Femoroacetabular impingement (FAI) is a common cause of intra-articular hip pathology and secondary hip osteoarthritis. There are three types of FAI: pincer impingement (excessive prominence of the anterolateral rim of the acetabulum), cam impingement (overgrowth of the femoral head rotating inside the acetabulum) and a combination of pincer and cam impingements (Byrd, 2010). The abnormal abutment of the proximal femur against the rim of the acetabulum produced by the FAI causes limitations in range of motion and produces shear forces that lead to hip dysfunction, chondral abrasion, delamination/labral injuries, and eventually, full-thickness cartilage loss. The natural history of this impingement process is initially acetabular cartilage injury, which is followed by labral injury and ultimately joint arthrosis (Edelstein, 2012).

Hip arthroscopy allows for a minimally invasive procedure to correct the offending bony lesions. Osteoplasty is performed to reshape the impingement lesion on the femoral and/or acetabular side (removing either the non-spherical portion of the femoral head and/or resection of the anterior acetabular over-coverage). Labral repairs are performed, if possible, to avoid disruption of joint mechanics and abnormal distribution of forces around the joint. Anchors are placed on the rim of the acetabulum and the suture is passed through the labrum and around the split portion, and then the labral tissue is re-approximated (Enseki, 2006).
## Summary of Recommendations

### Precautions
- WB restrictions: foot flat WB with crutches (2 wks)
- Walk without crutches 2-4 wks
  - 2→0 crutches preferred
- Avoid any “pinch” feeling in the hip
- Avoid hip flexor/adduction aggravation as strengthening and activity progresses

### ROM/Manual Therapy
- Early motion as required to prevent adhesions
- Circumduction (only after PT instruction) OR no resistance upright biking for PROM
- Limit external rotation and extension ROM during early post-op phase
- No aggressive PROM or stretching until at least 8 wks (only if excessive hypomobility is present)

### Corrective Interventions
- Proper activation and recruitment of all hip and core musculature without compensation required prior to initiating strengthening
- Neuromuscular re-education for balance and correction of faulty mechanics
- Therapeutic exercise and neuromuscular re-education for LE strength (focus on DL and SL activities)

### Outcome Testing
- 1st visit, 6 wks, and discharge (may increase frequency if warranted)
- Hip Outcome Score (HOS)
  - ADL (17 items) | Sports (9 items)

### Criteria to Initiate Plyometric Program
- Full, functional, pain-free ROM
- > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg
- Squat > 150% BW (barbell squat or leg press)
- 10 forward and lateral step downs from 8” step with proper mechanics

### Criteria to Initiate Running Program
- Full, functional, pain-free ROM
- > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg
- Squat > 150% BW (barbell squat or leg press)
- 10 forward and lateral step downs from 8” step with proper mechanics
- Hop and hold with proper mechanics (uninvolved→involved)
- Ability to tolerate 200-250 plyometric foot contacts without reactive pain/effusion
- No gross visual asymmetry and rhythmic strike pattern with treadmill or over ground running

### Criteria for Return to Sport/Discharge
- Physician clearance at last check-up
- Strength: > 90% compared to uninvolved hip (using hand-held dynamometer)
- > 90% BW with SL leg press
- Functional Performance:
  - > 90% limb symmetry with SL hop for distance, SL triple crossover hop, and SL 6-meter timed hop (with demonstration of proper LE landing mechanics)
  - Ability to complete sport-specific drills with correct mechanics (at maximum speed w/o pain)
  - Vail Sport Test
- Patient reported outcome measures: Score ≥ 90% on HOS (ADL and Sports subscales)

*Criteria for discharge from PT is less rigorous for those not returning to sport. Ensure the patient is able to perform all ADLs and recreational activities without pain, reactive effusion, and with appropriate functional mechanics.*
Phase I: Day 1 Post-Op until D/C crutches (0-4 weeks)

