The Hip Joint

Exercises and Injuries
Anterior Pelvic Tilt

- How would weak hamstrings, and tight hip flexor muscles affect the lower back?
Anterior Tilt

- abdominals
- back extensors
- stretched but weak
- strong but tight
- hip flexors
- hamstrings
- strong but tight
- stretched but weak

Muscle Balance

Muscle Imbalance
Anterior Tilt

Pelvic Motion, Lateral View
Anterior Tilt

• How can excessive anterior tilt be corrected?
# Anterior Tilt

<table>
<thead>
<tr>
<th>Direction</th>
<th>Injuries</th>
<th>Cures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior Tilt</td>
<td>1.) low back pain</td>
<td>A) Strengthen abdominal muscles and hamstrings</td>
</tr>
<tr>
<td></td>
<td>2.) hamstring strain</td>
<td>B) Stretching hip flexors (and erector spinae)</td>
</tr>
<tr>
<td></td>
<td>3.) knee problems</td>
<td></td>
</tr>
</tbody>
</table>
Lateral Pelvic Tilt

- During walking the gluteus medius and minimus abduct (or hold up) the free leg, preventing it from sagging.
- Both are important in transferring weight from one leg to the other (e.g. running, hopping, skipping, etc.)
- Their effectiveness decreases with age.
# Lateral Tilt

<table>
<thead>
<tr>
<th>Direction</th>
<th>Injuries</th>
<th>Cures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral Tilt</td>
<td>1.) iliotibial band syndrome</td>
<td>A. Stretching hip adductors,</td>
</tr>
<tr>
<td></td>
<td>2.) low back pain -- usually one sided</td>
<td>B. Strengthen hip abductors</td>
</tr>
<tr>
<td></td>
<td>3.) adductor strains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.) lateral hip pain</td>
<td></td>
</tr>
</tbody>
</table>
Exercises for the Hip Joint
Terminology

- **Compound**
  - An exercise that involves two or more joint movements.

- **Isolated**
  - An exercise that involves just one discernible joint movement.
Terminology

**Closed Chain**
An exercise when the distal end of an extremity is fixed to any surface

**Open Chain**
An exercise when the distal end of an extremity is not fixed to any surface
Gluteus Maximus

- Produces hip extension beyond 15 degrees; not used extensively during walking
- Strongly used during running, hopping, skipping, and jumping
- Best isolated with the knee flexed to reduce hip extension from the hamstrings
Hip Extensors – Squats
Hip Extensors – Dead Lift
Hip Extensors – Lunge
Hip Extensors – Step Up
Hip Extensors – Leg Press
## Hip Extension

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Compound/Isolated</th>
<th>Open/Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squats</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Deadlift</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Lunge</td>
<td>C</td>
<td>O</td>
</tr>
<tr>
<td>Step up</td>
<td>C</td>
<td>O</td>
</tr>
<tr>
<td>Leg Press</td>
<td>C</td>
<td>O</td>
</tr>
</tbody>
</table>
Hip Adductor Muscles

- Not heavily used in ordinary movements
- Horse back riding, the breaststroke kick in swimming
Hip Adductors – Seated
Hip Adductors – Lever
Hip Abductors – Cable
Hip Abductors – Seated
Hip Abductors – Lever
## Hip Abductors/Adductors

<table>
<thead>
<tr>
<th></th>
<th>Compound/Isolated</th>
<th>Open/Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>I</td>
<td>O</td>
</tr>
<tr>
<td>Seated</td>
<td>I</td>
<td>O</td>
</tr>
<tr>
<td>Lever</td>
<td>I</td>
<td>O</td>
</tr>
</tbody>
</table>
Hip Flexors – Leg Raise
Hip Flexors – Lever
Iliopsoas

- Strong hip flexor muscle
- Raises legs off the floor from the supine position.
- Pulls anteriorly on the lower lumbar vertebrae
- May aggravate lower back problems
- Strong abdominal muscles can prevent lumbar strain
- Used during complete sit-ups and straight leg sit-ups.
- Stretching this muscle requires hyper-extension of the hip.
**Hip Flexors**

<table>
<thead>
<tr>
<th></th>
<th>Compound/Isolated</th>
<th>Open/Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg</td>
<td>I</td>
<td>O</td>
</tr>
<tr>
<td>Raise</td>
<td>I</td>
<td>O</td>
</tr>
<tr>
<td>Lever</td>
<td>I</td>
<td>O</td>
</tr>
</tbody>
</table>
Stretching

• Opposite action of the muscle
• For example, to stretch a hip extensor muscle, perform hip flexion.
Gluteal Muscles - Stretching
Abductors - Stretching

[Images of stretching exercises]
Hip Flexors - Stretching
Tensor Fasciae Latae

- Prevents external rotation at the hip when flexed

**Iliotibial Band Stretch**
This exercise helps prevent IT band syndrome.

1. Position yourself as shown, with your right hand and forearm on the wall while keeping your arm straight.
2. Move your right foot back so that it crosses behind the left leg.
3. Slowly lean into the wall and feel the stretch in your right iliotibial band and your calves.
4. Hold for 30 seconds.
5. Switch to other side and repeat.
Abductors (IT Band) - Stretching
HIP INJURIES
Hip Pointer
A hip pointer is a contusion to the iliac crest, the surrounding soft tissue structures, or the greater trochanter of the femur.

Typically, the injury is caused by a direct blow or fall.
HIP DISLOCATION
Dislocation

- Any traumatic hip dislocation requires **immediate treatment**, ideally within six hours or less.

- This is because a traumatic hip dislocation **interrupts the normal blood circulation** to the top of the femur, depriving the bone of its vital oxygen supply.

- Unless the dislocated hip is reduced (replaced in its socket) promptly, and normal circulation is restored within the hip joint, there can be permanent damage to the head of the femur. This permanent damage is called **avascular necrosis**.
January 13, 1991, Bo Jackson partially dislocated his hip, tearing the blood vessels to the neck and head of the femur.

X-rays revealed a small fracture to the posterior of the hip socket.

Four weeks later, scans of the joint showed the beginning of vascular necrosis, in which the bone cells die because of deficient blood supply, and chondrolysis, in which cartilage degenerates.

Eventually Jackson would require a total hip replacement which relieves him of pain and allows him full range of motion.
Causes

1. **Osteoarthritis** is perhaps the most common cause for hip replacement surgery.

2. **Avascular necrosis** is another cause of degeneration of the hip joint.

3. Abnormalities of hip joint function resulting from fractures of the hip and some types of hip conditions that appear in childhood can also lead to degeneration many years after an injury.
Surgery - FYI
Parts

- Acetabular component – metal shell with plastic inner socket
- Femoral component – metal stem with a metal or ceramic head
Operation
Removing the femoral head

- Dislocate the hip joint
- Cut femoral neck with power saw
Reaming the Acetabulum

- Power drill and special reamer remove the cartilage
- Bone is formed to fit the metal shell
Inserting the Acetabular Component
Preparing Femoral Canal
Inserting the Femoral Stem

Femoral Stem
(inserted into femoral canal)
Attaching the Femoral Head

Femoral Stem
(inserted into femoral canal)
Completed

Artificial Hip (in place)