

Osteitis Pubis

• GREEN

- **Intro:**
 - Non-infectious idiopathic, inflammatory condition of the pubic symphysis & surrounding structures
 - Results in groin / lower abdominal px
 - Multiple causes, likely related to overuse / trauma
 - Association w/ surgery: 1st described in pts who had undergone suprapubic surgery, remains a complication of invasive procedures around the pelvis
 - Can occur as an inflammatory process in athletes
 - Incidence of 0.5-0.8% in athletes, w/ higher incidence in distance runners & athletes in kicking sports
 - M>F (3:1)
- **Aetiology (risk factors):**
 - Fibular-acetabular impingement (FAI)
 - Pregnancy / childbirth
 - High-level of athletic activity (*athletic pubalgia*)
 - Urological / gynaecological surgery
 - Trauma
 - Psoriatic arthritis
 - Ankylosing spondylitis
- **Pathophysiology:**
 - Stress injury affecting the peri-symphyseal pubic bones due to increased strain on the anterior pelvis
 - Pubic symphysis, a non-synovial amphiarthrodial joint, has minimal motion normally due to a static ligamentous complex
 - Pubic symphysis is where rectus abdominis inserts & the adductor complex originates
 - Antagonistic actions of the rectus abdominis (elevates symphysis) & adductors (depressing the joint) create conditions osteitis pubis development through chronic tendinosis
 - Chronic muscle imbalance leads to abnormal forces on the pubic symphysis, causing instability, pubic bone stress reaction, & eventual hyaline cartilage degeneration
 - Alternative theory: osteitis results from increased compensatory motion across the joint due to limited motion elsewhere in the kinetic chain (*FAI*)



Osteitis Pubis (cont)

- **Clinical presentation:**
 - Waddling antalgic gait or crepitus
 - Px localised over the symphysis & radiating outward
 - Anterior & medial groin px
 - Gradual onset
 - Adductor px / lower abdominal px that then localises to the pubic area
 - Aggravated during turning, walking, coughing, sneezing, lying on one side, & walking up or down stairs
 - Commonly tenderness around the pubic symphysis & pubic ramus, along w/ painful muscle spasms in the adductor region
- **Physical examination:**
 - +ve palpation, Spring test of pubic symphysis, Adductor squeeze test
- **Diagnosis:**
 - In early stages, plain radiographs may appear normal
 - Chronic case: pubic symphysis demonstrates lytic changes, sclerosis, sub-chondral resorption, bony margin irregularities & widening
 - Dynamic instability of the pubic symphysis (>2mm of subluxation) can be observed on frog-leg view
- **Complications:**
 - Chronic px
 - Infection
 - Non-union fusion
 - Recurrence
 - Scrotal / labial swelling
- **Management:**
 - Approx. 3 - 6 month recovery time (conservative care)
 - RICE, NSAIDs, (steroid) injections
 - Surgery
- **Ddx:**
 - Athletic pubalgia
 - FAI
 - Osteomyelitis
 - Adductor strain
 - Rectus abdominus strain
 - SIJ dysfunction
 - GU disease

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Transient Osteoporosis of the Hip (TOH)

- **YELLOW**



Transient Osteoporosis of the Hip (TOH) (cont)

- **Intro:**
 - Idiopathic & self-limiting disorder that causes temporary bone loss of the proximal femur
 - Characterised by unexplained hip px
 - Associated w/ ↓ ROM, non-specific labs, & mostly uncertain radiographic findings
- **Aetiology (risk factors):**
 - Mainly affects the hip joint, but can also affect knee, ankle, & foot
 - M>F (esp, 30-60 yrs)
 - Also more common in women in late stages of pregnancy (last 3 months) or who have recently given birth
- **Pathophysiology:**
 - Not clear understanding
 - Blockage of small blood vessels that surround the hip
 - Hormonal changes
 - Abnormal stresses (external load & force) on the bone
- **Clinical presentation:**
 - Sudden onset of px, usually anterior thigh, groin, lateral hip, or buttocks
 - Px that intensifies w/ weight bearing & may lessen w/ rest
 - No previous accident or injury to the hip that would trigger px
 - Slightly limited motion (gentle hip movement usually pxless)
 - Px that gradually increases over a period of weeks or months & may be disabling
 - Noticeable limp due to guarding
- **Physical examination:**
 - ↓ ROM (AROM feels worse)
 - Severe px when wight bearing (min px w/ PROM)
- **Diagnosis:**
 - X-ray:**
 - Early stage (first 6 weeks) of the disease may exhibit slight decrease in bone density (challenging to detect)
 - Several months later, may reveal significant loss of bone density, w/ femoral head nearly disappearing
 - Nuclear medicine bone scan:**
 - Can more clearly show changes in the bone
 - DEXA:**
 - Not useful in Dx of TOH



