Phase 1: Protective (Weeks 1-4 Days 1-28)

Patient Instructions:

1) Wear the brace at all times when patient is up
2) Wear the compression stockings for 4 weeks
3) Do not sit in a chair or with hip bent at 90 degrees for more than 30 min. or sleep in the CPM with hip bent to avoid tightness in the front of the hip
4) Lay on stomach 1-2 hours per day to prevent hip tightness. May use a small pillow under the waist to prevent back pain
5) Continuous Passive Motion Machine:
    a. Begin with limits set at 30 degrees and 70 degrees
    b. Progress 10 degrees in each direction per week
    c. Do not exceed 0-120 degrees
6) Sleep in the brace at 0 degrees extension and de-rotation boots if not using the CPM at night. (Patient and caregiver will be instructed how to properly adjust brace)

Precautions:

1) Brace:
    a. 2 weeks non-micro fracture
    b. 6 weeks micro fracture
    c. 6 weeks for patient with joint hyper mobility and following capsular placation. After 2 weeks the will be set at 0 degrees extension for remaining 4 weeks
2) Weight Bearing:
    a. TTWB with walker or bilateral crutches for 2 week for patients without micro-fracture. Progress to WBAT with crutches or walker for additional 1-2 weeks. Patient should be absent of signs of compensatory gait prior to discharge from crutches or walker. No Trendelenburg or painful gait.
    b. NWB with walker or crutches for 6 weeks for patient following micro fracture procedure. (Exception: See Alter G guidelines for gait training). Progress to PWB for 1 week and then to WBAT. Discharge of walker or crutches when normal gait mechanics are achieved.
    c. TTWB for 2 weeks with walker or crutches for patients with joint hypermobility syndrome and/or after capsular plication. Progress to WBAT for remaining 4 weeks with brace set at 0 degrees extension and 90 degrees flexion. Discharge of walker or crutches on when normal gait mechanics are achieved.
3) ROM Restrictions:
    a. Hip Flexion: 90 Degrees for 2 weeks. After 2 weeks progression of flexion ROM should be absent of groin pain and not forced. Instruct the patient that this includes while on the stationary bike and when sitting in a chair.
        i. **Limit flexion to 120 degrees for additional 2 weeks if capsular plication was performed or patient presents with**

joint laxity

b. Extension:
    i. Non-Micro and Micro patient: NO passive or forced open chain extension past neutral for 2 weeks
        1. Weight bearing extension limited by comfort
    ii. Hyper mobility patient: NO passive or forced open chain extension past neutral for 6 weeks.
c. Abduction: 40 degrees for 4 weeks
d. Internal Rotation:
    i. Supine: Hip flexed to 70 degrees- 20 degrees for 3wks
    ii. Prone: No limits within the comfort of the patient
e. External Rotation:
    i. Supine: Hip flexed to 70 degrees- 20 degrees for 3wks
    ii. Prone: 0 degrees for 3 weeks
    iii. **If plication was performed or in joint laxity cases no prone external rotation for 6 weeks**
f. Adduction: Not past midline for 2 weeks

4) AROM: NO ISOLATED Active or Active resisted hip **FLEXION** during transfers and positioning for 4 weeks.
    a. Avoid active straight leg raise and hip flexion in sitting
    b. Avoid sitting in a 90 degree position for more than 30 min for first 2 weeks
    c. The patient may use the stationary bike (without clips), Alter G and community ambulation with or without assistive device within the weight bearing limitations.
    d. Active ankle pumps may be performed with the leg elevated at the ankle starting on the first therapy visit and performed as home exercise through the day. 20-25reps per session
    e. Special attention is given to restrict isolated active hip flexion. This is to avoid activation of the iliopsoas group and limit irritation and possible tendonitis and may require assistance from caregiver

Isometrics: 20 repetitions, 2-3 x/day

Begin all exercises the first physical therapy appointment unless instructed to start later.

