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Current Concepts in the Treatment of Hip Injuries for the Physical Therapist Assistant

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Introduction

- This course will provide physical therapist assistants a clinical update on current concepts in treating patients with injuries of the hip region. The course will focus on condition-specific treatment in both non-operative and postoperative patients.
Objectives

As a result of this course, participants will be able to:

- Describe the condition characteristics that affect treatment methods for patients with pathology of the hip region.
- Safely implement rehabilitation activities that are commonly recommended for patients with pathological conditions of the hip region.
- Recognize surgical characteristics that dictate postoperative rehabilitation of patients undergoing surgery for conditions of the hip region.
- Progress patients with common hip region injuries through various stages of rehabilitation based upon their clinical presentation.

Course Outline

- Background and Review of Learner Outcomes
- Review of Clinical Anatomy
  - Bony Anatomy
  - Labrum and Capsuloligamentous
  - Musculature (by function)
  - Additional Soft Tissue Structures
  - Neurovascular
- Treatment for Common Conditions of the Hip
  - Osteoarthritis
  - Femoralacetabular Impingement and Labral Tears
  - Hypermobility/Instability
  - Muscle Injuries
  - Recognition of pelvic floor involvement
Course Outline (contd.)

- Postsurgical Rehabilitation
  - Total Hip Arthroplasty
  - Hip Arthroscopy
- Rehabilitation Progression Case Examples
- Summary of Concerns for Treating Patients with Hip Disorders
- Conclusion/Question/Answer

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Introduction

- Patients presenting with symptoms in the hip and pelvic region present unique challenges
- The large number of adjacent structures can make examination and treatment of the hip and pelvic region a challenging process
- Patients may experience pain originating from numerous intra and extra-articular sources
- An organized approach to treatment and constant monitoring for status changes is imperative when treating individuals with hip pathology
Femoral Neck

- Angulation in frontal (inclination) and transverse planes (declination/torsional)
- Angles change throughout development
- Variations from normal values can effect joint stability, lower extremity alignment, and injury patterns

Pelvic Complex

Innominate
The innominate bones articulate with the sacrum to form a closed ring with three joints:
- Left and right sacroiliac joints
- The pubic symphysis

Function: Transmit forces between the lower extremities and the spine
**Acetabular Labrum**

Fibrocartilagenous ring attached to periphery of the acetabulum

- *Internal Surface*: Attached to acetabular rim and transverse acetabular ligament
- *Central Surface*: Lined by articular cartilage continuous with that of the acetabulum
- *Peripheral Surface*: Attaches to joint capsule at the base

**Hip Joint Capsule and Ligaments**

- Dense, relatively inelastic, fibrous capsule
- Thickest anterior/superior, thinnest posterior/inferior
- Reinforced by extra-articular ligaments
Pelvic Complex Ligaments

Primary Hip Muscles

- **Flexion**: Iliopsoas, Rectus Femoris, TFL
- **Extension**: Gluteus Maximus, Hamstrings
- **Abduction**: Gluteus Medius, Gluteus Minimus, TFL
- **Adduction**: Adductor Magnus, Longus, Brevis, Gracilis
- **External Rotation**: Piriformis, Obturators, Gemelli, Quadratus Femoris
- **Internal Rotation**: Not the PRIMARY function of any muscle
Pelvic Floor Muscles

Muscles of the pelvic outlet, spanning from the peritoneum to the perineum regions

Abdominal Musculature

Muscles of the Trunk

- Pectoralis major
- External oblique
- Internal oblique
- Rectus abdominis
- Transverse abdominis
Hip & Pelvic Bursae

- Iliopsoas bursae
- Trochanteric bursae

Neurovascular Structures

Interactive Hip © 2000 Primal Pictures Ltd.
Lumbar Plexus Branches

- Iliohypogastric
- Ilioinguinal
- Genitofemoral
- Lateral Femoral Cutaneous
- Obturator
- Femoral
- Lumbosacral Trunk

Sacral Plexus Branches

- Nerve to Quadratus Femoris and Gemellus Inferior
- Nerve to Piriformis
- Nerve to Obturator Internus and Gemellus Superior
- Superior Gluteal
- Inferior Gluteal
- Posterior Femoral Cutaneous
- Sciatic Nerve
Vasculature

