



# BEAR<sup>®</sup> Implant

## REHABILITATION PROTOCOL



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**Instructions for Surgical Team:**  
Please provide this document and the BEAR® Implant Patient Post-Operative Instructions to the patient and/or parent/guardian following surgery.



Find a BEAR-trained  
Physical Therapist Near You

Date of surgery: \_\_\_\_\_

Name of patient: \_\_\_\_\_

Additional procedure?    ☐ Yes ☐ No

Name of operating surgeon: \_\_\_\_\_

Contact for operating surgeon: \_\_\_\_\_

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# Treatment Overview

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This patient received the BEAR Implant as treatment for a torn ACL. This is not an ACL Reconstruction (ACLR), and the Rehabilitation Protocol is different. Please follow this specialized BEAR Implant Rehabilitation Protocol in the pages that follow, unless instructed differently by the operating surgeon.

**Physical therapists:** For questions and to be connected with our rehab consultant, please contact Miach Orthopaedics 1-800-590-6995 or [Info@miachortho.com](mailto:Info@miachortho.com)

## Pre-Surgical Preparation for Surgical Team

- Moderation of range of motion (ROM) for the first 2 weeks is necessary to provide a protective environment for the healing ACL. Therefore, we recommend no aggressive or repetitive ROM exercises during this period. While passive range of motion (PROM) within the ROM restrictions is allowed, over-stretching or pressure into end range flexion is not permitted.
- The patient should begin their home exercises within 48 hours post-op (except pediatrics). Please teach these exercises to the patient at the last pre-operative visit.
  - These exercises will be reviewed again at their first PT visit to ensure proper form and frequency.
- Notify the patient at their last pre-op visit that they should schedule their first physical therapy visit to take place within first week post-op.

## Weight Bearing Status

- Partial Weight Bearing (PWB) - 50%
- Brace locked in extension for partial weight bearing for 4 weeks
- With clearance from PT and surgeon, patient may advance to weight bearing as tolerated (WBAT) with crutch wean at 4 weeks, only if the following criteria are met:
  - able to walk with normal gait pattern
  - no pain
  - no extensor lag
  - good quad control
  - ability to safely ascend/descend stairs without noteworthy pain or instability

## Bracing Instructions

ACL hinged knee brace (TROM or equivalent) for weight bearing activities

- Locked for ambulation at 0° for the first 4 weeks outside of physical therapy
- Locked for sleep at 0° for first 4 weeks post-op
- Unlock for ROM to specified degrees when seated or at physical therapy for gait training after 2 weeks
- Advance to unlocked brace for WBAT ambulation at week 4 if the patient is comfortable doing so and if they demonstrate appropriate quadriceps control (should not flex past 90° until week 4)



# Treatment Overview Cont'd

## Brace Range

| Timeframe           | Degree Range                                                                                          |
|---------------------|-------------------------------------------------------------------------------------------------------|
| First 24 hours only | Brace locked at 0° or until 1st post-op surgeon visit for adolescents                                 |
| 0 to 2 Weeks        | 0 - 45°                                                                                               |
| 2 to 4 Weeks        | 0 - 90°                                                                                               |
| 4 to 6 Weeks        | Progress to full ROM as tolerated                                                                     |
| 6 to 14 Weeks       | Change to functional brace (if requested by surgeon) when Active Range of Motion (AROM) is 0 to ≥110° |

## Recommendations

- No aggressive scar massage until phase 3
- No **aggressive** stretching or overpressure into end range flexion until week 12. Light manual ROM is permitted as needed
- No continuous passive motion (CPM)
- Driving: No driving until patient is off all narcotics; for patient with RIGHT leg procedure, no driving until the patient is full weight bearing without crutches and has at least 60° of flexion
- Jobs with physical labor: Restrictions per operating surgeon and in the following PT protocol
- The only modalities for muscular strengthening to be used are NMES (NeuroMuscular Electrical Stimulation), Electromyographic (EMG) biofeedback, and optional low intensity Blood Flow Restriction (BFR) strength training **for patients limited by pain or poor load tolerance**
- If stiffness is observed at any phase, ensure proper post-op management of pain and swelling and contact the operating surgeon.