1) Gluteal sets: Tighten buttocks- hold for 5 sec each repetition
2) Quad sets: Tighten quads/thigh muscles by pushing knee into the table. Hold 5 sec. each rep.
3) Transverse Abdominals: Draw belly button in towards the table without causing a pelvic tilt. Hold for 5-10 breaths.

Passive ROM and Home Exercises: Performed 2x/day for 6 weeks

**Proper instruction of all home care givers is key to the success of the PROM. Use of an IPad or smartphone to record the therapist during the first therapy visit can be used for good home reference.

1) Circumduction in Flexion: In supine flex the hip, not exceeding 70 degrees. Knee is bent at 90 degrees. Move the thigh in a circular fashion within the ROM limitation above. Rotation should be in both a clockwise and counter-clockwise rotation. Circumference of the circular pattern it not exceed the circumference of the base of the thigh. **Perform in each direction 3 minutes**
2) Flexion: In supine. The therapist or the caregiver elevates the leg flexing the hip by bring the knee towards the chest. ROM limit: 90 degrees for 2 weeks. After 2 weeks progress gradually and with pain free ROM. **If plication was performed and in laxity cases flexion will be limited to 120 degrees for 2 more weeks.**
   Perform 30 reps
3) Circumduction in neutral: In supine. With the knee straight, bring the leg out into slight abduction and flexion. Hand placement at the heel and under the knee or calf. A circular motion is then performed in both a counter clockwise and clockwise rotation. Again, the circumference of the motion is no larger than the circumference of the base of the thigh. **30 reps in each direction**
4) Abduction:In supine. Keeping the leg straight the therapist of caregiver with pull the leg away from the midline of the body. ROM limit: 40 degrees for 4 weeks. **Perform 30 reps.**
5) Supine External Rotation: Flex hip to 70 degrees with knee flexed at 90 degrees. Slowly rotate the foot inward towards the opposite leg. Limit ROM to 20 degrees and avoid pain. **Perform 30 reps.**
6) Supine Internal Rotation: Flex hip to 70 degrees with the knee flexed at 90 degrees. Slowly rotate the foot outward. Avoid pinch in the joint. **Perform 30 reps.**
7) Prone Internal Rotation: With the patient on their stomach, flex knee to 90 degrees and slowly move the foot away from midline of the body. **Perform 30 reps.**
8) Prone External Rotation: 0 degrees for 3 weeks. After 3 weeks, with patient on their stomach, flex knee to 90 degrees and slowly move the foot in towards the midline of the body. Avoid hip pain. **If plication was performed or hip laxity cases limit prone external rotation to 0 degrees for 6 weeks.**

Stationary Bike: Start on day 1-3 after surgery depending on the patients post op pain levels

1) Upright bike (no recumbent) to avoid hip flexion past 90 degrees for the first 4 weeks. Seat should be adjusted to insure the hip flexion is not past 90 degrees. Also, in some cases the patient may need to sit upright and avoid reaching forward to the handle bars to avoid flexion past 90 degrees as well. These instructions are to carry over to the home if the patient will be using a bike at home. If this cannot be maintained at home then the bike will not be part of

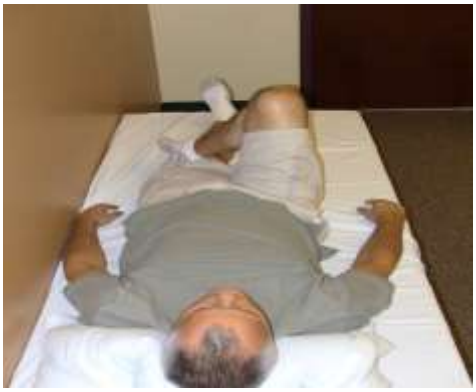
the home program.

2) Avoid clipping in or strapping the foot of the involved side to the pedal. This is to avoid hip flexor stress.
3) The uninvolved side may be clipped in or strapped however. This will help limit the amount of active work the involved limb with perform. Therefore, limiting hip flexor stress.
4) **15 minutes per session and up to 2 sessions per day. Increase 5 min/week up to max of 30 minutes.**

Alter G Gait Protocol: If Alter G anti-gravity is available the following protocol may be followed.