Gluteal Region Arteries

Superior Gluteal Artery
Inferior Gluteal Artery
Internal Pudendal Artery
Clinical Considerations for Treatment of Common Hip Conditions

Treatment of Intra-articular Hip Disorders

- Femoral Acetabular Impingement Syndrome
- Hip Joint Hypermobility
- Osteoarthritis
Femoral Acetabular Impingement Syndrome (FAI)

**FAI Condition Characteristics**

Femoral Acetabular Impingement (FAI)

- Occurs when there is decreased joint clearance between the femur and the acetabulum
- Two types have been described:
  - *Cam*: Femoral deformity
  - *Pincer*: Acetabular deformity
FAI and Acetabular Labral Tears

- Most often FAI is not the initial diagnosis of interest.
- Patient symptoms most likely resulting from secondary labral tear, chondral damage, or degenerative changes
- These changes result in pain and functional limitation
Clinical Presentation of FAI

- Clinical Tests
  - Numerous tests for FAI have been described
  - No tests demonstrates good specificity – primary utility is screening (Riemen et al, 2015)
- Diagnosis of symptomatic FAI is dependent on a “cluster” of findings
  - Groin pain
  - Pain with specific activities, typically involving repetitive or deep flexion
    - Squatting
    - Sitting
  - Relatively younger
  - No severe loss of ROM, with IR and flexion potentially being affected
  - Potential mechanical symptoms
  - Clinical tests (above) may be helpful in combination with other findings
  - Other differential diagnoses ruled out
Key Treatment Strategies for FAI

Activity Modification
- Avoid repetitive end ranges of flexion, IR, and abduction

Joint Mobilization (PT)
- Address early capsular changes

Flexibility
- Psoas and rectus to eliminate anterior pelvic tilt

Strength in Protected Ranges
- Avoid impinging positions

Motor Control

Multiplanar Hip & Lumbopelvic Strengthening

Progress from single joint emphasized exercises (non-weightbearing), to compound movements emphasizing movement in one plane of motion, while maintaining stability in others
FAI – Multiplanar Control


Inadequate control

- Frontal plane (adduction)
- Transverse plane (internal rotation)

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FAI – Multiplanar Control

Strength Activities

- Abductors
- External rotators

Functional Exercises

- Weight bearing with multiplanar stability demands
Lumbopelvic Component

- Address flexibility and strength deficits contributing to dynamic pelvic positioning and stabilization
  - Loss of frontal plane stabilization of pelvis and transverse plane stability of the hip in weight bearing associated with symptomatic FAI (Austin et al, 2008)
    - Strengthen hip abductors and external rotators
  - Dynamic anterior pelvic tilt associated with impingement condition occurring earlier in flexion ROM (Ross et al, 2014)
    - Optimize flexibility of ilioptosan and rectus femoris
    - Strengthen and optimize recruitment of lumbopelvic stabilizers

Pelvic Control
Spectrum of FAI-related Joint Pathology

Femoral Acetabular Impingement $\rightarrow$ Variable etiology

$\downarrow$

Altered joint mechanics

$\downarrow$

Labral Lesions $\rightarrow$ Variable timing and types of lesions

$\downarrow$

Chondral Damage

$\downarrow$

Osteoarthritis $\leftarrow$ Small scale studies, OA precursors in blood (Bedi et al., 2013)

Not well understood

Not everyone; patterns vary

The Hypermobile Hip Joint
Hypermobile Hip Condition
Characteristics

- Joint hypermobility may predispose individuals to injuries of the hip joint and lumbosacral structures
- Categories of Hypermobility
  - Generalized
  - Focal (acquired with trauma or repetitive force)
- Brief screen of joint tissue integrity may be useful in diagnosis and prognosis
- May guide treatment recommendations

The Hypermobile Patient
(know the underlying cause)

Boney Architecture (dysplasia)
- Mis-shaped Femoral Head
- Femoral Deformity: Coxa valga, increased femoral version
- Shallow Acetabulum
- Anteverted Acetabulum

Primary Capsulo-labral Compromise
- Universal laxity (inherent)
- Focal Laxity (acquired)
- Ligamentum Teres Deficiency
Clinical Presentation of Focal Hypermobility

