rx as OSD
Osteochondritis Dissecans

• Can occur in 8-20 years old
• Knee is the most commonly affected
• Also the capitulum of the humerus and the dome of the talus
• Mechanism:
  • subchondral bone becomes avascular
  • With the articular cartilage that covers it may slowly separate over 2-3 months
  • Forming a loose body in the joint
  • Leaves a shallow cavity in the articular surface which usually fills with fibrocartilage
Osteochondritis Dissecans

• Before separation of the fragment, the patient (usually male) complains of:
  • Intermittent aching or discomfort in the knee after exercise (mechanical joint pain)
  • A feeling of insecurity of the joint
  • Intermittent swelling

• Once separated the main symptoms are:
  • Recurrent locking
  • Pain
  • The knee giving away or collapsing

• Both knees should be examined as it’s bilaterally affected in 25% of cases
Osteochondritis Dissecans

- **Palpatory sign** - flex knee to 90 degrees, look for tenderness of femoral condyle, just medial to the inferior pole of the patella
- **Wilson’s sign** may be positive:
  - Flex the knee to 90 degrees, internally rotate tibia, gradually extend the knee – patient may report pain
  - The pain is relieved by externally rotation the tibia
- X-ray examination bilaterally may show the defect, usually best seen on the intercondylar view
- Severe cases may need chondral grafts

Patella dislocation

- Most common in preadolescent and adolescent girls
- Lateral displacement is most common – low velocity where the knee is flexed the tibia hit, or the foot caught, or a misstep; high velocity for example in a car accident with a flexed knee hitting the dashboard
- Severe pain is felt at the front of the knee, and the patient is unable to straighten it and the patella is located laterally
Patella dislocation

- The knee will be swollen & the patella can be seen and felt on the lateral side of the femoral condyle.

- Reduction can be achieved by guiding the patella medially with some extension stress on the lower leg, this should be done with caution and if not achieved early after injury hospital referral is indicated.

- After reduction there is a blood stained effusion and tenderness over the medial part of the quadriceps expansion, which is usually strained or torn.

- Repeat dislocations are common.

- This predisposes later degenerative joint disease.
Patella dislocation

- **Causes of lateral instability of the patella**
  - General ligamentous laxity
  - Under development of the lateral femoral condyle with a shallow intercondylar groove
  - Small patella
  - Abnormally high patella position (patella alta)
  - Genu valgum
  - Muscle - weak VMO

- **Apprehension test**
  - Knee in slight flexion
  - Patella gently pushed laterally
  - It is positive if the patient contracts their quads and looks apprehensive
Patella dislocation

Chiropractic Management

• Exercises to strengthen the quadriceps
  • Especially the VMO
  • Aim for a 3:2 strength ratio quads:hams
• Utilise full ROM functional movements ASAP
• Stretch the iliotibial band
• Mobilise the knee joint
• Significant pronation of the foot can complicate the condition, so consider an orthotic and/or taping
Patella tracking dysfunction (patella femoral pain syndrome/chondromalacia patellae)

• Common among active adolescents 10-15 years old
• Imbalance in function of leg musculature especially quads can result in the patella sliding too far medially or laterally in the femoral groove
• With such contact, the relatively weak sub-chondral bone may be unable to withstand the loads placed on it
• Results in trabecular micro-fracturing, which may incite a low-grade painful inflammatory response
• Increased sulcus angle/trochlea depth may have a predictive relationship Resorlu et al J Back Musculoskelet Rehabil. 2017;30(3):603-608
Patella tracking dysfunction

• Characteristic Symptoms:
  • Gradual onset of pain
  • Deep pain is felt in the sub patella region it may also be medially or laterally distributed
  • Pain is aggravated by activities involving patellofemoral compression eg:
    • Ascending/descending stairs
    • Walking up/down hills
    • Sitting with the knee bent for a long period of time
    • Squatting
  • Crepitus, easily felt if you palpate the knee while the patient does a deep knee bend from a standing position
Patella tracking dysfunction

**Signs**

- Patella misalignment
- Predisposing factor = femoral anteversion, external tibial torsion, increased foot pronation, generalised joint laxity, leg length inequality
- **Popliteus weakness with an posterior tibia subluxation**
- Discomfort if the patella is moved laterally/medially
- **Patellofemoral grind test is usually positive either laterally or medially (it may be +ve in asymptomatic patients)**
- Tenderness to deep palpation on the inferior aspect of the patella laterally or medially
Patella tracking dysfunction

• Patello-femoral Arthralgia (PFA)
  Medial grind test and inferior/medial patella pain palpation +ve
  Weak vastus lateralis (VL) and strong vastus medialis (VM)

• Excessive Lateral Pressure Syndrome (ELPS)
  Lateral grind test and inferior/lateral pain palpation +ve
  Weak VM and Strong VL

Hearon K Advanced Principles of Lower Extremity Adjusting
Patella tracking dysfunction Rx

- **Adjust posterior tibia subluxation** manually or with drop piece
- PFA- strengthen VL
- ELPS- strengthen VM/VMO
- Stretch tight muscle groups- iliotibial band, hamstrings/calves
- Ice
- Minimise activities with high &/or prolonged compressive loads (walking down stairs, bent knee sitting etc)
Post Adjustment
Patella tracking dysfunction – Rx

• Treat and correction spinal and extremity subluxations as found with particular attention to foot mechanics
• May need to use and orthotic to maintain the arch to stop medial rotation of the tibia
• Once pain levels are decreased, encourage incremental functional full ROM training – body weight squats, lunges
Reflex Retention

• A number of primitive or neonatal reflexes are capable of causing gait abnormalities if retained- ATNR, TLR/STNR, plantar grasp

• Unilateral retention of the Galant causes a particular limp with the child hitching up one side

• It is associated with fidgeting, poor concentration and poor bladder control
Takeaways

• Lower limb pain that
  • doesn’t have an obvious cause
  • Is worse at night (non-mechanical pain)
  • And/or is increasing

• Imaging and/or bloods should be considered – ddx inflammation/infection/tumour

• But the commonest cause of limp in children is a benign and self limiting condition

• Correction of mechanical extremity dysfunction (subluxations) can have a hugely positive impact