

Appendix:

**Appendix A: Post-Operative Physical Therapy Protocol**

**Acute Phase I – Immediate Post-Surgical Phase (Day of Surgery to 6 weeks)**

**(no formal PT)**

**GOALS**

- Gain understanding of intraoperative findings of the joint and provide insight into underlying causative factors
- Provide patient with understanding of etiology of symptoms
- Patient education of PT examination findings
- Compliance with self-care, home management, activity modification
- WBAT with crutches and foot flat gait pattern
- Restore Functional ROM within surgeon post-operative guidelines
- Minimize pain at rest
- Minimize pain with ambulation

**PRECAUTIONS/GUIDELINES**

- Avoid/Surgical irritation
- Avoid Ambulation to fatigue
- No Pivoting during ambulation
- Avoid symptom provocation during ambulation, activities of daily living (ADL), therapeutic exercise
- No Active Hip Flexion, No SLR
- No extreme combined ROM e.g. flexion/IR, Flexion/ER
- Limit ROM beyond 90 degrees of flexion
- Weight-bearing per surgeon's guidelines (typically WBAT with crutches)
- Functional ROM per surgeon's guidelines

**TREATMENT STRATEGIES**

- Patient education
  - Activity modification
  - Bed mobility
  - Positioning
- Gait training with appropriate assistive device on level surfaces
  - WBAT with crutches “*step to/foot flat*” gait pattern
- Stair Training with appropriate device “*step to*” with rail/assistive device as indicated
- Training in transitional movements with support utilizing non-operative leg
- Initiate core control: Transversus abdominus isometrics

## **CRITERIA FOR ADVANCEMENT**

- Control of pain
- **Able to attend outpatient PT**

## **Sub-acute Phase II–Post Surgical Phase (Weeks 7-12):**

### **GOALS**

- Independent home exercise program
- Optimize ROM
- $\geq 4/5$  LE strength,  $\geq 3/5$  trunk strength
- Good, dynamic balance
- Pain-free ADL
- Pain-free hip flexion

### **PRECAUTIONS**

- Symptom provocation
- Ignoring functional progression
- Sacrificing quality for quantity

### **TREATMENT STRATEGIES**

- Home exercise program, as instructed: evaluation-based to incorporate treatment strategies
- Instruction of ROM
- Demonstration of moderate level core exercises
- Cross-training: elliptical trainer backwards more than forward, bicycle light resistance, seat height elevated, stair stepper backwards, treadmill backwards walking
- Initiate gym routine to include hip strengthening machines as tolerated
- Initiate plyometrics
- No forward running
- No lunges
- Use leg press instead of mini squats

### **CRITERIA FOR ADVANCEMENT**

- ROM within normal limits pain-free
- Alternate Ascend/Descend 8-inch step with good pelvic control no UE support
- Good pelvic control during single-limb stance and dynamic balance
- Normalized gait pain-free without an assistive device
- No Pain at rest, ADL/IADL nor walking

### **Advanced Phase IIIa—Post Surgical Phase (Weeks 13-16):**

#### **GOALS**

- Independent home exercise program
- Optimize ROM
- $\geq 4/5$  LE strength,  $\geq 3/5$  trunk strength
- Good, dynamic balance
- Pain-free ADL
- Pain-free hip flexion

#### **PRECAUTIONS**

- Symptom provocation
- Ignoring functional progression
- Sacrificing quality for quantity

#### **TREATMENT STRATEGIES**

- Home exercise program, as instructed: evaluation-based to incorporate treatment strategies
- Instruction of ROM
- Demonstration of moderate level core exercises
- Cross-training: elliptical trainer backwards more than forward, bicycle light resistance, seat height elevated, stair stepper backwards, treadmill backwards walking
- Initiate gym routine to include hip strengthening machines as tolerated
- Initiate plyometrics
- No running
- No lunges
- Use leg press instead of mini squats

#### **CRITERIA FOR RETURN TO SPORT**

- Gluteal strength and core trunk strength to maintain pelvic control
- 0/10 pain with advanced activities
- Normal ROM

### **Advanced Phase IIIb—Post Surgical Phase (Weeks 17-24):**

#### **GOAL**

- Independent home exercise program
- Optimize ROM
- 5/5 LE strength,  $\geq 4/5$  trunk strength
- Normal Muscle Length