Clinical Presentation
- Often reports pain during repetitive activity
- Often involved in activities requiring significant flexibility: dancing, gymnastics, etc.
- Examine for hip and lumbopelvic weakness

Clinical Tests
- Positive log roll test (anterior)
  - No metrics available regarding sensitivity or specificity
  - Apprehensive with long axis distraction (anterior or general)

Key Treatment Strategies for the Hypermobile Hip

- Dynamic Stabilization
  - Strength
    - Primary hip movers with specific focus on abductors and rotators of the hip
    - Lumbopelvic stabilizers
    - Neuromuscular Control
- Symmetry
- Patient Education
Neural (Proprioceptive)   
Passive (Bony, Labrum, Capsuloligamentous)   
Active (Muscular)   
Rehab Focus

Treatment Spectrum

Strength

Motor Control

Central Strength / Endurance

Symmetry

- Side-to-Side
  - Attempt to minimize the discrepancy between dominant and non-dominant sides

- Group-to-Group
  - External vs. internal rotators
  - Abdominal vs. lumbar extensors
  - Not specifically equal strength, but appropriate ratio

- Strength-to-Flexibility
  - Avoid over-emphasizing stretching without an appropriate strength foundation
  - Do not create motion that can not be controlled
Focal Hip Strengthening Progression

Weight-bearing Stabilization

Dynamic Strength
Improve Motor Control

- Improve efficiency of control at various positions
- Begin early recruitment activities
- Progress to functional positions with multiple tasks
- Eliminate compensation strategies

Clinical Course and Outcomes for the Hypermobile Hip

- Moderate or greater dysplasia has association with early onset hip OA (<50 years; Gala, Clohisy, Beaule, 2016)
- Unresponsive cases with hip dysplasia may be candidates for hip preservation procedure
  - Periacetabular osteotomy (PA)
- Focal capsular-ligamentous hypermobility has better prognosis for conservative treatment, however surgical options exist for unresponsive cases
  - Arthroscopy to address attenuated/torn structures and labral pathology
Hip Osteoarthritis

- Description
  - Global cartilage loss and loss of joint space
  - Wide-spread loss of normal joint structure and related loss of function
  - Often the cumulative result of an earlier injury pattern progressing over time
    - Previous injury
    - Actebular labral tear
    - Dysplasia (early onset OA)
    - Avascular necrosis
Clinical Criteria for Hip Osteoarthritis

- Hip internal rotation less than 15°.
- Hip flexion less than or equal to 115°
- Age greater than 50 years
Or...

- Hip internal rotation greater than or equal to 15°, along with
  - Pain with hip internal rotation
  - Duration of morning stiffness of the hip less than or equal to 60 minutes
  - Age greater than 50 years

Sensitivity, 86%; specificity, 75% (Altman, 1991)

Hip OA – Key Treatment Strategies

- Strong Recommendations
  - Manual therapy
  - Flexibility
  - Strength
  - Endurance
- Moderate Recommendations
  - Education/activity modification
  - Ultrasound (1 study)
  - Weight loss
- Weak Recommendations
  - Bracing
Clinical Course and Expected Outcomes for Hip OA

- Typically, symptomatic and functional changes related to hip OA are slow-developing.
- Prognosis is related to extent of radiographic changes.
- THA is a well-established option for end-stage OA not responsive to conservative treatment.
- The time of progression from initial diagnosis to THA procedures is highly variable and patient dependent.
- Current/developing interest in hip preservation surgeries and use of biologics.

Treatment of Soft Tissue Disorders of the Hip Region

- Proximal Hamstring Injuries
- Adductor Injuries
- Greater Trochanteric Pain Syndrome
Proximal Hamstring Injuries

- Proximal hamstring injuries can be a source of significant functional impairment

- Spectrum
  - Strain (gr I) -> Avulsion (gr III)
  - Usually eccentric load combined with stretching mechanism
  - Suspicion of acute avulsion necessitates need for referral
  - Conservative treatment is choice in majority of cases
  - Surgery may be indicated in majority/complete disruption or unresponsive cases

- Recurrence rate is high and complicates rehabilitation
- Involvement of sciatic nerve is a concern