Goals

- Protect healing tissue
- Pain and edema control (recommend compression garments/shorts to assist)
- Improve pain-free ROM
- Normalize muscle activation

Precautions

- No sitting > 2 hours
- Avoid hip extension (slow walking speed and no treadmill use)
- Gentle external rotation (ER) per patient’s tolerance
- Avoid twisting/pivoting
- No active straight leg raises (SLRs) or crunches/sit-ups
- No lifting/carrying > 10 lbs
- Avoid pain

Crutch Progression

- 2 crutches → 0 crutches highly recommended to promote normalized gait mechanics
  - 2 → 1 → 0 crutches only when appropriate to slow patient progression or to limit walking distance

Criteria for Community Ambulation without Crutches

- Adequate hip ROM for normalized/painfree gait pattern (10° hip extension)
- Score of 0-1 performing 10 repetitions of Active Hip Abduction Test (Appendix B)
- 60 secs of single leg stance (SLS) without compensation (hip drop, trunk lean) or pain
- Normalized gait pattern without assistive device

ROM/Stretching

- Circumduction (begin only after PT education; review mechanics with family at 1st PT visit)
  - 30° and 70° of hip flexion → 6 min each (3 mins clockwise, 3 mins counterclockwise)
  - Can be replaced with 10-15 mins of upright biking with no resistance (x2 daily)
- PROM (painfree): Hip flexion, abduction, prone hip internal rotation (IR) and ER
- Stretches: prone quadriceps, supine iliopsoas (uninvolved knee to chest)
- Prone lying → prone prop on elbows 5-10 mins (x2 daily)
- GENTLE scar mobilizations can begin after incisions closed

Neuromuscular Control

This section is 1st priority → do not progress to strengthening until muscle activation and isolated control is normalized

- Gluteal muscles (prone, supine, seated, ½ kneel, tall kneel, standing), transverse abdominis, hamstrings, quadriceps
  - Supine hip abduction/adduction, prone hip IR/ER, prone terminal knee extension (TKE)

Therapeutic Exercise

<table>
<thead>
<tr>
<th>Early Exercises</th>
<th>Advanced Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine butterflies and reverse butterflies, quadruped cat/camel, quadruped backward rocking, prone hamstring curls, bridges</td>
<td>Criteria to begin this section: normalized gait pattern, minimal reactive pain and edema</td>
</tr>
<tr>
<td></td>
<td>Sidelying clams, supine marches (w/o bridge), heel slide to march, standing TKE → with focus on pelvic stability and appropriate weight shifting, passive FABER slides</td>
</tr>
</tbody>
</table>

Criteria to Progress to Phase II

- Normalized gait pattern for household distances
- Minimal to no reactive pain and swelling with ADLs and PT exercises
- Muscle activation and isolation is normalized
- Pass the Prone Hip Extension Test (Appendix A)
  - 10 repetitions
  - Proper gluteal muscle activation (gluteus maximus 1st, hamstrings 2nd)
  - Leg extends 10° past neutral
- No compensatory movement patterns at pelvis (no anterior pelvic tilt)
- No anterior hip pain
## Phase II: D/C Crutches to Painfree with ADLs (4-8 weeks)

### Goals
- Restore full PROM and AROM
- Progressively improve strength of the proximal hip musculature (gluteals, iliopsoas, hip rotators)
- Normalize postural/pelvic control with DL and SL activities
- Normalize gait at preferred walking speed for community distances
- Tolerate ADLs without pain or limitation

### Precautions
- Avoid joint and/or soft tissue aggravation due to early/excessive progression of activity
- Avoid aggressive stretching into hip extension/ER including modified Thomas test position (consider structures involved: i.e. labral repair, capsular plication, generalized laxity)
- Avoid running or impact activities

