Post-operative arthroscopic ACL reconstruction

Diagnosis:  (Left) / (Right) Arthroscopy, ACL Reconstrxn (BTB, Hamstring, Allograft) / Meniscal Repair / Partial Meniscectomy / Chondroplasty / Microfracture / Debridement

*** PLEASE NOTE: SEE ATTACHED MENISCUS REPAIR PROTOCOL IF INDICATED ***

General Information:

The following ACL rehabilitation guidelines are based on a review of the randomized controlled trials related to ACL rehabilitation. For many aspects of ACL rehabilitation there are either no studies that qualify as best evidence or the number of studies is too few for conclusions to be drawn with confidence. In these circumstances, certain aspects of this protocol are based upon the guidance of the Multi-center Orthopaedic Outcome Network panel (MOON). The guidelines have been developed to service the spectrum of ACL injured individuals (from non-athlete to elite athlete). For this reason, example exercises are provided instead of a highly structured rehabilitation program. Attending rehabilitation specialists should tailor the program to each patient’s specific needs. Some treatment methods with supporting evidence (e.g. using a high intensity electric stimulation training program for strength, aqua-therapy, etc) are not included in the program because not all therapy sites may have this available.

Progression from one phase to the next is based on the patient demonstrating readiness by achieving functional criteria rather than the time elapsed since surgery. The time frames identified in parentheses after each Phase are approximate times for the average patient, NOT guidelines for progression. Some patients will be ready to progress sooner than the time frame identified, where others will take longer.

The recommended number of visits to the rehabilitation specialist (including visits merely for evaluation/exercise progression) is 18 to 30 visits with the majority of the visits occurring early (BIW x 8-12 weeks).

Phase 0: Pre-Operative Recommendations

- Normal gait
- AROM 0-120°
- Strength: 20 SLR with no lag
- Minimal effusion
- Education on post-op exercises & need for compliance
- Educated in ambulation with crutches
- Educated in follow-up expectations
- Wound care instructions
Phase I: Immediate Post-operative phase - Approx time 2 wks post-surgery

**GOALS:**
- Full knee extension ROM
- Minimize pain
- Good quadriceps control (≥20 no lag SLR)
- Minimize swelling
- Normal gait pattern

Phase I: Immediate Post-Operative Phase (Approx. timeframe Surgery-2 weeks)

**Crutch use:**
- WBAT with crutches (beginning the day of surgery)
- TTTW if meniscal repair

**Crutch d/c criteria:**
- Normal gait pattern (Crutches until 4-6 wks if meniscal repair)
- Ability to safely ascend/descend stairs w/o pain/instability
- Reciprocal stair climbing

**Knee immobilizer:**
- Brace locked in extension until able to perform SLR independently (1st visit)

**Cryotherapy:**
- Cold with compression/elevation (e.g. Cryocuff, ice w/ compressive stocking)
- 1st 24 hours or until acute inflammation is controlled: every hour for 15 minutes
- After acute inflammation is controlled: 3x per day for 15 minutes
- Crushed ice in the clinic (post-acute stage until D/C)

**EXERCISE SUGGESTIONS**

- **ROM:**
  - Extension: Low load, long duration (5 minutes) stretching
    - e.g. heel prop, prone hang minimizing co-contraction & nociceptor response
  - Flexion: wall slides, heel slides, seated assisted knee flexion,
  - Bike: Rocking for range (no resistance, motion-focused)
  - Patellar mobilization: medial/lateral mobilization initially followed by superior/inferior direction while monitoring reaction to effusion & ROM

- **Muscle Activation/Strength:**
  - Quadriceps sets emphasizing vastus lateralis and vastus medialis activation
  - SLR emphasizing no lag
  - Electric Stimulation: Optional if unable to perform no lag SLR
    - D/C use when able to perform 20 no lag SLR
  - Double leg quarter squats
  - Standing theraband resisted terminal knee extension (TKE)
  - Hamstring sets & Hamstring curls
  - Side lying hip adduction/abduction (Avoid adduction moment in this Phase with concomitant grade II-III MCL injury)
  - Quad/ham co-contraction supine & Prone hip extension
  - Ankle pumps with theraband & Heel raises (calf press)
- Cardiopulmonary: UBE or similar exercise is recommended
- Scar Massage: (only when incision is fully healed)

CRITERIA FOR PROGRESSION TO PHASE 2:
- NO lag SLR
- Normal gait
- Crutch/immobilizer/D/C
- ROM: no greater than 5° active extension lag, 110° active flexion

Phase 2: Early rehabilitation phase 2-6 weeks post-surgery

GOALS:
- Full ROM
- Improve muscle strength
- Progress neuromuscular retraining

PHASE 2: Early Rehabilitation Phase (Approx timeframe: weeks 2-6)