Proximal Hamstring Injuries

- Profile/mechanism
  - Proximal hamstring injuries can be a source of significant functional impairment
  - Recurrence rate is high and complicates rehabilitation (Foreman et al. Phys Ther in Sport, 2006)
  - Involvement of sciatic nerve is a concern in more involved cases

- Clinical examination
  - Variable depending on injury severity
  - Historical context (acute vs. overuse), palpable tenderness, + pain selective tissue tension testing

- Treatment
  - Appropriate staging is critical
  - Criteria-based progression
  - Re-injury is primary concern
  - Address known risk factors for injury/re-injury
Proximal Hamstring – Key Treatment Strategies

- Early treatment
  - Protect scar development while avoiding adhesion development: rest/modification, PROM
    - Manual therapy: commonly utilized as acuity decreases, weak evidence
  - Minimize atrophy: submaximal isometrics, AROM
- Criteria for progression
  - Full PROM and AROM of hip and knee
  - Symmetrical gait pattern
  - Tolerance to therapeutic activities

- Intermediate treatment
  - Pain free strengthening: concentric to eccentric strength progression
  - Restoration of tissue mobility flexibility
  - Establish neuromuscular control of trunk and pelvis: lumbopelvic/core stabilization, balance
  - Improve endurance
- Criteria for progression
  - Full/symmetrical hamstring flexibility
  - >90% hamstring strength (vs. uninvolved)
  - Appropriate neuromuscular control
  - Jogging without pain or asymmetry
Proximal Hamstring – Key Treatment Strategies

- Late stage rehabilitation
  - Restore full flexibility
  - Restore strength
    - Emphasize eccentric control at position of maximal tension (hip flexion, knee extension)
  - Full restoration of endurance
  - Full neuromuscular control
  - Plyometric progression
  - Sport specific progression

- Criteria for progression
  - Full strength in all positions
  - Full flexibility
  - Pass sport-specific testing criteria
Adductor Injuries

- Common cause of groin pain
- Differential diagnoses
  - Hip flexor involvement
  - Radicular influences (L1, L2, L3)
  - Hip joint involvement
- Most common structure of interest is adductor longus
- Described in athletes
  - Soccer
  - Football
  - Ice hockey

Adductor Injuries – Condition Characteristics

- Clinical examination
  - Painful to palpation
  - Pain and weakness with resisted testing
  - Pain with flexibility/ROM testing
  + Adductor Squeeze Test
Key Treatment Strategies for Adductor Injuries

- Rehabilitation Considerations
  - Variably described in the literature
  - Manual therapy (soft tissue mobilization) is often recommended, but literature is weak
- Strength progression
  - Isometric -> Concentric -> Eccentric
  - Emphasize local muscle endurance
  - Lumbopelvic strength
  - Focus on adductor to abductor ratio (>80%)
Greater Trochanteric Pain Syndrome (GTPS)

- Pain in this region was most commonly labeled trochanteric bursitis in the past
- While trochanteric inflammation is possible, other structures are often involved
  - Gluteus Medius
    - Tendonopathy
    - Tear
  - Gluteus Minimus
    - Tendonopathy
    - Tear

Gluteal Tendinopathy – Condition Characteristics

- More common in females
- 40-65 years common age span
- Also recognized in athletes
- Functional Difficulties
  - Pain variable with walking, side lying, sitting
  - Fatigue and possible gait disturbance
- Clinical Findings
  - Palpable tendon attachment pain
    - Posterior/superior trochanter = glut medius
    - Anterior = glut minimus
  - Pain with resisted abduction
  - + De-rotational Test
  - Pain with 30 sec SLS
  - Rule out intra-articular involvement as primary source
Key Treatment Strategies for Gluteal Tendinopathy

- Treatment
  - Impairment based
    - Stretching and strength only as tolerated
  - Soft tissue mobilization?
  - Activity modification
  - Motor control activities
Pelvic Floor Concerns

- Traditionally focused upon in the female population, urinary incontinence, pelvic pain, and girdle dysfunction are not exclusive to females can affect all ages

- Differential Diagnosis (limited list)
  - Urinary tract infection
  - Hernia
  - Prostate conditions (male)
  - Endometriosis
  - Polyp complications
  - Colitis
  - Lumbopelvic disorders
  - Osteitis pubis
  - STDs
  - Neoplasms

Pelvic Floor Concerns

- Pelvic floor questionnaires are freely available for organized screening approach