## Modifications for Patients with Open Physes

- 2 weeks post-op immobilization/brace locked at 0 degrees
- WBAT right away with crutches
- After 2 weeks the patient is allowed to progress ROM as tolerated. The brace is unlocked at the 2 week visit and locked 0-90° only as protection from falls when they are ambulating
- After the initial 2 week period, put the patients into the middle of phase 1

## Additional Instructions

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# Phase 0: Preoperative PT and Immediately After Surgery

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## Preoperative Recommendations

**Phase Goals:** Begin as soon as possible following initial injury to re-establish the following goals prior to surgery

- Full AROM and PROM knee extension
- Knee flexion ROM within 10° of uninvolved limb
- Trace to zero knee effusion
- No knee extension lag with straight leg raise (SLR)
- Quadriceps Strength Index (QI) ≥80% of uninvolved limb - Retain values for post-operative comparison to minimize overestimation of strength
- Teach the Home Exercises to patient/guardian(s) at the last pre-operative visit (*see Patient Post-Operative Instructions* document). Also, highlight the importance of rehabilitation compliance
- Educate on brace, crutch use and PWB

## Patient Education

- Importance of prehab for optimal post-operative outcomes
- What to do immediately after surgery (0-48 hours)
- Anticipated return to sport timeline: 9-12 months
- Expected outcomes: Return to prior level of competition is often difficult, but possible
- Osteoarthritis risk



# Phase 1: Weeks 0 to 4

## Home Program with PT Supervision & 1-2 Week Visit with Surgeon

### Important Instructions for Phase 1

**Facilitated by PT:** The *Patient Post-Operative Instructions* and Home Exercises should be reviewed and taught again at the first post-op clinic visit with surgeon and again with PT at their week 1 and 2 post-op visits.

### Goals

1. Quad activation
2. Control inflammation and pain
3. Full extension ROM
4. Introduce flexion ROM

## Recommendations

| Area            | Instructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Crutch Use      | <ul style="list-style-type: none"><li>Beginning the day of surgery, patients are cleared for PWB (begin up to 50% body weight) with crutches and brace locked to 0° for weight bearing and unlocked in flexion (see chart on page 1) until criteria are met as early as 4 and no later than 6 weeks post operatively</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Bracing         | <ul style="list-style-type: none"><li>Brace locked at 0° for the first 24 hours after surgery</li><li>Hinged Knee Brace instructions after the first 24 hours post-op<ul style="list-style-type: none"><li>While seated (at rest) and for ROM exercises, brace range should be set to 0 - 45° for weeks 0 to 2 and then 0 - 90° for weeks 2 to 4. <b>Do not flex the knee past the specified degrees</b></li><li>For ambulation and weightbearing, brace should be locked at 0° for 4 weeks outside of physical therapy and then unlocked for ambulation gait training and Activities of Daily Living (ADL) (only during PT visits)</li><li>At week 2 can begin gait training and ADL with brace unlocked at physical therapy</li><li>For sleep, brace should be locked at 0° for 4 weeks</li></ul></li></ul> |
| Quad Activation | <p>Patient should begin these within the first week after surgery. <b>Do not flex past specified degrees</b></p> <ul style="list-style-type: none"><li>Wall slides<ul style="list-style-type: none"><li>Extension ~4-5min, 2x per day</li><li>Flexion ~1 or 2 sets x10 reps with a 5 – 10 sec hold, at least 2x per day</li></ul></li><li>Quad set/quad with superior patellar glide based on visual inspection and palpation isometric contraction <b>3 sets x10 reps, 2 or 3x per day</b></li><li>Patellar mobilizations: medial/lateral mobilization, superior/inferior direction</li><li>Exercise of other lower extremity joints and muscles as needed</li></ul>                                                                                                                                         |

## Phase 1 Cont'd

| Area        | Instructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NMES        | <ul style="list-style-type: none"><li>With knee in full extension on a treatment table, increase stimulation amplitude so that <b>at a minimum</b> it would result in a full tetanic contraction of the quadriceps (no fasciculations observed on visual inspection) with <b>evidence of superior patellar glide</b>, based on visual inspection and palpation</li><li>Continue to increase the stimulus amplitude to the patient's maximum tolerance level</li><li>10-15 10s contractions with a 50s rest between contractions</li></ul> <div><p><b>Electrodes</b><br/>Distal are center/medial and proximal center/lateral and are large</p></div> |
| Cryotherapy | <ul style="list-style-type: none"><li>Cold with compression/elevation (e.g., Cryo-cu, Don Joy Iceman device or equivalent)</li><li>First 24 hours or until acute inflammation is controlled: every waking hour for 15 minutes</li><li>After acute inflammation is controlled: 3x per day for 15 minutes</li><li><b>Do not sleep with automated device running while on the knee</b></li><li><b>Keep a layer of fabric or ace wrap between skin and icing device at all time</b></li></ul>                                                                                                                                                                                                                                                                                                                                |