EXERCISE SUGGESTIONS
- ROM: Low load, long duration (assisted prn)
  Heel slides/wall slides
  Heel prop/prone hang (minimize co-contraction/nociceptor response)
  Bike (rocking-for-range→riding with low seat height)
  Flexibility stretching all major groups
- Strengthening: **Quadriceps:**
  Quad sets
  Mini squats/wall squats
  Step ups
  Knee extension from 90° to 40°
  Leg press
  Shuttle Press without jumping action
- Strengthening: **Hamstrings:**
  Hamstring Curls
  Resistive SLR with sports cord
  Hip Musculature: Hip adduction/abduction: SLR or with equipment
  Standing heel raises: progress from double to single leg support
  Seated calf press against resistance
  **Multi hip machine in all directions with proximal pad placement**
- Neuromuscular training:
  Wobble board
  Slide board
  Rocker board
  Fitter
  Single leg stance with or without equipment (e.g. instrumented balance System)
- Cardiopulmonary:
  Bike
  Elliptical trainer
  Gentle Core Strength
  Full ROM
  Minimal effusion/pain
  Functional strength and control in daily activities

CRITERIA FOR PROGRESSION TO PHASE 3
Phase 3: Strengthening and Control Phase - 7-14 weeks post-surgery

**GOALS:** Maintain full ROM, Increase Quad Strength, Incorporate increased Core & Gluteal Strengthening without stressing ACL graft incorporation
Running to begin @ 14-16 weeks without pain or swelling
Hopping without pain, swelling, or giving way by 14 weeks

**EXERCISE SUGGESTIONS**

- **Strengthening:**
  - Squats
  - Leg press
  - Lunges
  - Shuttle
  - Sports cord
  - Wall squats
  - Step ups/down
  - Hamstring curl
  - Knee extension 90° to 0° beginning at 10 weeks

- **Neuromuscular Training:**
  - Wobble board/rocker board/roller board
  - Perturbation training
  - Instrumented testing systems
  - Varied surfaces

- **Cardiopulmonary:**
  - Straight line running on treadmill or in a protected environment begins at 14 weeks (No cutting or pivoting)
  - All other cardiopulmonary equipment

**CRITERIA FOR PROGRESSION TO PHASE 4**

- Running without pain or swelling
- Hopping without pain or swelling (bilateral and unilateral)
- Neuromuscular training and strength exercises without difficulty

Phase 4: Progressive Training Phase - 15-18 weeks post-surgery

**GOALS:** Preparation for running by 4.5 months postop depending on motion, strength, & neuromuscular control.

**EXERCISE SUGGESTIONS** – Progressive increase in intensity from Phase 3

- **Strengthening:**
  - Squats
  - Leg press
  - Step ups/down
  - Hamstring curl
  - Lunges
  - Knee extension 90° to 0°
  - Shuttle
  - Sports cord
  - Wall squats
  - Core
  - Glute

- **Neuromuscular Training:**
  - Wobble board/rocker board/roller board
  - Perturbation training
  - Instrumented testing systems
  - Varied surfaces

- **Cardiopulmonary:**
  - Straight line gentle jog-walk program on treadmill or in a protected environment (No cutting or pivoting) at 17-18 weeks
  - All other cardiopulmonary equipment – bike, elliptical, arc trainer, octane

**CRITERIA FOR PROGRESSION TO PHASE 5**

- Jogging without pain or swelling
- Hopping without pain / swelling (bilateral & unilateral)
- Neuromuscular training & strength exercises without difficulty
See Attached Table below:

### Phase 5: Advanced Training Phase - 18-24 weeks post-surgery

**GOALS:**
- Running patterns (Figure-8, pivot drills, etc.) at 75% speed w/o difficulty
- Jumping w/o difficulty
- Hop tests at 75% contra-lateral values (Cincinatti hop tests: single leg hop for distance, triple hop for distance, crossover hop for distance, 6 meter timed hop)

**EXERCISE SUGGESTIONS**
- **Aggressive Strengthening:**
  - Squats, Lunges, Plyometrics, Core & Gluteal Strengthening
- **Agility Drills:**
  - Shuffling, Hopping, Carioca, Vertical jumps
Running patterns at 50-75% speed (e.g. Figure 8)
Initial sports specific drill pattern at 50-75% effort

- **Neuromuscular Training:**
  - Wobbleboard/Rockerboard/Rollerboard
  - Perturbation training
  - Instrumented testing systems
  - Varied surfaces

- **Cardiopulmonary:** Running / Swimming / Elliptical / Biking / Upper Extremity CV Workout

**CRITERIA FOR PROGRESSION TO PHASE 6**
- Maximum vertical jump without pain or instability
- 75% of contra-lateral on hop tests
- Figure 8 run at 75% speed without difficulty

**Phase 6: Return to Sports 25-36 weeks**

**GOALS:**
- 85% contra-lateral strength
- 85% contra-lateral on hop tests
- Sport-specific training without pain, swelling, or difficulty

**EXERCISE SUGGESTIONS**
- **Aggressive Strengthening:**
  - Squats, Lunges, Plyometrics
- **Sport Specific Activities:**
  - Interval training programs
  - Sprinting
  - Pivot and drive in basketball
  - Spiking in volleyball
  - Running patterns in football
  - Change of direction
  - Kicking in soccer
  - Skill/biomechanical analysis with coaches & sports medicine team

**RETURN TO SPORT EVALUATION RECOMMENDATIONS:**
- Hop tests: single leg hop, triple hop, cross over hop, 6 meter timed hop
- Isokinetic strength test (60°/second)
- Deceleration shuttle test

**RETURN TO SPORT CRITERIA:**
- No functional complaints
- Confidence when running, cutting, jumping at full speed
- 85% contra-lateral values on hop tests

Please send progress notes & call with questions.