- In many cases, appropriate screening is the goal for patients with pelvic floor dysfunction, in an attempt to refer to specialist
  - OBGYN
  - PT with pelvic floor specialization
Female Hip and Pelvic Concerns

- Unique anatomy and specific life events such as pregnancy, delivery, and menopause predispose the female population to specific concerns
  - Pelvic muscle dysfunction
  - Underactive diaphragm
    - leakage
    - Prolapse
    - Sexual dysfunction
  - Overactive diaphragm
    - “Staccato” urination
    - Evacuation issues and/or constipation
    - Myofascial pain/"trigger" points
    - Painful intercourse

Update: Surgical Procedures of the Hip Joint
Update: Surgical Procedures of the Hip Joint

- **Arthroscopy**
  - Labral procedures
  - Osteoplasty (FAI)
  - Capsular Modification (Hypermobility)
  - Combination with Athletic Pubalgia Repair

- **Arthroplasty**
  - Posterior vs. Anterior Approach
  - Materials and Fixation
  - Hip Resurfacing Arthroplasty Procedures

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**Hip Arthroscopy**

- Arthroscopy offers the potential for less invasive management of conditions affecting the hip joint

- **Indications**
  - Labral tears
  - FAI
  - Capsular laxity/hypermobility
  - Snapping hip (extra-articular)
Acetabular Labral Tears

Debridement/Resection
• Most commonly performed arthroscopic hip procedure

Repair
• May be indicated for detachment or intrasubstance tears

Reconstruction
• More recently performed
• ITB allograft example

Resection of Peripheral Labral Tear
Osteoplasty – Arthroscopic Approach

Microfracture for Chondral Lesions

- Suggested for small to medium-sized lesions
- Chondral lesions may be found in conjunction with labral compromise and/or FAI
- Attempt to facilitate growth of hyaline-like fibrocartilage
Current Concepts in Postoperative Rehabilitation for Hip Arthroscopy

Early Postoperative Rehabilitation Protocols

  - Healing properties of involved tissues (time-based)
  - Limited available evidence
  - Demands of patient population
  - Clinician experience
REHABILITATION CONCERNS

Labral Debridement/Resection & Loose Body Removal
  Minimal, early protection

Capsular Modification
  ROM, tensile forces

Tendon Release/Lengthening - Repair
  Contraction, stretch, tensile forces

Microfracture
  Wgt Bearing, Shear Forces

Osteoplasty
  Wgt Bearing, Bony Tensile Forces

Labral Reconstruction
  Wgt Bearing, ROM for Healing Envt.

Biologics/Regenerative
  Optimize "niche" Envt?

Postoperative Protection of Healing Tissues after Arthroscopy

- Acetabular labrum
  - resection vs. repair vs. reconstruction

- Femoral neck
  - osteoplasty

- Chondral preservation
  - microfracture

- Capsule
  - Modification procedures to address laxity

- Musculotendinous structures
  - tendon release procedures
Immediate Postoperative Treatment

- Early ROM
- Stationary bike
- Strength integrity (non-weight bearing isometrics)
- Positioning consultation to avoid acquired flexibility issues
- Postural education
- Home exercise program
- Monitor for adverse/unexpected events

Exercise Progression: Early Non-weight Bearing Exercises

- Isometrics
  - Thighs: Quad, hamstring, gluteal setting
  - Hip: All directions, with delayed initiation of flexion
- Thigh PRE’s
  - SAQ’s
  - “Clamshell” -> S/L SLR’s
- Lumbopelvic Strength
  - PPT
  - Abdominal “hollowing”
  - Bridge progression
Range-of-Motion Progression

- Gentle PROM permitted within the first week
- Excessive flexion and abduction is initially avoided, to avoid soft tissue irritation
- Circumduction motion to decrease postoperative adhesions (Willimon et al, 2014)
- Caution with early joint mobilization intervention (typically no sooner than 4 weeks to address PROM deficits)
Range-of-Motion Progression

