



Osteochondral Allograft of Femoral Condyle with High Tibial Osteotomy

Post-Operative Rehabilitation Protocol

0-2 weeks

- NWB for 6-8 weeks with crutches
- Brace locked in full extension
- Quad Sets with brace locked at 0 degrees
- Heel Slides
- Ankle pumps
- Gentle PROM 0–90°
- 0 to 6 weeks: Use CPM for 6 hours/day, beginning at 0–40° and advance 10 degrees as tolerated daily until 90 degrees is reached

2-6 weeks

- Brace locked in extension when ambulating and sleeping
- Side-lying hip and core
- Advance quad set and stretching

6-8 weeks

- Addition of heel raises
- Total Gym (close chain)
- Eccentric quads, eccentric hamstrings
- Advance core, glutes and pelvic stability
- Begin WBAT progression

8-12 weeks

- Advance to full WBAT by 8 weeks
- Gait training
- Progress close chain activities
- Advance hamstring work, lunges/leg press 0–90° only, proprioception/balance exercises
- Begin stationary bike

12-24 weeks

- Advance phase III exercises and functional activities: walking lunges, planks, bridges, swiss ball, half-bosu exercises
- Advance core/glutes and balance

Weight Bearing Status

NWB x 6-8
weeks

Brace Settings

Locked
straight x 6-8
weeks when
ambulating
or sleeping.
Otherwise
open brace
once good
quad control

ROM Restrictions

PROM 0-
90°
beginning
POD 1



6-12 months

- Advance functional activity
- Return to sport specific and impact when cleared by MD usually at 9 months



| Exercise | Week | | | | | | | | | | | | | | |
|---|---|---|---|---|--------|-------------|---|---|------------------|----|----|----|----|----|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 16 | 20 | 26 | 32 | |
| Initial Exercises: | | | | | | | | | | | | | | | |
| ROM Goals | 0-90° | | | | 0-125° | | | | Progress to full | | | | | | |
| Flexion/extension, wall slides | [Green bar] | | | | | | | | | | | | | | |
| Flexion/extension- seated | [Green bar] | | | | | | | | | | | | | | |
| Patella/Tendon mobilization | [Green bar] | | | | | | | | | | | | | | |
| Extension mobilization | [Green bar] | | | | | | | | | | | | | | |
| Quad Series | [Green bar] | | | | | | | | | | | | | | |
| Hamstring strength progression | [Green bar] | | | | | | | | | | | | | | |
| Sit and reach for hamstrings (towel) | [Green bar] | | | | | | | | | | | | | | |
| Ankle Pumps | [Green bar] | | | | | | | | | | | | | | |
| Crutch weaning | NWB → PWB by 6 weeks | | | | | | | | Full by 8 weeks | | | | | | |
| SLR (w/ brace until quad control restored) | [Green bar] | | | | | | | | | | | | | | |
| Toe and Heel Raises | [Green bar] | | | | | | | | | | | | | | |
| Balance Series | [Green bar] | | | | | | | | | | | | | | |
| Weight-bearing Strength Exercises: | | | | | | | | | | | | | | | |
| Leg Bridges (2 → 1 leg) | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| SLS Balance progressions | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Beginning cord exercises | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Squat/Leg press (ISO → reps, 2 → 1 leg) | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Step-up/Lunge Progressions | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Dead Lift (2 → 1 leg) | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Cardiovascular Exercises: | | | | | | | | | | | | | | | |
| Bike with non-operative leg-no resistance | [Green bar] | | | | | | | | | | | | | | |
| Bike with both legs-no resistance progress as tolerated | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Aqua jogging | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Treadmill-walking (no limp) | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Swimming with fins | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Elliptical Trainer | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Stair stepper | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| *Note for Cardio Exercises | Must tolerate daily walking with no limp & no significant increase in pain/swelling prior to initiating WB cardio (walk, elliptical, stepper) | | | | | | | | | | | | | | |
| Agility Exercises: | | | | | | | | | | | | | | | |
| Running Progression | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Initial-Single Plane | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Advance-Multi Directional | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| High Level Activities: | | | | | | | | | | | | | | | |
| Golf Progression | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Outdoor biking, hiking, running | [Green bar] | | | | | [Green bar] | | | | | | | | | |
| Return to Full Sport at 9 months post-op | [Green bar] | | | | | [Green bar] | | | | | | | | | |

Adapted from post-operative protocol created by Howard Head Physical Therapy, Jill Monson, PT, OCS and Jon Schoenecker, PT, OCS, CSCS



Quad Series:

- Quad sets (5 sec hold) also quick contractions (NMES to supplement)
- Prone quad sets
- SLR with no extension leg
- Progression of Quad Strengthening (WB exercises at 6 weeks)
 - LAQ in safe range -no added resistance to begin
 - Once weight bearing tandem stance TKE with 5 sec hold
 - Isometric wall sit
 - SLR with resistance
 - Step up progression
 - Squat progression
 - Leg press progression
 - Lunge progression

Hamstring Series:

- Hamstring stretching (supine/prone)
- Hamstring set (heel dig)- contract hamstring with knee flexed pressing heel into the floor (5 sec hold)
- Hamstring curls
- Progress to resisted hamstring curl

Sport Test Exercises:

- Goals: impact training and introduction of directional drills
- Double leg squat jumps
- Box jumps
- Speed skaters
- Double leg jumps for height and distance progress to single leg as tolerated
- Blaze pod change of direction drills

Further Clarifications and Considerations

- May begin to implement BFR as early as 1 week into post-op period
- Cord exercises (resistance band/cord): resisted double knee bends, resisted hamstring curls



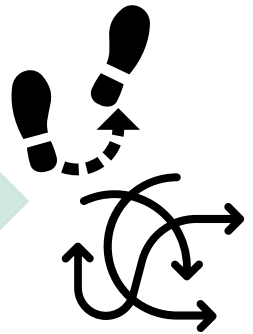
Return to Running Criteria

- Trace effusion, flexion within 5 degrees of contralateral side
- LSI on anterior reach Y balance test $\geq 90\%$
- LSI on quadriceps torque output on isometric measurement $\geq 75\%$
- 12" SL squat tolerance
- Able to walk > 1 mile with no limping or pain
- Able to "hop" with UE assist on operative leg 5 times without pain or compensation
- SL balance with eyes closed 30 seconds without loss of balance



Return to Agility/Change of Direction Criteria

- Return to running criteria listed above met
- No effusion
- Full ROM
- Quad LSI on isokinetic $\geq 85\%$
- Hamstring LSI on isokinetic $\geq 85\%$
- LSI on anterior reach Y-balance $\geq 95\%$
- SL hopping pain-free and effusion free



Return to Sport Criteria

- In order to test must demonstrate full AROM, no pain, no/trace effusion, 5/5 strength, negative lachman and pivot shift, LSI $\geq 95\%$ hamstring curl and leg press
- Quadricep strength $\geq 95\%$ of contralateral side (< 2cm of atrophy)
- Able to perform single leg squat with correct form
- LSI SL hop $\geq 95\%$
- Y-Balance $\geq 95\%$ (mean of 3 trials in anterior, posterolateral, posteromedial /100)
- Vertical jump test, single leg hop distance, and timed single leg hop over 20 -feet $\geq 90\%$ of contralateral side