### Criteria for progression to Phase 2

- ☐ 4 weeks out of surgery

## Phase 2: Weeks 4 to 7

### Early Post-Operative Physical Therapy

#### Goals

1. Full knee extension
2. Flexion ROM >90°
3. Good quadriceps isometric contraction
4. Minimize pain and swelling
5. Walk with a normal gait pattern

#### Recommendations

| Area                                                            | Instructions                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Crutch Use</b>                                               | <ul style="list-style-type: none"><li>• With clearance from PT and surgeon and when the criteria below are met, may advance from PWB to WBAT with crutch wean at 4 weeks:<ul style="list-style-type: none"><li>▪ no pain</li><li>▪ no extensor lag (as measured by full SLR without lag)</li><li>▪ Adequate flexion ROM</li></ul></li></ul>                                                                                                              |
| <b>Bracing</b>                                                  | <ul style="list-style-type: none"><li>• Hinged Knee Brace: Brace range set to 0 - 90° for weeks 2 to 4; once 90° ROM is met, patient may remove flexion stop to allow for full ROM in this phase (4-7 weeks)</li><li>• Unlocked for weight bearing and ambulation if good quad control has returned<br/><b>At 4 weeks brace is no longer required for sleeping</b></li></ul>                                                                             |
| <b>Range of Motion</b><br>No aggressive ROM<br>or over pressure | <ul style="list-style-type: none"><li>• Extension: Low load, long duration stretching (~5 minutes) such as heel prop. The patient can now add bag hang (minimizing co-contraction and pain response as needed)</li><li>• Patellar mobilization: medial/lateral mobilization initially followed by superior/inferior direction while monitoring reaction to effusion and ROM</li><li>• No over pressure or stretching into end range of flexion</li></ul> |
| <b>Muscle Activation &amp; Strengthening</b>                    | <ul style="list-style-type: none"><li>• Quadriceps sets emphasizing whole muscle activation</li><li>• Long arc quad exercises 90 to 0</li><li>• SLR emphasizing no lag</li><li>• Start reciprocal stair training at 4 to 6 weeks</li><li>• Step-ups</li><li>• Hip strengthening</li><li>• Mini squats</li><li>• Calf strengthening</li><li>• Terminal knee extensions (TKEs)</li></ul>                                                                   |
| <b>NMES</b>                                                     | <ul style="list-style-type: none"><li>• Continue until quad limb symmetry index is 80%</li></ul>                                                                                                                                                                                                                                                                                                                                                         |
| <b>Neuromuscular Control</b>                                    | <ul style="list-style-type: none"><li>• Weight shift</li><li>• Progress to single leg stance</li></ul>                                                                                                                                                                                                                                                                                                                                                   |



## Phase 2 Cont'd

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**If stiffness is observed in this phase, it is most likely associated with “fear avoidance,” rehab non-compliance, and concomitant procedures such as meniscal repair. In this case, the following should be implemented:**

- Ensure proper post-op management of pain and swelling
- Ensure patient is compliant with the recommended protocol (please consult the operating surgeon before any action is taken in the case where the patient's protocol has been altered for any reason)
- Additional modalities/exercises include:
  - Patella mobilizations
  - Supine bag hangs (weighted)
  - Low load, long duration flexion
  - Heel slides/wall slides
  - Heel prop/bag hang (minimize co-contraction/pain response)
  - Bike (rocking-for-range -> riding with high seat height until comfortable and then bringing seat height down as ROM improves)
  - Flexibility stretching of all major muscle groups

### **Criteria for progression to Phase 3**

- ☐ 7 weeks out from surgery
- ☐ Full extension ROM
- ☐ Flexion ROM > 90°

## Phase 3: Weeks 7 to 12

### Post-Operative Physical Therapy

#### Goals

1. Minimize pain and swelling
2. Full knee extension ROM; flexion to within 15° of the contralateral
3. Good quadriceps control ( $\geq 20$  no lag SLR)
4. Normal gait pattern