- **Labral Debridement**
  - Typically allow full PROM as tolerated after 2 weeks
- **Labral Repair** (Enseki & Kohlreiser, 2014)
  - Hip flexion <90 degrees – variable time frame
  - Hip extension to neutral - variable time frame
  - Variable limitation of external rotation
- **Labral Repair** (Enseki & Kohlreiser, 2014)
  - Hip flexion <90 degrees – variable time frame
  - Hip extension to neutral - variable time frame
  - Variable limitation of external rotation
- **Capsular Modification** (Enseki et al, 2006; Edelstein et al, 2012)
  - Anterior capsular procedure: avoid forced external rotation and extension for 3-4 weeks
  - Posterior capsular procedure: avoid forced internal rotation and flexion for 3-4 weeks
- **Osteoplasty** (Enseki & Kelly, 2010)
  - Avoid forced internal rotation for 4 weeks

Weight Bearing*

- Labral resection: 10 –14 days, partial weight bearing for less invasive procedures (labral resection)
- **Labral repair**: variable, with protected weight bearing extended 4+ weeks**
- **Osteoplasty**: 4+ weeks protected weight bearing**
- **Microfracture**: 6+ weeks protected weight bearing**

* Emphasize “heel-toe” gait pattern & pelvic stabilization to decrease potential for psoas irritation

** May utilize aquatic activities to normalize gait pattern in partial weight bearing environment
Strength

- Tendon release procedures
  - Iliopsoas: Hold supine straight leg raise 4 weeks
    - Short lever hip flexion below 90 degrees is usually well tolerated
  - ITB: Hold side-lying straight leg raise 3 weeks
- Guided primarily by symptoms after patient is FWB

All planes of motions emphasized
Specific emphasis on stability of transverse and frontal planes to address known patterns of weakness in the non-arthritic hip pain population
(Harris-Hayes et al, 2014)
Combination Procedures

- Commonly will see labral resection/repair combined with another procedure
  - Labral resection & osteoplasty
  - Labral resection & capsular modification
- Rehabilitation protocols usually follow the most conservative aspect of each procedure
- Labral resection & osteoplasty
  - ROM as tolerated at 2 weeks
  - PWB until 4 weeks

Return to Occupational Activities Following Hip Arthroscopy

- Varies secondary to:
  - Individual patient characteristics
  - Nature of surgical procedure
- Low load occupation
  - 6 to 12 weeks
- Manual labor
  - 8 to 24 weeks
Return to Athletic Activities Following Hip Arthroscopy

- Varies by:
  - Individual athlete characteristics
  - Demand of sport
  - Nature of procedure
- Return to sport
  - 8 weeks *minimal* for isolated labral resection
  - 12 to 24 weeks for capsular procedures
  - 12 to 32 weeks for osseous/chondral or involved combination procedures

*return to sport may occasionally be accelerated in high-level athletes, within the boundaries of tissue healing properties

Total Hip Arthroplasty

- Approaches
  - Posterior
  - Anterior
  - Lateral/Anterolateral
- Materials (femur-acetabulum)
  - Metal-on-polyethylene
  - Ceramic on ceramic
  - Metal-on-metal,
  - Ceramic-on-polyethylene
- Fixation
  - Cemented
  - Non-cemented
  - Hybrid
Surgical Approach – Rehabilitation Implications

- Posterior
  - Most common approach
  - Gluteus medius is typically spared
  - Precautions: Flexion, internal rotation, adduction

- Anterior
  - Less secondary muscle disruption
  - Allows larger femoral prosthetic
  - Less chance of dislocation
  - Technically demanding

- Lateral/Anterolateral
  - May involve muscle “splitting” as part of procedure
  - May have concerns for extension and external rotation
  - Precautions are variable

Fixation – Rehabilitation Implications

- Cemented (femur and acetabulum)
  - Immediate fixation, earliest weightbearing
  - Highest risk of loosening
  - Often reserved for least active patients

- Non-cemented (femur and acetabulum)
  - Biological fixation (strongest), may delay weightbearing
  - More active patients
  - Cemented femur, Non-cemented acetabulum
THA Variations

- Minimally Invasive Technique
  - Smaller incision
  - Theoretically allow accelerated rehabilitation
  - Small body of research

- Resurfacing THA
  - Femoral “cap” is utilized (anterior approach)
  - Spares bone
  - Younger, active patients, with appropriate bony qualities
  - Higher ceiling for activity goals
  - Controversial
    - Higher failure rate
    - Blood ion concerns