- Good, dynamic balance unilateral and bilateral LE
- Pain-free with all activities

#### **PRECAUTIONS**

- Symptom provocation
- Sacrificing quality for quantity

#### **TREATMENT STRATEGIES**

- Return to Sport
- Return to all prior level of activities pain-free
- Cross-training: elliptical trainer backwards more than forward, bicycle light resistance, seat height elevated, stair stepper backwards, treadmill backwards walking
- Initiate gym routine to include hip strengthening machines as tolerated
- Initiate plyometrics
- No running
- No lunges
- Use leg press instead of mini squats

#### **CRITERIA FOR RETURN TO SPORT**

- Gluteal strength and core trunk strength to maintain pelvic control
- 0/10 pain with advanced activities
- Normal ROM

# **Appendix B-Non-Operative Physical Therapy Protocol**

## **Acute Phase I – (Day 1 (PT evaluation)-Weeks 1-2):**

### **GOALS**

- Provide patient with understanding of etiology
- Patient education of home exercises
- Compliance with self-care, home management, activity modification
- Normalize gait
- Restore ROM
- Restore joint mechanics of lumbar spine, pelvis and hip
- Restore pelvic alignment
- Initiate strengthening
- Minimize pain at rest
- Minimize pain with ambulation and function (consider assistive device for pain relief and normalize gait pattern)

### **PRECAUTIONS/GUIDELINES**

- Avoid symptom provocation during ambulation, activities of daily living (ADL), therapeutic exercise
- No active hip flexion with long lever arm, e.g. No SLR

### **TREATMENT STRATEGIES**

- Home exercise program, as instructed;
  - abdominal setting (focus on Transverse Abdominus), gluteal setting if permitted, quadriceps setting pain free, plantar flexion and eversion with elastic bands, all pain free
  - ROM
    - Restore Pain-free P/AROM all directions
      - Lumbar Spine
      - Ilium
      - Hip
    - Restore Pelvic Alignment
    - Joint glides and mobilization with movement for joint capsule restrictions
- Patient education
  - Activity modification
  - Bed mobility
  - Positioning
  - Shoe wear
  - Assistive device as indicated for ambulation
- Soft tissue techniques to address iliacus, psoas, piriformis, TFL, ITB, gluteal muscles, superior/proximal rectus femoris

- Pelvic alignment techniques (muscle energy techniques, Joint Mobilization, STM)
- Gait training
- Hydrotherapy/Pool Aquatics
  - Gait-backward walking
  - Pain-free active range of motion
  - Single-leg standing
- Open chain strengthening for knee flexion, hip abduction hip extension to neutral, gastrocnemius
- Initiate core control: Transversus abdominus isometrics
- Balance training: double-limb support

### **CRITERIA FOR ADVANCEMENT**

- Control of pain
- Symmetrical pelvic alignment
- Normalized gait with appropriate assistive device

### **Sub-acute Phase II –Strengthening (Weeks 3-12):**

#### **GOALS**

- Normalize gait- no pain nor deviations with or without assistive device
- 0/10 pain during ADL
- Ascend/descend 8-inch step with good control, with or without rail/assistive device
- Core control during low demand exercises
- Good pelvic stability to meet demands of ADL
- Continued Symmetrical pelvic alignment
- ROM Lumbar spine and hip within functional limits
- Patient education and independence with home therapeutic exercise program

#### **PRECAUTIONS**

- Antalgic gait
- Symptom provocation
- Pain during ADL
- Pain during therapeutic exercise: hip abduction and flexion to tolerance
- Faulty movement patterns of hip, pelvis, lumbar spine
- Impaired posture
- Capsular and soft tissue irritation
- No active SLR nor hip flexion exercises until pain subsides

#### **TREATMENT STRATEGIES**

- Manual therapy as indicated for lumbo-pelvic-hip impairments e.g. STM, joint mobilization, joint manipulation, MET, kinesiotaping
- Postural re-education to control neutral pelvis