1) Non Micro Fracture Patients:
    a. Begin the Atler G at 1wk post op at 30%-50% weight bearing depending on patients pain tolerance
    b. Progress per the patient's tolerance or 10% each week to 100%
    c. Progress to standard treadmill when full weight bearing is achieved without pain and with a normal gait pattern. Do not exceed 3.0 mph.
    d. Pace:
        i. Week 1: 1-1.5mph
        ii. Week 2: 1.5-2.0mph
        iii. Week 3: 2.0-2.5mph
        iv. Week 4: 2.5-3.0mph
        v. **Do not exceed 3.0mph**
        vi. **Progress speed based on patients pain levels. All gait should be pain free.**
    e. The goal is to maintain a pain free gait and to achieve a normal gait pattern.
2) Mirco Fracture:
    a. Begin the Alter G at 2 weeks post op at 20% weight bearing.
    b. At 6 weeks post op begin to progress to 50% as able.
    c. At 8 weeks gradually progress to 75% weight bearing.
    d. Goal is achieve 100% weight bearing by 10 weeks.
    e. Follow pace schedule as above but not to exceed 3.0 mph and must be pain free.
3) Plication and Joint Laxity:
    a. Begin the Alter g at 2 weeks post op at 30%-50% weight bearing
    b. Progress per patient tolerance or 10% each week to 100%
    c. Follow the pace schedule as described, but not to exceed 3.0 mph before end of 6^{th} week
    d. May progress to standard treadmill once FWB is achieved and without pain and normal gait mechanics. Do not exceed 3.0 mph.

Ambulation on the Alter G should be pain free. Do not progress the patient's weight bearing or speed until they have achieved pain free gait at the previous level.



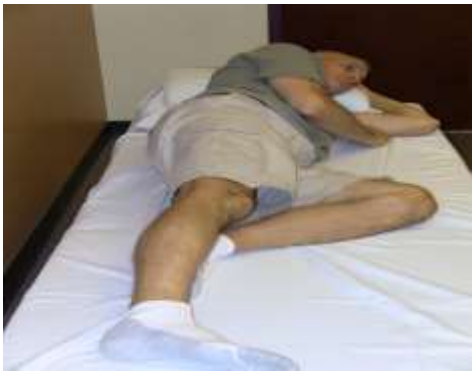
Phase 2 Gluteal Progression

(Weeks 2-3 Days 8-21 based on pt progress/proficiency)

Perform with operative leg 3 x 10 once a day

Glut Medius: Attempt to initiate glut medius with assisted side lifts (SLR Abd) in muscle test position; work on eccentrics (negatives) until pt can perform without pelvic compensation.

Straight leg raises (ABD), [glut medius focus]: Lying on uninvolved side, raise top leg up and slightly back without moving the trunk and without pelvic compensation. Start only when pt can properly perform without and avoid any compensatory movements.

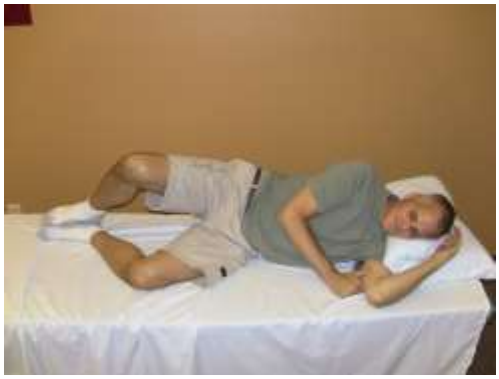



Straight leg raises (EXT), [glut maximus focus]: In prone flex involved side knee to 90^0 or further, lift that knee off the table keeping the knee flexed, raise leg 6-8 inches and avoid any compensatory movements.

