



Dr. Walter Lowe

Knee Arthroscopy

Post-Operative Rehabilitation Protocol

Ironman Sports Medicine Institute

3rd Edition



Tips for Successful Recovery

1. **Surgical pre-cautions:** Do not change bandages unless instructed by physician. Wear compression hoses on operative limb until crutches are discharged. **If you suspect a DVT, contact Dr. Lowe's office immediately at 713-486-6540 or refer to ED immediately. If patient has reactive effusion that does not improve with rest, ice, and compression, contact Dr. Lowe's office.**
2. Begin **stretching extension** ROM on day one. Achieve full extension ROM by week 1. **If not achieved by end of week 2, notify the physician's office.**
3. Address **quad activation** early and focus on isolation of quadriceps activation. Use surface emg, NMES, and cueing to isolate quadriceps. Be aware of co-contracting from hamstrings, and ensure proper form. Do not progress to standing activities if patient is unable to achieve isolated quad set in long seated position. Goal by week 2 is to achieve heel lift with a quad set.
***Dosing quad sets:** 10 minutes of 10 second squeeze/10 second rest, x5 times a day.
4. **Straight leg raises:** Ensure quadriceps is activated and is maintaining contraction throughout the SLR range to eliminate extensor lag. Aim for a calf tap and elimination of extensor lag by week 2. Calf tap: the calf taps/skims the table while the heel stays elevated as the leg descends to starting position. Continue doing SLR until 10# ankle weight is achieved.
5. Do not force **flexion ROM**, but encourage steady progression. Patellar mobility is imperative. Use gentle soft tissue techniques for areas such as anterior interval/fat pad, quadriceps, hamstrings, and scar management. **If 90° of flexion is not achieved by end of week 1, notify physician's office.**
6. Start double leg (DL) mini squats and leg press from 0° to 60° initially, then progress to 90° as tolerated. Single leg (SL) activities may be initiated at week 4 with SL leg press and step-ups, then advancing to SL activities as tolerated. **Loaded leg extensions are prohibited.**
***Squat progressions example:** DL leg press, DL mini squats, DL chair squats, DL body weight squats, SL leg press, SL step ups, Static lunge split squat, SL step downs, SL squats, SL split squat with elevated back leg, walking lunges, SL sit to stands, SL slide outs.
7. **Pre-run/pre-jump program** includes tempo-based activities with focus on the deceleration phase such as DL speed squats, DL drop squats, DL "bounce bounce bounce squat", then progress to alternating SL drop squats. Also, intermittently increase the tempo of regular strengthening exercises to align with the timing requirements of jogging and jumping.
8. **Walk/Jog program: MD approval required.** Begin on treadmill with 2- 3 days per week. Begin with 1:1 or 2:1 walk to jog ratios, (ie. 1 min walk to 1 min jog or 2 min walk to 1 min jog). Then progress each week by 1 min jog until 12-15 min of jogging is achieved.
9. **Plyometric program: MD approval required.** Begin with small DL jumps, jump rope, and small depth jump landings& box jumps. Progress box height as skill is mastered. Ensure equal weighted DL take-off and landing before progressing to SL plyometrics. Initiate SL plyometrics with alternating L and R landings in place and then advance to SL hops. Begin a sportmetric based plyometric program when released by surgeon.
10. **Isokinetic protocol:** After 8 weeks and **with MD approval**, may begin training and testing with 300°/sec and progress to 180°/sec. **Do not proceed if patient has history of anterior knee pain.**
11. **Return to Play Progression:** a graded re-exposure is essential. Return to non-contact practice, return to contact practice, return to scrimmage, return to interval play, return to full time play.

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PHASE 1 - ACUTE (0-2 Weeks)

PHASE GOALS: REGAIN MOTION, RESTORE AMBULATION & ADL STATUS

RANGE OF MOTION

- 0-1 Week – Full extension and progress flexion to 90°
- 1+ Weeks – Maintain full extension and gradually progress to full flexion
- Patellar mobs, calf/hamstring stretching, heel prop, prone hangs, heel slides

WEIGHT BEARING

- 0-2 Weeks – Weight bearing as tolerated
- 2+ Weeks – FWB with symmetrical gait

CRUTCH USE

- D/C crutches when gait is normal

STRENGTHENING

- Quad sets, straight leg raises, hip abduction, SAQs, LAQs
- Pre-gait, TKEs, calf raises, static balance, mini squats, chair squats, step ups, hip machine, bridges, total gym
- Stationary biking: must be > 110° knee flexion

CRITERIA FOR FULL AMBULATION

- **≥ 0 DEG KNEE EXTENSION & 90 DEG KNEE FLEXION**
- **≥ 30 STRAIGHT LEG RAISES WITHOUT LAG**
- **MINIMAL EFFUSION, PAIN, & SYMMETRICAL GAIT WITHOUT A LIMP**
- **MD OR PT APPROVAL**