### ROM/Stretching
- Soft tissue and joint mobilization to achieve symmetrical PROM
  - Avoid aggressive end range stretching
- Upright bike, butterfly/reverse butterfly stretches, FABER slides, half kneeling hip flexor stretch, prone IR/ER PROM
- May benefit from referral to massage therapist if patient is developing soft tissue dysfunction/irritation (commonly affects TFL, adductors)
  - Soft tissue irritation suggests need for regression of activities and/or exercises
- Continually assess patient’s current activity level outside of PT

### Therapeutic Exercise
- Ensure appropriate gluteal activation and timing
- Integrate psoas progressive exercises (Appendix C)
  - Early Exercises
    - Bridge progression, quadruped progression, DL squat, leg press, side planks, modified forward plank progression, resisted side stepping (start with band at knees)

### Late Exercises
- Prior to initiating full WB SL exercises patient should pass criteria for community ambulation and demonstrate mastery of DL tasks
- Forward and lateral step ups, heel taps, ER progression (on stool, standing on ipsilateral LE), SL Romanian dead lift (RDL), SLS with perturbations
- Aquatic therapy may be appropriate and can be initiated once incision is well-healed and patient is cleared by physician

### Cardiovascular Exercise
- May progress time on upright bike as tolerated
  - Ensure patient can perform 30 mins with no resistance and without symptoms prior to adding resistance
  - Decrease time to ≤15 min when adding resistance
  - May begin elliptical when patient demonstrates adequate hip extension, gluteal activation, and lumbopelvic stability

### Criteria to Progress to Phase III
- Symmetrical and painfree hip ROM to meet the demands of patient’s activities
- Symmetrical DL squat to 70° of knee flex
- 10 repetitions of 8” step downs with good neuromuscular control
- Normalized gait pattern for community distances of ambulation
### Phase III: Painfree ADLs to Return to Impact Activities (8-12 Weeks)

#### Goals
- Correct abnormal/compensatory movement patterns with higher level strengthening activities *Avoid any “pinch” feeling in the hip*
- Optimize neuromuscular control/balance/pro proprioception
- Increase volume/intensity of aerobic activities; begin to restore non-impact cardiovascular fitness
- Initiate progressive plyometric activities
- Return to run program can be initiated towards end of phase III if criteria met

#### Precautions
- Avoid sacrificing quality for quantity during strengthening
- Avoid hip flexor/adductor inflammation as activity increases
- Ensure patient maintains full flexibility and painfree ROM as strength continues to increase
- Avoid aggressive stretching within this phase unless significant hypomobility noted

#### ROM/Stretching
- ROM should be checked periodically to ensure that loading the hip with new exercises does not alter neuromuscular response and normal joint mechanics
- If full ROM is not achieved by week 10, terminal stretches should be initiated

#### Therapeutic Exercise
- Continue progressive LE/core strengthening: Slow to fast, simple to complex, stable to unstable, low to high force
- DL strengthening advancement to SL strengthening
- Progress core stability tasks with emphasis on rotational and side-support tasks (Side planks, cable crossovers, kneeling chops/lifts, windmill / Plank to pike, plank over SB)
- LE strengthening tasks with multi-planar movements: Emphasize core stability and hip/knee control (no valgus) during these tasks
- Proprioception: Vary surfaces, add perturbations, include variety of positions, etc.

#### Cardiovascular Exercise
- Dynamic warm-up initiated (inchworm, progressive lunges towards end of phase)
- Upright Bike/Elliptical Progression (see return to biking protocol)
  - Progress resistance (and cross ramp on elliptical) as tolerated
- Swimming Progression (see return to swimming protocol)
  - Can begin freestyle kick; continue to avoid rotational kicks

#### Plyometrics
- Criteria to initiate plyometric program
  - Full, functional, pain-free ROM
  - > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg
  - Squat 150% BW (barbell squat or leg press)
  - 10 forward and lateral step downs from 8” step with proper alignment (Appendix D)
- Progressive weight bearing, DL → SL demands
  - Shuttle plyometrics (DL → SL)
  - Forward hop and hold (uninvolved → involved)
  - DL mini hops/place jumps
- Proper take off/landing mechanics emphasized → NO knee valgus, good pelvic stability, soft/quiet landing with equal distribution of force
- Agility ladder can be initiated if appropriate form/tolerance to activity in progressive plyometrics
Return to Running