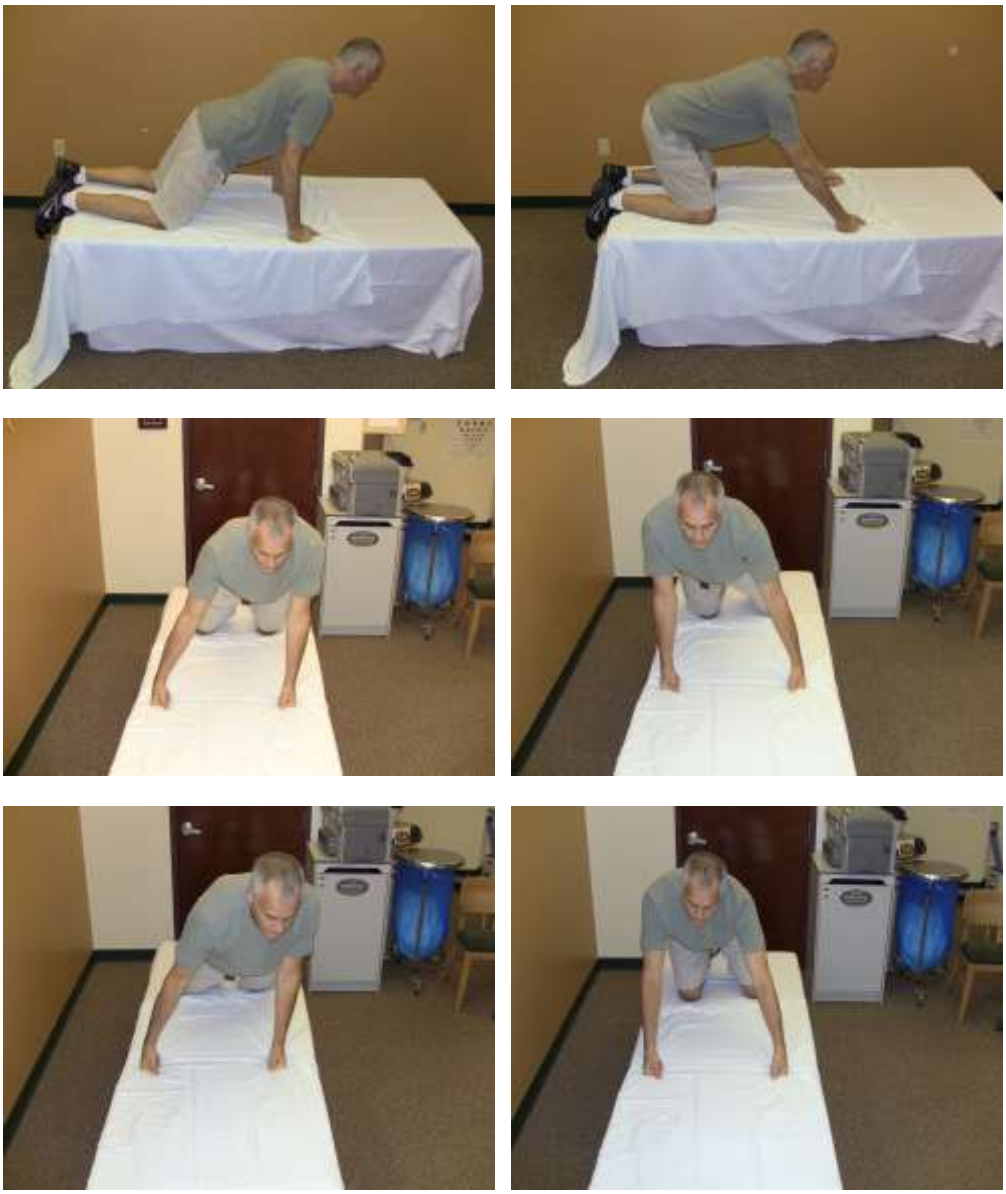

Straight leg raise (EXT): In prone keep knee extended and slowly lift involved leg off table then slowly lower back to table and avoid any compensatory movements.


Rose Wall Slides: Lying on uninvolved side with shoulders, hips, and heels flush up against wall, slowly slide top (involved) leg along wall, while moving heel maintain firm abdominal muscles.