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PHASE 2 – STRENGTH & JOGGING (2-8 Weeks)

PHASE GOALS: IMPROVE STRENGTH & INITIATE JOGGING PROGRAM

RANGE OF MOTION

- 2+ Weeks – Symmetrical & pain free with overpressure

STRENGTHENING

- SLRs 4 ways with weight or for time
- Leg press, step ups, step downs, RDLs, lunges, Bulgarian squats, wall sits
- Squat progression: bodyweight squats → single leg squats
- Advance hip abduction & glut strength: band walks, lateral lunge, reverse lunge
- Core exercises: planks, side planks, v-ups, Russian twist, superman
- Balance training: foam pad, balance board, BOSU

CONDITIONING

- Initiate dynamic warm-up: frankenstein kicks, leg swings, knee hugs, heel sweeps, heel/toe walks, oil rigs, lateral lunge, hip rotation, inch worm, speed squats
- Stationary bike, elliptical, & rowing machine
- 4+ Weeks – May initiate treadmill walk/jog progressions: begin with 30"-1' W/J intervals, advance jog time by 1 min each week
- 4+ Weeks -- Swimming: progress kicking gradually and pain-free, with MD approval for wound closure

CRITERIA FOR JOGGING

- **PAIN LESS THAN 3 / 10 (WORST)**
- **WITHIN 2 DEG NORMAL KNEE EXTENSION & 120 DEG KNEE FLEXION**
- **QUADRICEPS & HAMSTRING STRENGTH \geq 60% NORMAL**
- **LESS THAN 4cm DEFICIT ON SINGLE-LEG SQUAT (ANTERIOR REACH)**
- **AT LEAST 1 MINUTE OF SINGLE LEG SQUATS**
- **MD OR PT APPROVAL**

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PHASE 3 – STRENGTH, AGILITY, & PLYOMETRIC (8+ Weeks)

PHASE GOALS: INTRODUCE DYNAMIC MOVEMENTS AND DL PLYOMETRICS

RANGE OF MOTION

- 8+ Weeks – Maintain symmetry & pain-free with overpressure

STRENGTHENING

- Gym strengthening: squats, deadlifts, initiate olympic lifting
- SL strengthening: SL squats, sit to stands, ball slams, step ups/downs
- Dynamic core exercises: mountain climbers, planks, pikes, pale off press
- Integrate interval strength circuits & work/rest timed intervals
- Dynamic eccentric loading: double & single leg

CONDITIONING

- Dynamic warm-up & integrate sport specific warm up
- Biking, elliptical, jogging, swimming, & rowing
- Advance to track workouts and linear speed drills

PLYOMETRICS & AGILITY:

- Ladder drills, footwork agility drills, cone drills
- Plyometrics DL → SL: jump rope, line jumps, cone jumps, depth jumps, box jumps, tuck jumps, squat jumps, SL hop, SL triple hop, SL cross over hop
- Change of direction drills: begin with < 90°, progress to 90° and greater
- High intensity predictable patterned movements, incorporate sport specific drills

CRITERIA FOR PLYOMETRIC AND HEAVY AGILITY

- **PAIN LESS THAN 2 / 10 (WORST)**
- **QUAD & HAM STRENGTH \geq 80% NORMAL; \geq 50% H/Q RATIO FOR FEMALES**
- **AT LEAST 3 MINUTES OF SINGLE LEG SQUATS (RESISTED)**
- **\leq 5 ON LANDING ERROR SCORING SYSTEM (LESS)**
- **MD OR PT APPROVAL**

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PHASE 5 - RETURN TO PLAY (12+ Weeks)

PHASE GOALS: SPORTS SPECIFIC MOVEMENTS & RETURN TO PRACTICE STRENGTHENING

- Gym strengthening: squats, deadlifts, and olympic lifting
- Interval strength circuits & work/rest timed intervals
- Dynamic eccentric loading: double & single leg
- Dynamic strength and core exercises
- Complex movement patterns
- Isokinetic protocols: 300°, 180°, and 60°/sec

CONDITIONING

- Jogging, biking, swimming, rowing, & interval sprint workouts

PLYOMETRICS & AGILITY (2-3 DAYS/WEEK)

- Max effort DL and SL jumps → progress with rotation
- Lateral & rotational agility drills
- Unpredictable cutting agility
- Non contract drills → contact drills with MD approval
- **Return to practice → return to contact practice → return to scrimmage → return to interval play → return to full play**

CRITERIA FOR RETURN TO PLAY

- **PAIN LESS THAN 2 / 10 (WORST)**
- **QUAD & HAM STRENGTH ≥ 90% NORMAL; ≥ 60% H/Q RATIO FOR FEMALES**
- **90% NORMAL ON SINGLE-LEG HOP TESTS**
- **95% NORMAL FIGURE OF 8, 5-10-5 PRO-AGILITY, & S-L VERTICAL JUMP**
- **MD APPROVAL**