Transient Osteoporosis of the Hip (TOH) (cont)

- **Complications:**
 - Fractures
 - Joint collapse
 - Chronic px
 - 2° OA
 - Recurrence
 - Functional impairment
- **Management:**
 - NSAIDs
 - Weight-bearing restriction
 - Strengthening & flexibility
 - Water exercises
 - Mobs / drops
 - Proper nutrition (vitamin D & calcium)
- **Ddx:**
 - Osteoporosis
 - AVN
 - RA
 - Stress fracture
 - Bone marrow oedema
 - Osteomyelitis
 - Hip labral tear
 - Referred px from Lx disorders

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Transient Synovitis (TS)

- **YELLOW** Refer to GP if pt starts showing red flags / isn't improving
- **Intro:**
 - Acute, non-specific, inflammatory process affecting joint synovium
 - Common cause of hip pain in paediatric population
 - Benign, self-limiting process
 - Must differentiate TS from an acute infectious process
 - Most common in children 3- 10 yrs old
 - Incidence estimated to be 0.2%, w/ total lifetime risk of 3%
 - M>F (4:1)
- **Aetiology (risk factors):**
 - Preceding upper respiratory infection (URI)
 - Preceding bacterial infection
 - Post-streptococcal toxic synovitis
 - Preceding trauma
 - Alternative theory: post-vaccine or drug-mediated hypersensitivity reactions & certain allergic predispositions



Transient Synovitis (TS) (cont)

- **Pathophysiology:**
 - Pathological cascade involves non-specific inflammation targeting synovial joint lining, leading to hypertrophic changes
 - Clinical Hx may reveal one or multiple risk factors
- **Clinical presentation:**
 - Acute unilateral limb disuse
 - Non-specific hip px, subtle limp, refusal to bear weight
 - Hx may show increased agitation or more frequent crying than baseline
 - Recent Hx of URI, pharyngitis, bronchitis, or otitis media (supports TS diagnosis)
- **Physical examination:**
 - Mildly ↓ ROM, especially ABduction & INternal rot.
 - Pts may exhibit hip flexion, abduction, & external rotation position to alleviate intra-articular pressure
 - 1/3 of pts may have normal ROM
 - Provocative tests: +ve basic log roll or FABER test (px on ipsilateral anterior side indicates hip disorder, while px on the contralateral side around the sacroiliac joint suggests SIJ dysfunction)
- **Diagnosis:**
 - Imaging:**
 - Radiographs: useful for excluding bony lesions unless onset of Ssx is within 3 days, no fever, child appears well, & has mildly restricted abduction w/o guarding against movement in other planes
 - Ultrasound: extremely accurate for detecting infra capsular effusion, doesn't help to determine the cause (used to guide hip aspiration)
 - MRI: useful in settings where routine aspiration is not performed to differentiate TS from septic arthritis
 - Labs:**
 - Complete blood cell (CBC) count
 - Erythrocyte sedimentation rate (ESR)
 - C-reactive protein measurement
 - Urinalysis & cultures
- **Complications:**
 - Recurrence of Ssx, in approx. 20-25% of pts (usually between 6 months)



Transient Synovitis (TS) (cont)

- **Management:**
 - Rest, NSAIDs, heat &/or massage
 - In case of clinical concern, pt admission for observation is considered
 - General improvement after 24-48 hours
 - Complete resolution may take 1-2 weeks (75% of pts)
 - If significant Ssx last for 7-10 days, consider alternative Ddx
 - If Ssx last longer than a month, pt may have alternative pathology
- **Ddx:**
 - Coxa magna
 - Osteomyelitis
 - Septic arthritis
 - 1° or metastatic lesions
 - Legg-Calve-Perthes disease (LCPD)
 - Slipped capital femoral epiphysis (SCFE)
 - Others: Lyme arthritis, pyogenic sacroiliitis, & juvenile RA

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Slipped Upper Femoral Epiphysis (SUFE)

• YELLOW

- **Intro:**
 - Most common hip pathology in pre-adolescents & adolescents
 - Also known as *slipped upper femoral epiphysis* (SUFE)
- **Aetiology (risk factors):**
 - Idiopathic w/ no Hx of trauma or injury before Ssx onset
 - Associated w/ endocrine disorders such as hyper/hypothyroidism, , growth hormone deficiency, renal disorders, & Down syndrome
 - Hypothyroidism is most common cause of non-idiopathic SCFE
 - Pre-adolescent & adolescent pts (10.8/100,000)
 - Obesity is single most significant risk factor
 - M>F
 - Periods of rapid growth
 - Prior hip radiation therapy
 - retroversion of the acetabulum or femoral head
 - Average age of onset is F 11.2 & M 12.0



Slipped Upper Femoral Epiphysis (SUFE) (cont)