Clams: Lie on uninvolved side with knees flexed and pelvis and legs stacked, slowly lift then slowly lower effected leg back to starting position, while moving leg maintain firm abdominal muscles.

Quadruped Racking: On hands and knees, shift your body weight forward on your arms then back onto your legs, then shift side to side, then shift into diagonal directions (Keep shoulders and hips in position and in line and maintain firm abdominal muscles).

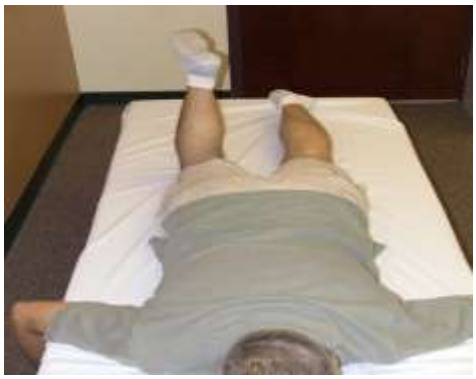


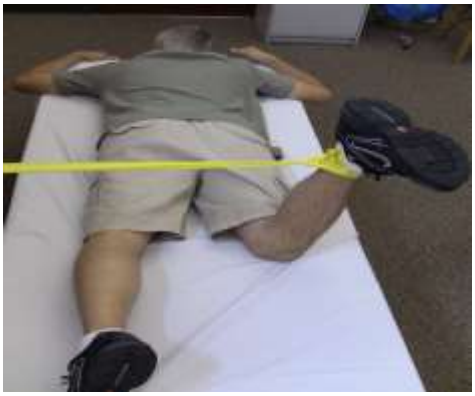
Additional Quadruped Exercises: Have the patient alternate lifting upper extremities and lower extremities and then progress to moving contra lateral extremities. Emphasize smooth movements, firm core, breathing, and correct exercise technique using a rod, dowel, etc across lower back to ensure patient does not use compensatory movements to complete exercise.

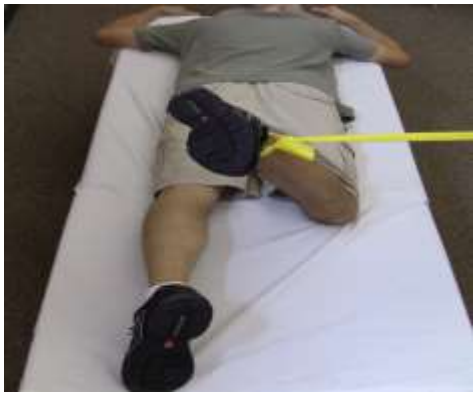
Standing Hip IR/ER: place knee of the involved LE on a stool, rotate hip without moving trunk so that the stool turns moving foot outward from body, progress using a resistance band for internal rotation and then progress to external rotation as per guideline milestones (not to exceed 0^0 for the first 21 days). Begin with least resistance first and progress pt, emphasize correct technique).




Active Prone IR/ER: In prone with involved knee bent to 90^0, allow foot to drop out so that the hip is in full IR, actively rotate hip back to <u>NEUTRAL</u> <u>ONLY</u> (may go beyond neutral after 4 weeks), partner may gradually add manual resistance (then progress to resistance bands) to this motion in both directions.







Bridging Series Exercises

Perform with operative leg 3 x 20 each 1-2 x a day

Double Leg Bridges: In supine with hip and knees bent [hook lying position] place rubber tubing around knees if needed, keep core stable/firm and then slowly raise buttocks and then slowly lower buttocks, progress to ball squeeze between both knees and then to single leg bridging as patient becomes more proficient with technique and coordination and endurance increases.

Bridge on Swiss Ball: In supine place feet up on Swiss ball and keep knees bent and keep core stable/firm, slowly raise buttocks and hold for 5 seconds, then slowly lower

buttocks. Then progress to extending knees and keep core stable/firm, slowly raise buttocks and hold for 5 seconds, then slowly lower buttocks, progress to laying with shoulders on ball and with feet on the floor, keep core stable/firm and then slowly raise buttocks and then slowly lower buttocks, progress to add arm rotations in this position or perform with single leg bridge.