#### Recommendations

| Area                                                                                                     | Instructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Hinged Knee Brace</b><br><br>T-Scope or Functional ACL Brace and has to be determined by the surgeon. | <ul style="list-style-type: none"><li>• Can change to functional ACL brace (if required by surgeon) when AROM in flexion is 110° or more</li><li>• Can be in either a hinged knee brace or functional ACL brace for walking and any other weight bearing and closed chain activity (bike, elliptical, leg press, wall slides, mini squats, etc...)</li></ul>                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Range of Motion</b>                                                                                   | <ul style="list-style-type: none"><li>• Extension: Low load, long duration (~5 minutes) stretching (e.g., heel prop, bag hang minimizing co-contraction and pain response)</li><li>• Flexion: AROM/Active-Assisted (AA) ROM exercises (e.g., wall slides, heel slides, seated active-assisted knee flexion. Manual ROM is permitted as needed but no aggressive stretching or overpressure until week 12.</li><li>• Bike: Rocking-for-range</li></ul>                                                                                                                                                                                                                                                                                |
| <b>Muscle Activation &amp; Strengthening</b>                                                             | <ul style="list-style-type: none"><li>• Electric Stimulation: Continue until quadriceps QI is <math>\geq 80\%</math></li><li>• Double-leg wall slides or mini-squats without knee over foot</li><li>• Hamstring sets: For hamstring curls, do not flex knee more than is comfortable for the patient</li><li>• Proximal Hip Strengthening: e.g., side-lying hip adduction/abduction, Prone Hip Extension</li><li>• Quadriceps/hamstring co-contraction supine</li><li>• Open chain knee extension progressive resistance</li><li>• Reciprocal stair training</li><li>• Aqua jogging in pool okay starting at 8 weeks post op</li><li>• Step-up/downs</li><li>• Lunges</li><li>• Squats</li><li>• Romanian Deadlifts (RDLs)</li></ul> |
| <b>NMES</b>                                                                                              | <ul style="list-style-type: none"><li>• Continue until QI is <math>\geq 80\%</math></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Neuromuscular Control</b>                                                                             | <ul style="list-style-type: none"><li>• Single Leg Squat (SLS) progression</li><li>• Joint angle repositioning</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

#### Criteria for progression to Phase 4

- ☐ Minimum of 12 weeks from surgery
- ☐ 20 reps no lag SLR
- ☐ QI = 60-80%

## Phase 4: Weeks 12 to 20

### Early Strengthening & Rehabilitation

#### Goals

1. Full extension ROM, flexion ROM within 10° of uninvolved knee
2. Improve muscle strength
3. Progress neuromuscular retraining

#### Recommendations

| Area                                                 | Instructions                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Range of Motion                                      | <ul style="list-style-type: none"><li>• Continue additional exercises listed in phase 2 if patient hasn't achieved full ROM</li></ul>                                                                                                                                                                                                                                                                            |
| Progressively Overload Quads                         | <ul style="list-style-type: none"><li>• Step-ups</li><li>• Leg press; shuttle press without jumping action</li><li>• Progressive Resistance Exercises (PREs) knee extension of dynamometer, knee extension machine, bag weights</li></ul>                                                                                                                                                                        |
| Progressively Overload Hamstrings                    | <ul style="list-style-type: none"><li>• Hamstring curls</li><li>• Resistive back SLR with sports cord for hamstring</li></ul>                                                                                                                                                                                                                                                                                    |
| Progressively Overload Other Musculature (if needed) | <ul style="list-style-type: none"><li>• Hip adduction/abduction: side lying SLR or with equipment</li><li>• Standing heel raises progress from double to single leg support</li><li>• Seated calf press against resistance</li><li>• Multi-hip machine in all directions with proximal pad placement</li><li>• Swimming with flutter kicks only</li></ul>                                                        |
| Neuromuscular Training                               | <ul style="list-style-type: none"><li>• Wobble board, rocker board, single-leg stance with or without equipment (e.g., instrumented balance system), slide board</li></ul>                                                                                                                                                                                                                                       |
| Cardiopulmonary                                      | <ul style="list-style-type: none"><li>• Bike, elliptical trainer, Stairmaster, flutter kicking in pool starting at week 12</li><li>• Transition to straight line running on treadmill (zero gravity or standard treadmill) or in a protected environment after clearance by operating surgeon and quad QI ≥80%, zero effusion and full ROM, otherwise, hold off on straight line running until Phase 5</li></ul> |