Walk/jog progression can be initiated towards end of phase if patient demonstrates:

- Full, functional, pain-free ROM
- > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg
- Squat 150% BW (barbell squat or leg press)
- 10 forward and lateral step downs from 8” step with proper alignment (see appendix D)
- Hop and hold with proper mechanics (uninvolved→involved x10 repetitions)
- Ability to tolerate 200-250 plyometric foot contacts without reactive pain/effusion
- No gross visual asymmetry and rhythmic strike pattern with treadmill or over ground running

<table>
<thead>
<tr>
<th>Phase</th>
<th>Walk/Run Ratio</th>
<th>Total Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 min / 1 min</td>
<td>10-20 min</td>
</tr>
<tr>
<td>2</td>
<td>3 min / 2 min</td>
<td>10-20 min</td>
</tr>
<tr>
<td>3</td>
<td>2 min / 3 min</td>
<td>10-20 min</td>
</tr>
<tr>
<td>4</td>
<td>1 min / 4 min</td>
<td>10-20 min</td>
</tr>
<tr>
<td>5</td>
<td>• Jog every other day until able to run 30 consecutive minutes&lt;br&gt;• Begin with 5 min walking warm up&lt;br&gt;• End with 5 min walking cool down</td>
<td></td>
</tr>
</tbody>
</table>

General Guidelines

- To complete each phase, follow the Total Time guidelines below.
  - 10 minutes x2 sessions
  - 15 min x1 session
  - 20 min x1 session
  - After completing any phase pain free for 20 minutes, patient is appropriate to move forward to next phase
- Allow at least one day of rest between runs
- Gradual increase in distance is priority before increased pace
- It is common for runners to experience increased pain and/or reactive edema at least x1 during this return to run progression. When pain occurs, runner must stop running immediately and rest at least 1 day before restarting program. With restart, perform last walk/jog ratio cycle completed painfree x2 before attempting the previously painful ratio cycle.
- Ten Percent Rule: only increase weekly mileage by 10% of the previous week
**Phase IV – Return to Sport / Full Activity (3-6+ Months)**

### Goals
- Initiate return to run program if not initiated in phase III
- Return to physically demanding jobs
- Progressively return to sport or prior/desired level of function

### Precautions
- Continue to emphasize proper landing mechanics (DL and SL)
- Avoid progression of plyometric exercises if increased pain (if yes, re-assess and address any underlying strength or neuromuscular impairments)
- Ensure patient maintains full flexibility and painfree ROM as strength continues to increase
- Closely monitor return to sport progression

### ROM/Stretching
- Continue ROM interventions and stretches from previous phases
  - Include multi-planar lumbar and hip ROM/flexibility
  - Emphasis on dynamic warm-up and stretching (i.e. walking lunges, hurdle steps, etc.)
  - Monitor sport-specific stretching with gradual return to end range stretching

### Therapeutic Exercise
- Hip and core strengthening with focus on pelvic stability
- Maintain DL strength but emphasize SL strengthening (involved and uninvolved)

### Neuro-muscular Control and Functional Performance
- Progress agility and plyometrics by adding in higher level activities (i.e. forward/backwards hopping, side shuffles, carioca, cutting, box drills, T drills, tuck jumps, DL/ SL jump turns)
  - Focus on hip and pelvic stability
  - Incorporate unstable surfaces with plyometrics
  - Sport specific drills in clinic (moderate speed → maximum speed)
- Prior to initiating speed training, patient must first complete entire return to run program without reactive pain/inflammation
- Ensure tolerance with DL and SL plyometrics prior to initiating power-focused or resisted, explosive training