Water Progression

Perform 3 x a week for 20-30 minutes

Water walking: Walk forward, backward, and side-to-side in chest deep water

Water Jogging: Jog in place in deep water

Swimming: Frog kick as performed in the breaststroke

Motion: Any type of A/ROME that is within the pt's pain tolerance is acceptable

Gait Progression "crutch weaning" (use 2 crutches)

Perform 3 x 10 each 1-2 x a day

Weight shifting exercises: Focus on avoiding Trendelenburg and/or other compensatory gait patterns

Increasing weight bearing (**if applicable**): Gradually add 25% weight on surgical leg every 1-3 days until 100%, continue to use both crutches during this period. Avoid early fatigue by taking rest periods, avoid limping and focus on correct walking and weight shifting techniques and proper mechanics. When the pt is steady and able, have them initially amb around their home without their assistive device before attempting to amb in the community without their assistive device. Have them take care when traversing uneven surfaces/terrain (i.e. grass, gravel, sand, etc.).

Stair and Curb Training: Provide education for both with and without assistive device and/or hand rail/s.

Balance Progression Exercises

Perform 3 x 10 and hold for 30 seconds 1 x a day

Single leg stance

Dyna-disc: Progress to touching the opposite foot to the ground at 9:00, 10:30, 12:00, 1:30, and the 3:00 o'clock positions. Emphasize firm core, breathing, and correct exercise technique.

Add dynamic balance activities as tolerated by the patient. Emphasize firm core, breathing, and correct exercise technique. Therapist can be creative.

Phase 3 Intermediate Exercises

(Week 6 Days 36-42 based on pt progress/proficiency)

Closed Chain and Single Plane

Perform 3 x 20 once a day (may need to decrease reps initially).

Double 1/3 knee bends: In standing with feet shoulder width apart, bend at the knees to 60^0 of flexion, DO NOT allow knees to go past toes, progress using a sport cord for resistance

Mini Squats with the Swiss ball (make sure the patient's knees do not pass their toes). Flex down to mid-range and progress to 90^0 knee flexion (as per timeline milestones). May have patient hold down position and increase hold time as patient's proficiency and strength increases. Make sure patient's weight is evenly distributed onto both feet and that patient does not compensate during the movements. Emphasize firm core, breathing, and correct exercise technique.

Sit <--> Stand transfers: Have patient perform on high table and progress to low surface. Make sure patient's weight is evenly distributed onto both feet and that patient does not compensate during the movements. Emphasize firm core, breathing, and correct exercise technique.

Hip Hiking on Step: Stand with operative leg on a step, slowly lower non-operative leg in a downward direction and then slowly lift it to the starting position.

Stepping: Have the perform sidestepping, front stepping, and backward stepping with their operative leg on a step, slowly lower non-operative leg in a downward direction and then slowly lift it to the starting position. Emphasize firm core, breathing, and correct exercise technique.

Phase 3 Advanced Core Progression Exercises

(Week 6 Days 36-42 based on pt progress/proficiency)

Planks: Lie on either side with knees bent resting on an elbow, slowly lift the hips up in a straight line, then slowly lower hips, progress by performing with legs straight, progress to performing in supine and then in prone.

Pilates: (ONLY WITH AN INSTRUCTOR) footwork and skater series, and hip extensions.

Sidestepping: Place rubber tubing around ankles (progress resistance as pt progresses), bend at knees (knee not to pass toes) and sidestep in each direction while maintaining the

bent knee position and keeping chest in an upright position. Distance of sidestepping is based on pt's progress, ability, and the therapist's judgment.

Single 1/3 knee bends: Use the same starting position as the double knee bends but with only the surgical leg, bend knee to 60^0 of flexion while maintaining a level pelvis AND not letting the knee "fall in" (corkscrew), progress by adding a sport cord for resistance (sports test exercise).