- **Pathophysiology:**
 - Uncertain mechanism
 - High physiological axial load on a weak physis
 - Obesity increase mechanical weight & force, while endocrine / renal disorders may weaken the physis
 - Slippage occurs at the hypertrophic zone of physis
 - Epiphysis stays in the acetabulum, & metaphysis EX rots w/ anterior translation
 - SCFE is a Salter-Harris type I fracture
- **Clinical presentation:**
 - Atraumatic Hx
 - Hip, thigh, groin, knee px
 - Limping & inability to WB
 - 4-5 months Ssx prior to Dx
 - Sitting w/ affected leg crossed over the other relieves px
- **Physical examination:**
 - ↓ ROM (esp. IR, FLEX, ABD)
 - Drehmann sign
 - Trendelenburg sign
 - Atrophy. of surrounding muscles
- **Diagnosis:**
 - Recent studies suggest US may be more sensitive than radiographs
 - **X-rays:** Epiphysis widening or growth plate lucency & blurring of proximal femoral metaphysis due to overlap on the displaced epiphysis
- **Complications:**
 - AVN
 - Chondrolysis
 - FAI
 - Slip progression
- **Management:**
 - Mainly operative
 - NSAIDs (px management)
 - Strengthening
- **Ddx:**
 - Septic arthritis
 - Osteomyelitis
 - Traumatic fracture
 - Sprain
 - Strain
 - LCPD
 - Osgood Schlatter disease

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Snapping Hip / Coxa Saltans

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- **Intro:**
 - Audible or palpable snapping sensation during hip joint movement
 - Affects 5-10% of the population
 - F>M
 - Common when engaging in repetitive extreme hip motions, e.g. ballet dancers (in 80%), weight lifters, soccer players, & runners
- **Extra-articular snapping hip:**
 - Iliotibial band moving over the greater trochanter during hip flexion, extension, & rotation
 - Proximal hamstring tendon rolling over the ischial tuberosity
 - Fascia late or anterior aspect of gluteus Maximus rolling over the greater trochanter
 - Psoas tendon rolling over the medial fibres of the iliac muscle
 - Combination of defects, e.g. thickening of both the posterior iliotibial band & anterior glute max
- **Intra-articular snapping hip:**
 - Iliopsoas tendon snapping over iliopectinal eminence or anterior femoral head
 - Parabola cysts
 - Partial or complete bifurcation of the iliopsoas tendon
 - **Differentiation from intra-articular pathology:** close physical exams & imaging; approx. 50% of internal snapping hip cases also have an additional intra-articular hip pathology identified
- **Aetiology (risk factors):**
 - Often caused by overuse but can also be triggered by trauma, e.g. intramuscular injection or surgical procedures
 - Coxa vera after total hip arthroplasty is linked to external snapping hip syndrome
 - Anatomical variations: increased distance between greater trochanters, prominent greater trochanters, & narrow bi-iliac width
 - Iliotibial band tightness, shorter muscle or tendon lengths, muscle tightness, or inadequate muscle relaxation



Snapping Hip / Coxa Saltans (cont)

- **Pathophysiology:**
 - External:**
 - Caused by iliotibial band snapping over the greater trochanter of the femoral head
 - During movements like flexion, extension, & external rotation
 - Internal:**
 - Caused by iliopsoas tendon snapping over bony prominences
 - Bone prominences include the iliopectinal eminence or the anterior aspect of the femoral head
- **Clinical presentation:**
 - Prevalence of snapping hip
 - Location of the snap
 - Timing of the snap
 - Age/duration of onset
 - Px / disability
 - Impact on ADLs
- **Physical examination:**
 - External:**
 - +ve Ober's test: tight iliotibial band
 - FABER test: iliotibial band snapping
 - Internal:**
 - FABER test: iliopsoas snapping
 - Stinchfield test: anterior groin px
 - Thomas test: tight hip flexors
 - Iliopsoas stress test: abdominal px
- **Diagnosis:**
 - Plain radiograph (not accurate), used to rule out anatomical variations, developmental dysplasia, or other hip pathology
 - External:**
 - T1 weighted axial MRI: thickened ITB or thickened anterior edge of glute max
 - Dynamic ultrasonography (if not visible on exam): demonstrates snapping of ITB over the greater trochanter, & can also reveal associated *tendonitis, iliopsoas bursitis, or muscle tears*
 - Internal:**
 - Magnetic resonance orthography: comprehensively identifies both the SHS & accompanying pathologies
 - Iliopsoas bursography
 - Fluoroscopy
 - Dynamic ultrasonography

Snapping Hip / Coxa Saltans (cont)

