

## ACL Reconstruction with Bone-Patellar Tendon-Bone (BPTB) Autograft

### General Guidelines

**Brace Settings:** Immobilizer until straight leg raise (SLR) without sag.

**Weight-Bearing:** WBAT with crutches until normal gait is restored.

**Range of Motion (ROM) Restrictions:** Full passive motion encouraged.

### Phase 1: Immediate Postoperative Protection (Weeks 0–2)

#### Goals:

- Reduce pain and inflammation.
- Protect the graft.
- Initiate quadriceps activation.

#### Precautions:

- Avoid excessive knee flexion beyond 90°.
- No active open-chain knee extension exercises.
- Maintain brace use as instructed.

#### Interventions:

- **Pain Management:** Cryotherapy and elevation to control swelling.
- **ROM Exercises:** Wall slides, seated flexion/extension.
- **Muscle Activation:** Quad sets, hamstring activation.
- **Mobility Work:** Patella/tendon mobilization, extension mobilization.
- **Circulatory Support:** Ankle pumps to reduce DVT risk.

#### Criteria to Progress:

- Pain and swelling controlled.
- Ability to perform straight leg raise without lag.
- ROM: 0°–90° of flexion.

### Phase 2: Progressive Range of Motion (Weeks 3–6)

#### Goals:

- Restore functional ROM.

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- Improve quadriceps control.
- Reduce dependence on assistive devices.

**Precautions:**

- Avoid impact activities.
- Maintain proper gait mechanics.

**Interventions:**

- **ROM Exercises:** Seated knee flexion, prone hangs.
- **Strengthening:** Toe and heel raises, balance series.
- **Cardiovascular Training:** Stationary bike (well leg only initially, progressing to both legs with no resistance).

**Criteria to Progress:**

- ROM  $\geq 120^\circ$  flexion.
- Normalized gait without crutches.
- Pain-free quadriceps contraction.

### Phase 3: Strengthening & Cardiovascular (Weeks 7–12)

**Goals:**

- Improve muscular strength and endurance.
- Normalize gait without assistive devices.

**Precautions:**

- Avoid cutting or pivoting movements.
- Gradually increase loading with resistance exercises.

**Interventions:**

- **Strengthening:** Weight-bearing exercises (double knee bends, bridges, lunges).
- **Cardiovascular Training:** Stationary bike with resistance, elliptical trainer.
- **Proprioception Work:** Balance drills.
- **Functional Training:** Aqua jogging (start Week 6), treadmill walking (start Week 12).

**Criteria to Progress:**

- Full ROM achieved.
- Ability to perform single-leg stance for 30 seconds.
- Pain-free functional movements.

## Phase 4: Advanced Strength & Agility (Weeks 13–20)

### Goals:

- Improve balance and proprioception.
- Introduce controlled plyometric exercises.

### Precautions:

- Avoid uncontrolled landing mechanics during plyometrics.
- Limit high-impact loading until strength is sufficient.

### Interventions:

- **Strengthening:** Balance squats, single-leg deadlifts, leg press.
- **Agility Training:** Running progression (initial single-plane → multi-directional drills).

### Criteria to Progress:

- Strength at least 80% of the contralateral leg.
- Completion of controlled agility drills without compensation.

## Phase 5: Return to Sport (Weeks 20–24+)

### Goals:

- Achieve full return to sport-specific activities.
- Prevent re-injury through neuromuscular training.

### Precautions:

- Avoid early return to sport without passing functional tests.
- Emphasize proper warm-up and cooldown strategies.

### Interventions:

- **Functional Testing:** Single-leg hop tests, agility drills.
- **Sport-Specific Work:** Progressive plyometrics, reactive drills.
- **Gradual Return:** Golf, biking (Week 16), skiing, basketball, tennis (Week 20).

### Criteria for Full Return:

- Strength  $\geq$  90% of the contralateral limb.
- Functional tests completed without pain or instability.
- Clearance from physician and physical therapist.