### Criteria to Return to Sport/Discharge
- Physician clearance at last check-up
- Strength: > 90% compared to uninvolved hip (using hand-held dynamometer)
- > 90% with SL leg press at body weight (number of repetitions to fatigue)
- Functional Performance
  - 90% limb symmetry with SL hop for distance, SL triple crossover hop, and SL 6-meter timed hop (with demonstration of proper LE landing mechanics)
  - Ability to complete sport-specific drills with correct mechanics (At maximum speed without pain)
  - Vail Sport Test (Appendix E)
- Patient reported outcome measures
  - Score ≥ 90% on HOS (ADL and Sports subscales)
References


Appendix A: Prone Hip Extension Test

The prone hip extension test assesses ability to fire the gluteus maximus while maintaining lumbo-pelvic-hip control. Criteria to pass test:

- 10 repetitions
- Proper gluteal muscle activation (gluteus maximus 1st, hamstrings 2nd)
- Leg extends 10° past neutral
- No compensatory movement patterns at pelvis (no anterior pelvic tilt)
- No anterior hip pain

Appendix B: Active Hip Abduction Test

<table>
<thead>
<tr>
<th>Score</th>
<th>Cues for Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Able to maintain position of pelvis in the frontal plane</td>
</tr>
<tr>
<td></td>
<td>Smoothly and easily performs movement; lower extremities, pelvis, trunk and shoulders remain aligned in frontal plane.</td>
</tr>
<tr>
<td>1</td>
<td>Minimal loss of pelvis position in the frontal plane</td>
</tr>
<tr>
<td></td>
<td>Slight wobble at initiation or throughout any movement; may show noticeable effort or “ratcheting” of moving limb</td>
</tr>
<tr>
<td>2</td>
<td>Moderate loss of pelvis position in the frontal plane</td>
</tr>
<tr>
<td></td>
<td>Has at least 2 of the following: noticeable wobble through movement; tipping of pelvis, trunk or shoulder rotation; increased hip flexion and/or rotation of the moving limb; rapid or uncontrolled movement</td>
</tr>
<tr>
<td>3</td>
<td>Severe loss of pelvis position in the frontal plane</td>
</tr>
<tr>
<td></td>
<td>Has more than 3 of the above characteristics and/or unable to regain control of movement once lost or may lose balance (has to place hand on table)</td>
</tr>
</tbody>
</table>

(A) Demonstration of the active hip abduction test from the starting position

(B) Demonstration of good control of the pelvis in the frontal plane; this would receive a score of 0. The alignment of lower extremities, pelvis and trunk has not changed from the start position, and upper extremity remains relaxed on the abdomen.

(C) Demonstration of poor control of the pelvis in the frontal plane; this would receive a score of 3. The upper extremity is placed on the table to prevent loss of balance, the pelvis has rotated forward and the top hip has flexed and internally rotated.

Appendix C: Psoas Progression

Clinicians may choose either of the two iliopsoas strengthening progressions based on clinician/patient preference. All exercises are performed with simultaneous abdominal drawing in maneuver and lumbar spine in neutral alignment.

A) Supine short-lever hip flexion
B) Seated hip flexion
C) Seated hip flexion on Swiss ball
D) Standing hip flexion with theraband resistance