#### Criteria for progression to Phase 5

- ☐ Full ROM
- ☐ Minimal effusion and pain
- ☐ Functional strength and control in daily activities (QI ≥80% LSI)
- ☐ Minimum 20 weeks out from date of surgery

## Phase 5: Weeks 20 to 30

### Strengthening & Control

#### Goals

1. Maintain full ROM
2. Running without pain or swelling
3. Hopping without pain, swelling or giving way

### Recommendations

| Area                          | Instructions                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strengthening</b>          | <ul style="list-style-type: none"><li>• Continue progressively overloading previous exercises</li><li>• Open Kinetic Chain (OKC) knee extension</li><li>• Shuttle</li><li>• Sports cord</li><li>• Wall squats</li><li>• Single leg squat: Get to 60° of flexion, able to do without internal rotation at the hip or valgus at the knee</li></ul> |
| <b>Agility Drills</b>         | <ul style="list-style-type: none"><li>• Double leg jumping progressing to hopping as tolerated</li></ul>                                                                                                                                                                                                                                         |
| <b>Neuromuscular Training</b> | <ul style="list-style-type: none"><li>• Wobble board/rocker board/roller board</li><li>• Perturbation training, instrumented testing systems, varied surfaces</li></ul>                                                                                                                                                                          |
| <b>Cardiopulmonary</b>        | <ul style="list-style-type: none"><li>• Begin or continue running progression on treadmill or in protected environment after clearance by operating surgeon and QI = 80%, to trace effusion and full ROM</li><li>• NO cutting or pivoting</li><li>• All other cardiopulmonary equipment</li></ul>                                                |

### Criteria for progression to Phase 6

- ☐ Running without increase in pain or swelling
- ☐ Neuromuscular and strength training exercises without difficulty
- ☐ Able to hold single leg balance for 60 seconds
- ☐ Vertical hop:  $\geq 50\%$  hop height on operated leg (hop test in brace)
- ☐ Completion of functional hop testing and clearance by operating surgeon
- ☐ Minimum of 30 weeks out from date of surgery
- ☐ QI  $\geq 80\%$



## Phase 6: Weeks 30 to 36

### Advanced Training

#### Goals

1. Running patterns (figure-8, pivot drills, etc.) at 75% speed without difficulty
2. Jumping without difficulty
3. Hop tests at 85% contralateral values (Cincinnati hop tests: single-leg hop for distance, triple-hop for distance, crossover hop for distance, 6-meter timed hop)

### Recommendations

| Area                          | Instructions                                                                                                                                                                                                                                 |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strengthening</b>          | <ul style="list-style-type: none"><li>• Continue progressively overloading previous exercises</li><li>• Plyometrics</li></ul>                                                                                                                |
| <b>Agility Drills</b>         | <ul style="list-style-type: none"><li>• Shuffling</li><li>• Hopping</li><li>• Cariocas</li><li>• Vertical jumps</li><li>• Running patterns at 50 to 75% speed</li><li>• Initial sports specific drill patterns at 50 to 75% effort</li></ul> |
| <b>Neuromuscular Training</b> | <ul style="list-style-type: none"><li>• Wobble board/rocker board/roller board</li><li>• Perturbation training, instrumented testing systems, varied surfaces</li></ul>                                                                      |
| <b>Cardiopulmonary</b>        | <ul style="list-style-type: none"><li>• Running</li><li>• Other cardiopulmonary exercises</li></ul>                                                                                                                                          |

#### Criteria for progression to Phase 7

- ☐ Maximum vertical jump without pain or instability
- ☐ 85% of contralateral on hop tests
- ☐ Run at 85% speed without difficulty
- ☐ IKDC Question #10 (Global Rating of Knee Function) score of  $\geq 8$  (suggested criteria; see page 13)
- ☐ Completion of functional hop testing showing 85% function and clearance by operating surgeon
- ☐ Minimum of 30 weeks out from date of surgery
- ☐ 85% QI

## Phase 7: Weeks 36 to 52

### Return-to-Sport

#### Goals

1. 90% contralateral quad strength
2. 90% contralateral on hop tests
3. Sport-specific training without pain, swelling or difficulty