Current Trends in Rehabilitation after THA

- Early Discharge (same day or next day)
  - Early results promising, further research needed (Basques BA et al., 2017)

- Early Weight Bearing
  - More aggressively promoting early mobilization
  - Increased confidence in materials and fixation

- ROM Precautions
  - Overall trend of becoming less restrictive
  - Better fit and methods of fixation
  - Larger femoral component, better fixation

- Expected Level of Activity
  - Higher ceiling for activity
  - Most evident for anterior approach and metal prosthetic components
THA Rehabilitation Considerations

- Early PRE’s supported in the literature (Okoro et al, 2012)
- Treadmill training may help normalize gait patterns (White et al, 2005)
- ADL return is variable
  - 6 weeks to 3 months
- Athletic Activity
  - Timing and type is not agreed upon
  - Impact is primary factor
  - Patient education is crucial

THA – Clinical Signs of Concern

- Majority occur early in the rehabilitation process
- Dislocation (highest risk first 3 months)
  - Sudden pain and apparent shortening of the limb are potential indicators of dislocation.
- Infection
  - Pain
  - Systemic Symptoms
- Deep vein thrombosis
  - Cardinal indicators
- Prosthetic loosening / acquired fracture (non-traumatic)
  - Pain > mechanical symptoms
- Residual nerve injury (3%)
  - Plexus injury
  - Peripheral nerve injury (Sciatic and Peroneal)
    - Motor and sensory testing
Case Study: Utilization of the Movement System Concept for a High School Wrestler with Femoral Acetabular Impingement Syndrome

16 year old high school (folk style) wrestler
In season weight of 195 lbs.
3 month history of slowly progressive left groin pain (1-5/10), and occasional left SIJ pain (<50% of time vs. groin)
Started at end of competitive season; but, more prominent in off-season training cycle
Symptoms most prominent at end of training sessions or end of day after multiple sessions
Once symptomatic, driving and sitting in class were also painful
Injury Hx; low back “strain” x 1 yr. ago (resolved), grade II L MCL sprain x 6 months ago (resolved with PT and ATC treatment)
OTC NSAIDs for current episode; not sure if helpful
HOS = 90% for ADL subscale; 69% sport subscale (100% is optimal)
Impairment Examination

- Movement testing alone does not allow complete determination of cause
- Impairment examination must be conducted:
  - PROM: all symmetrical and WNL, except passive left hip flexion (115 degrees on left; limited by pain) vs 130 degrees on right, and passive IR on left (10 degrees on left; limited by pain) vs 15 degrees on right
  - Strength: Weakness noted on left side for hip abduction and external rotation (approx. 80%; 4/5)
  - Length Testing: + Thomas (tight iliopsoas)
  - Joint mobility: no perceived differences in distraction testing for hip, although simultaneous caudal glide allowed pain-free left hip flexion to 125 degrees
  - Spine AROM testing and PA spine mobility testing yielded negative results
Treatment

- Hip Strength exercises
  - All planes of motion
- Lumbopelvic stabilization
- Activity modification
Re-evaluation

- 5 weeks after initial evaluation
- Pain:
  - 0/10 ADL's/rest; 1/10 with maximal exertion (primarily squatting with heavier weight (225 lbs))
  - Vague groin distribution, no SIJ pain
- HOS
  - ADL subscale = 100%
  - Sport subscale = 94%
- PROM: symmetrical on both sides, except flexion on left (126 degrees vs. 130 degrees on right; limited by soreness/"pinching") and IR (12 degrees vs. 16 degrees on right; capsular end-feel with "stiffness")
- MMT for hip symmetrical, lower abdominal leg lowering test within 1-2 inches from ground before losing pelvic control

Re-evaluation

- Movement Examination
  - Deep Squat
    - Unweighted: approx. 100 degrees hip flexion, symmetrical performance, consistent pelvic and lumbar spine control, no pain
    - Weighted (225 lbs. x 5 repetitions): approx. 90 degrees hip flexion, no deviations, no pain
  - Step-Down Maneuver
    - Symmetrical performance between LE's with 6 inch elevation
    - No pain
    - No loss of stability – able to maintain speed and position (frontal and transverse planes) throughout task

- Concluded patient was ready for return-to-play progression
Questions?

Thank You!
REFERENCES