- **Management:**
 - RICE
 - NSAIDs
 - Steroid injections
 - Activity modifications
 - Release: TFL, glute medius, glute max, & adductors
 - Activate: abductors
 - STW
 - SMT
 - Mobs / drops
- **Ddx:**
 - Acetabular labral tear
 - Bursitis: greater trochanter / iliopsoas
 - Femoral head AVN
 - Hip tendonitis
 - Iliopsoas tendinitis
 - ITB syndrome
 - Intra-articular loose body of the hip
 - Synovitis

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Meralgia Paraesthetica

• GREEN

- **Intro:**
 - Also known as Bernhardt Roth syndrome, lateral femoral cutaneous n. (LFCN) syndrome / neuralgia
 - Associated with LFCN compression
 - Purely sensory nerve
 - Vulnerable to compression during its course from Lx-Sx plexus to inguinal ligament
 - Passes into subcutaneous tissue of anterior thigh, involving px & dysethesia



Meralgia Paraesthetica (cont)

- **Aetiology (risk factors):**
 - Slightly more common F>M
 - Common in military
 - Most common 40-50 yrs
 - Pregnant & obese pts have increased risk
 - 3-4 / 10,000
 - Carpal tunnel syndrome associated w/ an ↑ risk of meralgia paraesthetica
- **Spontaneous causes:**
 - Diabetes mellitus
 - Lead poisoning
 - Alcohol abuse
 - Hypothyroidism
- **Mechanical causes:**
 - External direct pressure from tight seat belts, belts, or restrictive clothing
 - Increased intra-abdominal pressure from obesity, pregnancy, or tumours
 - Leg length discrepancy
 - Degenerative changes of pubic symphysis
 - Rare bone tumour near the iliac crest
- **Iatrogenic causes:**
 - Surgeries of surrounding areas
- **Pathophysiology:**
 - Derives from posterior divisions of L2/L3 spinal nerves
 - Lateral psoas → under iliac fascia → crosses anterior iliacus m. → ASIS → anterior & posterior divisions pass under / through / above the inguinal ligament
 - Anterior: sensory to anterior thigh-knee
 - Posterior: sensory to lateral thigh-greater trochanter
 - External compression or internal pressure (obesity, pregnancy, tumours)
 - Surgical injury during the nerve's passage
 - Metabolic causes like diabetes (injury may result from swelling due to ↓ axoplasmic transport), alcohol or lead poisoning



Meralgia Paraesthetica (cont)

- **Clinical presentation:**
 - Unilateral Ssx of upper lateral thigh
 - Burning px, paraesthesia, hyperaesthesia
 - Subacute onset over days to weeks
 - Pts often point to or rub outer thigh (potential loss of hair from rubbing)
 - Ssx don't change w/ position
 - Aggravated by prolonged hip EX (waking, rising from seated position)
 - May be relieved by hip flexion (sitting)
 - Hx of tight clothing, trauma, weight-gain, pregnancy
- **Physical examination:**
 - Pelvic compression test (side-lying on unaffected side)
 - Meralgia paraesthetica test
 - Sensory changes (pin-prick, light touch)
- **Diagnosis:**
 - Radiographs are not required
 - May consider blood tests if metabolic etiology
- **Complications:**
 - Result from surgical transection of LFCM, leading to permanent anaesthesia (sensory loss)
- **Management:**
 - Benign, self-limiting
 - Often spontaneous remission
 - Pt reassurance & education
 - Reducing pressure & irritation (weight-loss)
 - Icing
 - SMT
 - NSAIDs
 - Abdominal exercises
 - Injection
 - Surgical decompression
 - **Other:** pulsed radiofrequency n, ablation, electroacupuncture, K-taping
- **Ddx:**
 - Lx radiculopathy
 - Abdominal masses
 - Pelvic tumour
 - Metastasis of iliac crest
 - Avulsion fracture
 - Hip OA
 - Chronic appendicitis

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Legg-Calve-Perthes Disease (LCPD)

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• **Intro:**

- Idiopathic osteonecrosis of capital femoral epiphysis of femoral head occurring in the paediatric population
- Also known as *coxa plana*

• **Aetiology (risk factors):**

- Cause is unknown, possibly idiopathic or related to factors disrupting blood flow (key factor in development of LCPD) to femoral epiphysis
- Bilateral in 10%-20% cases (asymmetrical due to different stages)
- Causes include: trauma (macro or repetitive micro), coagulopathy (in about 75% of pts), & steroid use
- Thrombophilia is found in approx. 50% of pts
- 3-12 yrs old (highest occurrence at 5-7 yo)
- 1 in 1200 children <15 yo
- M>F (5:1)

Risk factors: Caucasian / Asian heritage, HIV, low socioeconomic status, birth weight <2.5kg, secondhand smoke exposure

• **Pathophysiology:**

Usually 4 phases:

1. **Necrosis:** disruption of blood supply → infarction of femoral capital epiphysis (esp. subchondral cortical bone) → growth of ossific nucleus stops → infarcted bone softens & dies
2. **Fragmentation:** body reabsorbs the infarcted bone
3. **Reossification:** Osteoblastic activity → femoral epiphysis reestablished
4. **Remodelling:** new femoral head (enlarged & flattened) → reshaping occurs during growth → healing (if responding to conservative c.) takes 2-4 yrs

• **Clinical presentation:**

- Limp of acute / insidious onset, often painless (1-3 months)
- Px (if present) localised to hip or referred to the knee, thigh, or abdomen
- With progression, px typically worsens with activity
- No systemic findings should be found



Legg-Calve-Perthes Disease (LCPD) (cont)

- **Physical examination:**
 - ↓ IR & ABD of hip
 - Px on rot. referred to the anteromedial thigh &/or knee
 - Atrophy of thighs & buttock from px leading to disuse
 - Leg length discrepancy
 - Trendelenburg sign: weak abductors (glute med & min)
 - Antalgic gait (acute): short-stance phase 2° to px in the weight-bearing leg
 - Trendelenburg gait (chronic): downward pelvic tilt away from the affected hip during swing phase
- **Diagnosis:**
 - Labs are used to exclude other diagnoses

Imaging:

 - Early radiographs can be normal
 - Plain films are preferred
 - Standard A-P pelvis & frog-leg views
 - If in doubt or plain films are normal, DEXA scan or MRI

Early findings:

 - Epiphyseal cartilage hypertrophy
 - Epiphysis appears smaller or denser
 - "Crescent sign"

Late findings:

 - Mushroom head & snow cap
 - DEXA shows decreased perfusion of the femoral head
 - MRI shows marrow changes
- **Complications:**
 - Coxa magna (widening) & coxa plana (flattening)
 - Damaged femoral head can result in premature physical arrest, causing leg length discrepancy
 - Poorly formed femoral can lead to acetabular dysplasia & hip incongruity
 - Hip incongruence can alter mechanics, causing labral tears
 - Complications like lateral hip subluxation or extrusion can result in lifelong problems
 - Late complication: arthritis



Legg-Calve-Perthes Disease (LCPD) (cont)

- **Management:**
 - **Goals:** px & Ssx management, restoration of ROM, & containment of femoral head in acetabulum
 - Activity restriction & protective weight-bearing until ossification is complete
 - NSAIDs
 - STW
 - Surgery
- **Ddx:**
 - Infectious etiology including septic arthritis, osteomyelitis, pericapsular pyomyositis
 - Transient synovitis
 - Multiple epiphyseal dysplasia (MED)
 - Spondyloepiphyseal dysplasia (SED)
 - Sickle cell disease
 - Gaucher disease
 - Hypothyroidism
 - Meyers dysplasia

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Acetabular Labral Tear (A/PLT) / Loose Body

• YELLOW

- **Intro:**
 - Involves the cartilage ring (labrum) around the outside rim of the hip joint socket
 - Labrum cushions the hip joint & acts as a rubber seal, securing the thighbone within the hip socket
- **Aetiology (risk factors):**
 - Most tears occur in anterosuperior quadrant
 - Posterosuperior tears are more common in Asian population due to hyperflexion or squatting motions
 - Occur between 8-72 yrs (highest incidence in 50 yrs)
 - F>M
 - 22-55% pts w/ hip/groin px have an ALT
 - Up to 74% of ALTs have no specific cause
 - Trauma & sports-related causes
 - Individuals attending gym 3x/week have an ↑ risk of developing ALT



Acetabular Labral Tear (A/PLT) / Loose Body (cont)

- **Pathophysiology:** **Five common mechanisms:**
 - Femoroacetabular impingement (FAI)
 - Trauma: mis-stepping, running w/ hyperextension, or EX rot
 - Capsular laxity: cartilage disorders (e.g. Ehlers-Danlos syndrome) or rotational laxity from excessive EX rot (ballet, hockey, gymnastics)
 - Hip dysplasia
 - Degenerative changes
- **Clinical presentation:**
 - Anterior hip / groin px
 - ALT indicated by buttock px; while PLT are less common
 - Clicking, popping, giving way, catching, & stiffness
 - Dull ache often ↑ w/ activities (running, brisk walk, twisting, & climbing stairs)
 - Specific manoeuvres causing groin px: 1) FX, ADD, IR fro ALT 2) Passive hyper EXT, ABD, EXT rot for PLT
 - Functional limitations: prolonged sitting, walking, climbing stairs, running, & twisting/pivoting
 - Ssx can persist for long duration (average >2 yrs)
 - Traumatic onset associated w/ an audible pop or sensation of subluxation
- **Physical examination:**
 - FX knee gait & shortened step length on affected leg
 - Anterior hip-impingement test (FAIR) or posterior impingement test
 - FABER test
 - Resisted SLR
 - Leg-roll test
- **Diagnosis:**
 - MR arthrogram preferred over MRI & plain radiograph
- **Complications:**
 - Recurrence**Post-surgical:**
 - DVT
 - Articular damage
 - Neuromuscular injury
- **Management:**
 - NSAIDs
 - 10-12 week protocol
 - Reduce WB
 - Injection
 - Strengthening
 - SMT
 - Surgery