Balance squats: with one leg behind you on a chair, squat with your opposite leg to 70^0, perform with opposite leg on a chair (single leg closed kinetic chain exercise)
Lunges (single leg closed kinetic chain exercise) short distance initially then progress based on pt's progress, ability, and the therapist's judgment.

Reverse Lunges (single leg closed kinetic chain exercise) based on pt's progress, ability, and the therapist's judgment.

Elliptical trainer: Begin with minimal resistance and increase intensity over time as tolerated by the patient. Perform 3 x a week x 15-20 minutes.

Phase 4 Advanced Exercises

(Week 8 Days 50-56 based on pt progress/proficiency)

Multi-Directional and Plyometric

Perform 10 sets for 1-2 minutes x 3-5 x a week

Plyometrics: Water to dry land progression.

Begin in water (chest deep) perform forward bounding and focus on absorption when landing, then progress to dry land ploymetrics.

Perform 3 x 50 for 3 x a week

Side-to-side lateral agility with a sports cord

Attach a sports cord from the side, with the involved leg facing the cord, step sideways to create tension on the sports cord, from a single knee bend position on the involved side, explode laterally, touching with the noninvolved leg momentarily, before the tension pulls you back, emphasize absorption back onto the involved leg.

Perform 3 sets for 1-2 minute intervals once a day

RUNNING: Expect to have mild limping/discomfort awkwardness- this should go away gradually, common sense dictates that if the limp worsens or if there is pain, RUNNING SHOULD STOP, progress to the next phase each week.

Forward/backward running with a sports cord.

Shift from one leg to the other leg while running in place without exaggerating the absorption and push off motion, face the sports cord for backwards running.

Walk to Run Ratio Table

Level	Walk/Run Ratio	Sets	Total Time	**Frequency**
R1	4 mins/1min	4 sets	20 min	4-5 times/week
R2	3 mins/2 mins	4 sets	20 min	4-5 times/week
R3	2 mins/3 mins	4 sets	20 min	4-5 times/week
R4	1 min/4 mins	4 sets	20 min	4-5 times/week
R5	10 mins Jog	2 sets	10 min	4-5 times/week

Golf Progression Table

Level	**Golf Progression**	**Volume**	**Frequency**
G1	Putt, Chip, 1/2 Swing Only	1 Bucket	For 1-2 weeks
G2	8-9 Irons, 3/4 Swing Only	1 Bucket	For 2 weeks
G3	All Irons, Use Cart, Full Swing	9 Holes	For 2 weeks
G4	Full Play, Walking 18 Holes	18 Holes	-

Phase 5 High Level Activities May Return to Sport at 12 weeks

(Week 12 Days 78-84 based on pt progress/proficiency)

Initial Agility Drills: Straight plane agility

For these agility exercises you will need to set up two cones initially about 10 yards apart so that the patient will have a clear understanding of the starting and end points. You may move the cones farther apart as the patient progresses.

Chop-Downs/Back Pedaling:

Jog forward from the starting cone, stutter step to a stop at the end point cone, absorb and push off smoothly into a back pedal to the starting cone.

Side Shuffles:

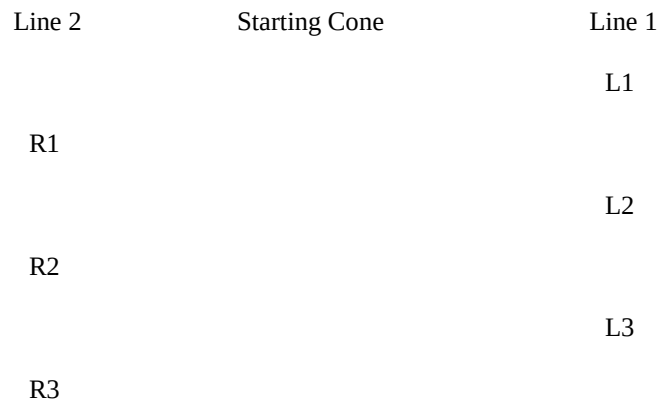
Start with feet shoulder width apart; maintain an athletic stance, from the starting cone shuffle to the right to the end point cone, and then shuffle back to the left to the starting cone.

