

### Importance of Hip


- Common pain referral site
- Serves as force transmitter for both upper and lower extremities
- More microtrauma injuries than macrotrauma

- **Coxa valga:** an angle between femoral neck and shaft greater than  $125^\circ$ ; increases pressure into the joint
- **Coxa vara:** an angle between femoral neck and shaft less than  $125^\circ$ ; increases stress on the femoral neck

### Femoral Neck Angles: Normal, Coxa Valga, Coxa Vara


- **Retroversion:** Femoral neck is rotated in relation to femoral shaft at an angle less than  $12^\circ$ ; results in calcaneal inversion, causing the person to ambulate with a toe-out gait.
- **Anteversion:** Femoral neck is rotated in relation to femoral shaft at an angle greater than  $15^\circ$ ; leads to foot pronation, causing the individual to ambulate with a toe-in gait.

### Femoral Neck Alignment with Long Axis of Femur: Normal, Retroversion, Anteversion




### Nerves

- Sciatic nerve: occasionally runs through piriformis. Impingement can cause posterior leg and calf symptoms
- Lateral femoral cutaneous nerve: passes through psoas major and under inguinal ligament. Impingement can cause TFL and anterolateral thigh aching and burning



### Nerves

- Obturator nerve: enters pelvis to provide sensory and motor innervation to medial thigh. Impingement causes medial thigh sensory and adductor strength changes




### Joint Mobility

- Convex femoral head on concave acetabulum therefore mobilization is in opposite direction of movement during open chain motion
- In capsular restriction: ER remains normal, IR is restricted
- Loose-packed position: 30 degrees flexion and 30 degrees abduction with slight IR



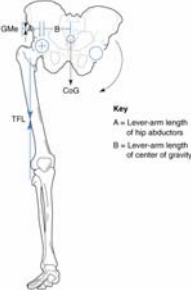
### Weight Bearing and Assistive Devices

- In one leg stance, abductors prevent contralateral lateral pelvic drop
- Force required to perform this is greater than body weight due to length of lever arm
- If muscles are not strong enough, contralateral pelvis will drop



### Weight Bearing and Assistive Devices

- Cane applied to opposite side of weakness will provide upward counterbalance force



Key  
 A = Lever-arm length of hip abductors  
 B = Lever-arm length of center of gravity



### Leg Length Discrepancies

- Can result from length, unilateral or soft tissue differences
- Shoe wear is most obvious indicator
- Can lead to osteoarthritis of longer leg




### Rehabilitation Considerations

- Hip pain difficult due to several referring sources
- Some hip injuries are self limiting
- Predisposing factors must be corrected
- Hip stabilization exercise must include co-contraction during balance, agility and functional exercise.




### Soft Tissue Mobilization

- Identify differential diagnosis that may be contributing to hip or groin pain
- If myofascial pain treatment may proceed
- Deep tissue massage, scar tissue mobilization, friction massage, myofascial release




### Joint Mobilization

- Grades III and IV if hip joint displays capsular pattern of restricted motion
- Little need to stabilize hip joint, pelvis anchors body



### Flexibility Exercises

- Knee, back and pelvis must be positioned appropriately
- Active contraction of opposing muscles leads to improved results
- Prolonged stretches most effective




### Strengthening Exercises

- Substitutions at hip occur easily and must be corrected
- Also strengthen trunk, knee and ankle



### Proprioceptive and Functional Exercises

- Progress from static balance to distracting balance activities then agility exercises, finally plyometrics
- Functional exercises are sport specific




### Muscle Imbalance Syndromes

- Characterized by tightness of a muscle group, weakness of antagonist, compensatory muscle firing patterns
- Symptoms: pain, reduced function
- Possible results: structural adaptations, changes in myofascial tissue




### Muscle Imbalance Syndromes

- Hip flexor tightness can lead to spondylitic pathology
- Piriformis tightness and weakness can result from sacroiliac dysfunction, leg length discrepancies, other muscle imbalance, running on canted surface




### Acute Soft Tissue Injuries

- Contusion
- Groin strain
- Sprains




### Inflammation Conditions

- Bursitis can occur in several bursae anteriorly, posteriorly and laterally
- Other diagnoses should be considered if no response to treatment
- Tendonitis often affects adductor longus, iliopsoas and rectus femoris



### Inflammation Conditions

- Osteitis pubis occurs more often in race walkers, distance runners and soccer players
- Tightness of iliopsoas can cause snapping hip and lead to bursitis and tendonitis
- Must correct underlying problem



### Fractures and Dislocations

- Traumatic fractures rare in sports, more often stress fx
- Slipped capital femoral epiphysis fractures are growth plate fractures in adolescents (cannot turn hip inward, foot turns outward)
- Pool activity beneficial
- Dislocations rare, but can be seen in high-energy sports