Acetabular Labral Tear (A/PLT) / Loose Body (cont)

- **Ddx:**
 - Contusion (esp. over bony prominences)
 - Strains
 - Athletic pubalgia
 - Osteitis pubis
 - Inflammatory arthritides (RA)
 - Piriformis syndrome
 - SHS
 - Bursitis(trochanteric, ischiogluteal, iliopsoas)
 - OA of femoral head
 - AVN
 - Septic arthritis
 - Fracture or dislocation
 - Tumours
 - Hernia (inguinal or femoral)
 - SCFE
 - LCPD
 - Referred px from Lx-Sx or SIJ regions

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Hernias (sports & inguinal)

• YELLOW

- **Intro:**
 - Protrusion of intestines through a weak spot in the abdominal muscles
 - Lump may disappear when pt lies down & can sometimes be manually pushed out
 - Coughing may cause the hernia to reappear, indicating the temporary nature
- **Aetiology (risk factors):**
 - Lifting heavy object w/o stabilising abdominal muscles
 - Diarrhea or constipation
 - Family Hx (4x more likely)
 - Persistent coughing or sneezing
 - Obesity, poor nutrition, & smoking (weaken muscles)
 - Pregnancy (low risk)
 - Injury: most sports-related hernias occur in the groin & don't appear as a bulge (if untreated, can evolve into an inguinal hernia)
 - Common surgery
 - Peaks at 5 yo & >70 yo
 - M>F (9:1)
- **Pathophysiology:**
 - Congenital & acquired component
 - Higher type III collagen compared to type I



Hernias (sports & inguinal) (cont)

- **Clinical presentation:**
 - Bulging in groin area
 - Px / burning / pinching sensation in groin area
 - Can radiate into scrotum or down the leg
 - Can be aggravated by activity or coughing
- **Physical examination:**
 - Palpable bulge
 - If no bulge, ask pt to cough while palpating inguinal area
- **Diagnosis:**
 - Usually used when body habits makes physical exam limited
 - Ultrasound
 - CT scan
 - MRI
- **Complications:**
 - Hernia recurrence
 - Chronic px
- **Management:**
 - Monitor hernia
 - Wearing a truss (supportive undergarment that holds it in place)
 - NSAIDs
 - Reduce pressure off the tissue (e.g. address breathing mechanics)
 - Strengthen supportive tissue (deep core)
 - Reduce aggravating activities
 - Surgery (very common)
- **Ddx:**
 - Lymphadenopathy
 - Lymphoma
 - Metastatic neoplasm
 - Hydrocele
 - Epididymitis
 - Testicular torsion
 - Abscess
 - Hematoma
 - Femoral artery aneurysm



Hernias (sports & inguinal) (cont)

- Sport hernia:**
- Weakness in the inguinal canal's posterior wall
 - Nerve irritation & px occur at the tendon insertion to the bone
 - Expansion of the transversals fascia at its weakest point
 - Enlargement of the inguinal triangle results from the fascia expansion
 - Rectus abdominis moves upward & inward due to enlargement
 - Increased tension on the pubis is noted, potentially leading to tears
 - Bulging may compress the genital branch of the genitofemoral n.
 - Contribution to chronic px

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Piriformis Syndrome

• GREEN

- Intro:**
- Sciatica nerve entrapment at the ischial tuberosity, presenting w/ radicular px
 - Piriformis m. is an EXT rot of the hip
 - Conditions that **mimic** it: Lx canal stenosis, disc inflammation, or pelvic causes

- Aetiology**
- (risk factors):**
- Accounts for 0.3-6% of all cases of LBP &/or sciatica
 - Annual incidence approx. 2.4 million cases
 - Middle aged pts
 - F>M (6:1)

- Pathophysiology:**
- Function of piriformis:**
- EXT rot during hip extension
 - Acts as a hip adductor during hip FX

Issues & consequences:

- Overuse, irritation, or inflammation of piriformis m. → leads to irritation of adjacent sciatica n. → sciatica n. entrapment may occur anterior to piriformis muscle or posterior to gemelli-obturator interns complex

Causes of piriformis stress:

- Chronic poor body posture
- Acute injury resulting in sudden & strong IR of the hip



Piriformis Syndrome (cont)