Multi-Plane Agility

Z Cuts:

This type of agility drill will focus on lateral cuts, planting feet, and change of direction. Have the patient stand in an athletic stance facing forward. The patient will start off by jogging in a diagonal direction to the left side cone number 1, then will plant their left leg and change direction and jog toward right side cone number 1, plant their right leg and jog to the left cone number 2, and have them repeat this process alternating between line 1 and line 2 cones for 8 to 10 cones. Each time they change directions, have them plant the outside foot, absorb and stay low, then push off into the new direction. Start the patient slowly then have them progress their stepping speed as the proficiency increases.

Set up cones in two lines about 5 yards apart. The cones in Line 1 are placed 10 yards apart on the 0 (L1), 10 (L2), and 20-yard (L3) mark. The cones in Line 2 cones are placed on the 5 (R1), 15 (R2), and 25-yard (R3) mark. Place a starting cone at the midway point between lines 1 and 2.



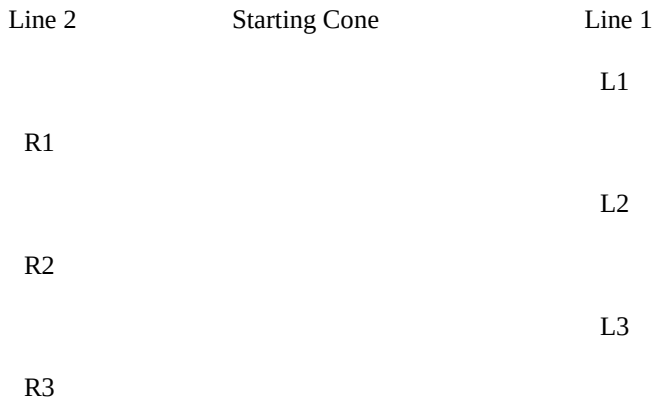
W Cuts:

This drill will emphasize backward pedaling; planting feet, keeping hips and shoulders square, and change of direction to forward jogging.

Set up cones in two lines about 5 yards apart. The cones in Line 1 are placed 10 yards apart at the 0 (L1), 10 (L2), and 20-yard (L3) mark. Line 2 cones are placed on the 5 (R1), 15 (R2), and 25-yard (R3) mark. Place a starting cone at the midway point between lines 1 and 2.

Have the patient stand in an athletic stance facing side-on slightly in front of the starting cone. They will jog backward to the first cone in Line 1 and they will plant the outside

right foot and keep their hips and shoulders square. Then they will push off into a forward jog to the first cone in Line 2 and they will plant the outside right foot and keep their hips and shoulders square. Then they will jog backward to the second cone in Line 1. They will continue this process as they alternate between backward and forward jogging to each line. Each time they change direction, they will plant the outside foot, absorb and stay low. Continue in this manner for 8-12 cuts. Repeat using your left leg as the outside leg to ensure it is used to plant. Start the patient slowly then have them progress their stepping speed as their proficiency increases.



Cariocas

Start with feet shoulder width apart; move to the left by stepping with the right foot across and in front of the left foot, keep moving to the left by moving left foot from behind the right foot to the original stance position, keep moving to the left by moving right foot behind the left foot, keep moving to the left by moving left foot to the original stance position.

Have patient maintain an athletic stance and perform the movements in a smooth and fluid motion throughout the exercise.

Have the patient perform this exercise by alternating legs for the initial step to ensure that each leg receives an equal workout.

Start the patient slowly then have them progress their stepping speed and distance as their proficiency increases.

Ghiardelli's

Start with feet shoulder width apart, then cross the right leg over the left iliac crest, swing the left leg out from behind the right leg (into the original stance position) absorbing and touching the ground with the left hand in one fluid motion. Cross the left leg over right iliac crest, swing right leg out from behind the left leg (into the original stance position) absorbing and touching the ground with the right hand in one fluid motion.

Start the patient slowly then have them progress their stepping speed and distance as their proficiency increases.

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