A) Marching
B) Walk Out
C) Heel Slide
D) Heel Slide with SLR


## Appendix D: Forward Step Down Test

<table>
<thead>
<tr>
<th>Definition of errors</th>
<th>Interpretation of errors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arm strategy:</strong> subject uses an arm strategy in an attempt to recover balance (1 point)</td>
<td>0-1 errors</td>
</tr>
<tr>
<td><strong>Trunk movement:</strong> trunk leans right or left (1 point)</td>
<td>2-3 errors</td>
</tr>
<tr>
<td><strong>Pelvic plane:</strong> pelvis rotates or elevates on one side compared to the other (1 point)</td>
<td>4+ errors</td>
</tr>
<tr>
<td><strong>Knee position:</strong> knee deviates medially and the tibial tuberosity crosses an imaginary vertical line over 2\textsuperscript{nd} toe (1 point); knee deviates medially and the tibial tuberosity crosses an imaginary vertical line over medial boarder of the foot (2 points)</td>
<td>4+ errors</td>
</tr>
<tr>
<td><strong>Balance:</strong> subject steps down on the uninvolved side or the subject’s tested leg becomes unsteady (1 point)</td>
<td>4+ errors</td>
</tr>
</tbody>
</table>

Appendix E: Vail Sports Test

Total Points: _____/54 (Patient must score 46/54 on the test in order to pass)

**Single Leg Squat (Goal: 3 minutes):** subject must perform each repetition at a cadence of 1 second up and 1 second down against resistance of a sportcord (placed under the foot of the leg that the test is being performed on).

<table>
<thead>
<tr>
<th>Yes (1) No (0)</th>
<th>Minute 1</th>
<th>Minute 2</th>
<th>Minute 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knee flexion angle between 30° and 60°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Patient performs repetitions without dynamic knee valgus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Patient avoids locking knee during extension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Patient avoids patella extending past the toe during knee flexion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Patient maintains upright trunk during knee flexion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Single Leg Squat Total Points**

If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1-minute timeframe).

**Lateral Bounding (Goal: 90 seconds):** subject performs a lateral hopping motion against resistance of a sportcord attached to the subject’s waist via a belt and on the other end to an immovable object that is level with the waist. The injured leg is positioned as the inside leg or the leg closest to the wall. The patient is instructed to hop from one leg to the other (leg length distance), absorbing energy while they land by bending at the knee and hip. Landing boundaries (distance of the hop) are demarcated on the floor with two pieces of tape, one of which begins at the point of resistance of the sportcord as it is stretched away from the wall and the other is the measured distance of the subject’s leg length from the first piece of tape.

<table>
<thead>
<tr>
<th>Yes (1) No (0)</th>
<th>1st 30 seconds</th>
<th>2nd 30 seconds</th>
<th>3rd 30 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knee flexion angle is 30° or greater during landing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Patient performs repetitions without dynamic knee valgus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Patient performs repetitions within landing boundaries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Landing phase does not exceed 1 second in duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Patient maintains upright trunk during knee flexion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Lateral Bounding Total Points**

If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 30 second timeframe).
Forward Jogging (Goal: 2 minutes): subject performs forward jogging against resistance of the sportcord with the belt around waist. The patient is instructed to hop from one leg to the other in an up and down manner (similar to jogging in place) while using proper form and absorbing energy with each landing by bending at the knee and hip.

<table>
<thead>
<tr>
<th></th>
<th>Yes (1) No (0)</th>
<th>Minute 1</th>
<th>Minute 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Knee flexion between 30° and 60°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Patient performs repetitions without dynamic knee valgus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Patient performs repetitions within landing boundaries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Patient avoids locked knee during extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Landing phase does not exceed 1 second in duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Patient maintains upright trunk during knee flexion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Forward Jogging Total Points**  
If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1-minute timeframe).

Backward Jogging (goal: 2 minutes): subject performs backward jogging against resistance of the sportcord with the belt around waist. The patient is instructed to hop from one leg to the other in an up and down manner (similar to jogging in place) while using proper form and absorbing energy with each landing by bending at the knee and hip.

<table>
<thead>
<tr>
<th></th>
<th>Yes (1) No (0)</th>
<th>Minute 1</th>
<th>Minute 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>Knee flexion between 30° and 60°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Patient performs repetitions without dynamic knee valgus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Patient performs repetitions within landing boundaries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Patient avoids locked knee during extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Landing phase does not exceed 1 second in duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Patient maintains upright trunk during knee flexion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Backward Jogging Total Points**  
If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1-minute timeframe).