- **Clinical presentation:**
 - Chronic px in buttock & hip area
 - Px when getting out of bed
 - Inability to sit for prolonged periods
 - Butt px worsened by hip movements
 - Ssx resembling sciatica
 - Difficulty differentiating radicular px due to 2° spinal stenosis vs piriformis s.
 - Radiating px into posterior thigh, occasionally lower leg at dermatomes L5 & S1
- **Physical examination:**
 - Mild-moderate tenderness around sciatica notch
 - FAIR test
 - Limited SLR
 - No neurological deficits
 - Sometimes limp when walking
 - Shortened & EXT rot leg when supine (*splayfoot*)
- **Diagnosis:**
 - US
 - MRI
 - CT
 - EMG
- **Complications:**
 - Related to surgery:**
 - Nerve injury (sciatica)
 - Infection
 - Bleeding
- **Management:**
 - Diagnosis of exclusion
 - NSAIDs
 - Muscle relaxants
 - Injections
 - Mobs
 - SMT
 - STW
 - Stretching
 - Surgery



Piriformis Syndrome (cont)

- Ddx:
 - Lx canal stenosis
 - Disc inflammation
 - Hamstring injury
 - Lx-Sx facet syndrome
 - Lx radiculopathy
 - Spondylolisthesis / spondylosis
 - SIJ dysfunction
 - Inferior gluteal artery aneurysm
 - Tumour
 - Arteriovenous malformation

Femoroacetabular Impingement (FAI)

• GREEN

- Intro:
 - Hip px due to mechanical impingement from abnormal hip morphology
 - Involves proximal femur &/or acetabulum
 - Soft tissue damage in the FA joint results from extreme hip rotation or repetitive abnormal contact between bony prominences
 - Degenerative changes & OA may develop in the long-term of this abnormal contact
- Aetiology (risk factors):
 - Still under investigation
 - Genetic factors may contribute to abnormal hip pathology
 - ↑ incidence in young athletes (males) due to *cam deformity* formation
 - Can occur in pts w/ a Hx of SCFE or LCPD
 - SCFE can cause a residual deformity even after surgical fixation, leading to an impingement
 - High prevalence in asymptomatic pts
 - Increased awareness → higher Dx rate throughout every. age



Femoroacetabular Impingement (FAI) (cont)

- **Pathophysiology:**
 - FAI syndrome is associated w/ 3 hip joint morphology variations: cam, pincer, & a combination
 - **Cam:** flattening or convexity of femoral head-neck junction, common in young athletic men
 - **Pincer:** "overcoverage" of femoral head by acetabulum, more common in women
 - Isolated cam or pincer morphology insufficient for FAI syndrome Dx
 - **Combination:** often associated w/ SCFE (85% of pts)
 - Cam & pincer morphologies can damage articular cartilage & labrum due to impingement, causing FAI Ssx

Other factors contributing to FAI:

 - Weakness of deep hip muscles compromising stability, leading to increased joint loading
 - Repeated loading of labrum causing up regulation of nociceptive receptors
- **Clinical presentation:**
 - Gradual onset of hip px, worsened by hip FX & IR
 - Activities like high-intensity sports, squatting, driving, & prolonged sitting aggravate
 - Acute hip px warrants workup for other potential causes

Key inquiries: trauma, infection, SCFE, LCPD, hip dysplasia, osteonecrosis, sporting activities, & other hip pathologies

 - Groin & anterolateral hip px, radiating to thigh, often with a "C sign" gesture indicating px location

Associated complaints: clicking, popping, & catching, suggesting a possible labral injury
- **Physical examination:**
 - Trendelenburg air or abductor lurch suggests abductor muscle weakness or insufficiency
 - ↓ ROM, especially FX & IR
 - FABER test: often +ve due to impingement-related labrum tear
 - +ve FAIR & posterior impingement test
 - +ve IROP test
- **Diagnosis:**
 - X-ray initially
 - CT or MR arthrogram for better appreciation of morphology of the hip / associated cartilage & labral lesions



Femoroacetabular Impingement (FAI) (cont)

- **Complications:**
 - Associated w/ surgery
- **Major:**
 - Femoral neck fracture: risk increases w/ excess reaction of a cam lesion
 - Abdominal compartment syndrome:during hip arthroscopy
 - Other: PE, deep joint infection, AVN, postoperative complication
- **Minor:**
 - Hematoma
 - DVT
 - Numbness & discomfort of lateral thigh
 - Temporary perineal numbness
 - Dyspareunia
 - Superficial infection
 - Heterotopic ossification
- **Management:**
 - Adaptation of ADLs to a safe ROM
 - Strengthening
 - SMT / hip distraction
 - Strengthening
 - NSAIDs
 - Steroid injections
 - Surgery
- **Ddx:**
 - Trochanteric bursitis
 - Athletic pubalgia
 - Snapping hip syndrome
 - Flexor muscle strain
 - Hip subluxation
 - Soft tissue tumour
 - Femoral neck stres fracture
 - Septic arthritis
 - Osteomyelitis
 - Soft tissue infection
 - Osteonecrosis
 - Lx radiculopathy
 - Inguinal hernia
 - Hip OA