- Home exercise program, as instructed, based on evaluation and progression
- Hydrotherapy: buoyancy assisting to buoyancy resisting exercises
- Hip strengthening progression
  - hip extension to neutral (gluteus maximus with or without hamstrings)
  - hip abduction pain-free and in neutral spine to isolate gluteus medius (no hip flexion)
  - clam shell with hip in neutral (0 degrees) with knee flexion
  - knee flexion to neutral (hamstrings)
  - leg press to 45-60 degrees (gradually increasing weight)
  - \*no lunges, no full squats
- Functional strengthening: leg press, mini functional squats (for functional activities, not repetitive exercise), step-ups/step-downs, foam, balance boards, functional and sport specific training
- Hip ROM with stable pelvis
  - Quadruped rocking backward (hip flexion)
  - Heel slides (hip flexion to 90)
- Core control progression
- Bicycle, seat elevated, pain-free progress from no resistance to min/mod resistance pain-free, elliptical more backwards than forward and pain-free
- Proprioception and balance exercises: progress from double-limb to single-limb support
- Flexibility: evaluation-based
- Modalities for pain control: TENS, Kinesiotaping, Ice, Cold Pack

### **CRITERIA FOR ADVANCEMENT**

- ROM within functional limits
- Ascend/descend 8-inch step with good pelvic control
- Good pelvic control during single-limb stance
- Normalized gait without an assistive device
- No Active Hip Flexion until pain subsides

### **Phase III–Advanced Strengthening/Return to High Level Function/Sports (Weeks 13-24):**

#### **GOALS**

- Independent advanced home exercise program
- Optimize ROM
- 5/5 LE strength, 4/5 trunk strength
- Good, dynamic balance
- Pain-free ADL
- Pain-free hip flexion
- Return to low impact recreation activities/sports

## **PRECAUTIONS**

- Symptom provocation
- Ignoring functional progression
- Return to sport pain-free
- Sacrificing quality for quantity
- No lunges, no deep hip/knee squats

## **TREATMENT STRATEGIES**

- Home exercise program, as instructed: evaluation-based to incorporate treatment strategies
- Instruction of ROM (surgeon guidelines, time frame)
- Demonstration of moderate level core exercises
  - Quadruped extremity lifts with or without weights
  - Full plank and side plank up to 2 minutes
  - UE Diagonal patterns on Bosu with weights, double leg to single leg
- Cross-training: elliptical trainer, bicycle, stair stepper, backwards more than forward or at least equal long term, all pain-free during and after
- Initiate gym routine to include hip strengthening machines and backward progression of functional training with gluteus maximus and gluteus medius and back extensors as tolerated
- Initiate plyometrics pain-free and as needed

## **CRITERIA FOR RETURN TO SPORT**

- Gluteal strength and core trunk strength to maintain pelvic control during sport specific or functional activities
- 0/10 pain with advanced activities
- Normal ROM
- Normal Strength
- Symmetrical Pelvic Alignment



**Appendix Table A1**

<b>Cohort</b>	<b>Included Patients</b>	<b>Failure</b>	<b>Scores Included</b>
PTA	All patients randomized to PTA	<ol style="list-style-type: none"><li>1. Conversion to THA prior to 24-month follow-up (n = 0)</li><li>2. Revision hip arthroscopy prior to 24-month follow-up (n = 0)</li><li>3. Crossover to surgery (n = 32)</li></ol>	<ol style="list-style-type: none"><li>1. 24-month follow-up scores for those who did not crossover</li><li>2. Scores immediately before crossover for those who did.</li></ol>
SPT	All patients randomized to SPT	<ol style="list-style-type: none"><li>1. Conversion to THA prior to 24-month follow-up (n = 3)</li><li>2. Revision hip arthroscopy prior to 24-month follow-up (n = 0)</li></ol>	<ol style="list-style-type: none"><li>1. 24-month follow-up scores for those who did not convert to THA or did so after 24 months</li><li>2. Scores immediately before THA conversion for those who converted before 24-months</li></ol>
CO	All patients who crossed over from PTA to SPT after completing at least 14 weeks of PT and achieving the maximal possible improvement from PTA.	<ol style="list-style-type: none"><li>1. Conversion to THA prior to 24-month follow-up (n = 2)</li><li>2. Revision hip arthroscopy prior to 24-month follow-up (n = 0)</li></ol>	<ol style="list-style-type: none"><li>1. 24-month follow-up scores after crossover (i.e., 24 months after hip arthroscopy) for those who did not convert to THA or did so after 24 months</li><li>2. Scores immediately before THA conversion for those who converted before 24 months</li></ol>