### Recommendations

| Area                                               | Instructions                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strengthening</b>                               | <ul style="list-style-type: none"><li>• Continue progressively overloading previous exercises</li></ul>                                                                                                                                                                                                                                                |
| <b>Sports Specific Activities</b>                  | <ul style="list-style-type: none"><li>• Interval training programs</li><li>• Running patterns in football</li><li>• Sprinting</li><li>• Change of direction</li><li>• Pivot and drive-in basketball</li><li>• Kicking in soccer</li><li>• Spiking in volleyball</li><li>• Skill/biomechanical analysis with coaches and sports medicine team</li></ul> |
| <b>Return-To-Sports Evaluation Recommendations</b> | <ul style="list-style-type: none"><li>• Balance test: Single leg balance for 60 seconds without touchdown for each leg</li><li>• Hop tests (single leg hop for distance) to be 95% of contralateral side</li><li>• QI <math>\geq</math>90%</li></ul>                                                                                                   |

### Return-to-Team Training Criteria

- ☐ No functional complaints
- ☐ Confidence when running, cutting, jumping at full speed
- ☐ 90% contralateral values on hop tests
- ☐ 90% QI
- ☐ IKDC Question #10 (Global Rating of Knee Function) score of  $\geq$ 9 (suggested criteria; see page 13)
- ☐ Clearance by operating surgeon

# Current Function Of Your Knee: Daily Activities

## IKDC QUESTION #10

How would you rate the function of your knee on a scale of 0 to 10, with 10 being excellent function and 0 being the inability to perform any of your usual daily activities which may include sports?

|                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1                        | 2                        | 3                        | 4                        | 5                        | 6                        | 7                        | 8                        | 9                        | 10                       |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cannot perform           |                          |                          |                          |                          |                          |                          |                          | No limitation            |                          |

### Tests include:\*

- 1. Dynamometer strength testing of hamstring and quadriceps
- 2. Single, triple, crossover, and timed hop tests

*\*Patient should bring ACL functional brace (if required by surgeon) for this testing.*

# H1

## H2

### Goals

1. Full extension ROM, flexion ROM with 10° of uninvolved knee
2. Improve muscle strength
3. Progress neuromuscular retraining

### Recommendations

|                                                             | Instructions                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Range of Motion</b>                                      | <ul style="list-style-type: none"><li>• Continue additional exercises listed in phase 2 if patient hasn't achieved full ROM</li></ul>                                                                                                                                                                                                                                                                            |
| <b>Progressively Overload Quads</b>                         | <ul style="list-style-type: none"><li>• Quad sets (Mini squats/wall squats)</li><li>• Step-ups</li><li>• Leg press; shuttle press without jumping action</li><li>• PREs knee extension of dynamometer, knee extension machine, bag weights</li></ul>                                                                                                                                                             |
| <b>Progressively Overload Hamstrings</b>                    | <ul style="list-style-type: none"><li>• Hamstring curls</li><li>• Resistive back SLR with sports cord for hamstring</li></ul>                                                                                                                                                                                                                                                                                    |
| <b>Progressively Overload Other Musculature (if needed)</b> | <ul style="list-style-type: none"><li>• Hip adduction/abduction: side lying SLR or with equipment</li><li>• Standing heel raises progress from double to single leg support</li><li>• Seated calf press against resistance</li><li>• Multi-hip machine in all directions with proximal pad placement</li><li>• Swimming with flutter kicks only</li></ul>                                                        |
| <b>Neuromuscular Training</b>                               | <ul style="list-style-type: none"><li>• Wobble board, rocker board, single-leg stance with or without equipment (e.g., instrumented balance system), slide board</li></ul>                                                                                                                                                                                                                                       |
| <b>Cardiopulmonary</b>                                      | <ul style="list-style-type: none"><li>• Bike, elliptical trainer, Stairmaster, flutter kicking in pool starting at week 12</li><li>• Transition to straight line running on treadmill (zero gravity or standard treadmill) or in a protected environment after clearance by operating surgeon and quad QI ≥80%, zero effusion and full ROM, otherwise, hold off on straight line running until Phase 5</li></ul> |

### Criteria for progression to Phase 5

- ☐ Full ROM
- ☐ Minimal effusion and pain
- ☐ Functional strength and control in daily activities (QI ≥80% LSI)
- ☐ Minimum 20 weeks out from date of surgery