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Disordered Hip Complex

- Hypertonic iliopsoas

- Starts w/ a muscular imbalance
- Most likely due to sedentary lifestyle
- Creates new muscular strains, ligamentous & capsular sprains & fascial tension

- Psoas pulls femur into FX & EXT rot
- Hip joint I spilled anterior & superiorly
- Considerable increase in intracapsular pressure of the hip joint
- Directly related to degenerative changes in the hip
- Limits pelvic sway

- Hip & groin px
- Possible referral into anterior-medial thigh
- LBP

- Modified Thomas test

- Passive stretching
- TrPs
- SMT
- STW
- PIR
- Muscle relaxers

Capsulitis of the Hip

- **Intro:**
 - Also known as: adhesive capsulitis & 'frozen hip'
 - Non-specific & painful ROM limitations
- **Aetiology (risk factors):**
 - May appear as 1° condition, develops w/o underlying cause
 - May occur as 2° entity, superimposed on underlying joint pathology
 - Commonly affects middle-aged females, suggesting potential hormonal or demographic influence
 - Unknown triggers: initiate inflammatory response leading to a frozen hip
 - Nocturnal or weight-bearing aggravation
- **Pathophysiology:**
 - Often begins w/ synovial membrane inflammation
 - Over time, inflammatory process may lead to fibrosis of the joint

Stages of frozen hip:

1 & 2 represent acute AC, where px is typically the 1° Ssx

3 & 4 represent chronic AC, characterised by ROM limitations as the 1° Ssx
- **Clinical presentation:**
 - Non-specific px
 - Nocturnal px or px exacerbated by weight bearing may occur
 - Progression of Ssx



Capsulitis of the Hip (cont)

- **Physical examination:**
 - ↓ ROM
 - Muscle weakness due to px & stiffness: flexors, extensors, abductors, & adductors
 - Potential instability or laxity of joints
 - Soft tissue palpation: potential tenderness, swelling, or warmth
 - Gait alterations or compensatory movements
 - Sensory & motor function in LL (nerve or vascular compromise)
- **Special test:**
 - Thomas test
 - Ober's test
 - FABER test
 - Provocative manoeuvres
- **Diagnosis:**
 - Challenging to Dx due to limited value in standard diagnostic tests & imaging techniques
 - Differentiate from *Arthrofibrosis*: AC is distinct from arthrofibrosis (knee, elbow, shoulder), & the initial inflammatory phase in AC progresses to capsular fibrosis
 - AC can lead to arthrofibrosis
- **Management:**
 - SMT
 - Pressure dilation
 - NSAIDs
 - Exercise program
 - Steroid injections
 - Surgery

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Congenital Dislocation of the Hip (CDH)

• YELLOW

- **Intro:**
 - Also known as developmental dysplasia of the hip (DDH)
 - Caused by abnormal hip development & can manifest in infancy or early childhood
 - Multifactorial cause, involving genetic, environmental, & mechanical factors



Congenital Dislocation of the Hip (CDH) (cont)

- **Aetiology (risk factors):**
 - F>M (4:1)
 - Breech position in the last trimester (most significant risk)
 - Family Hx
 - swaddling in the adducted & extended position
 - Postmaturity (prematurity isn't associated w/ ↑ risk)
 - 69.5 / 1000, but most are self-limiting in approx. 6-8. weeks
 - Leaving 4.8 / 1000, which need further treatment
- **Pathophysiology:**
 - Under-coverage of femoral head due to disrupted contact can lead to abnormal development
 - Swaddling in an extreme position hinders proper hip development
 - Acetabulum continues to grow up to age 5
 - Prolonged maligned contact causes chronic changes like capsule hypertrophy, ligament teres hypertrophy, & thickened acetabular edge
- **Clinical presentation:**
 - Mild hip instability
 - Limited ABD in infants
 - Asymmetric gait in toddlers
 - Hip px in adolescence
 - OA in adults
- **Physical examination:**
 - Trendelenburg gait (abductor insufficiency)
 - Lx lordosis
 - Leg length discrepancies
- **Diagnosis:**
 - US
 - X-ray
- **Complications:**

Failure to identify & treat:

 - Functional disability
 - Hip px
 - Accelerated OA
- **Management:**
 - Pavlik harness
 - Adolescent / adult hip preservation surgery
- **Ddx:**
 - Proximal femoral focal deficiency
 - Femoral neck fracture
 - Coxa vara
 - Residual effects of infective arthritis

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