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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 Infor*mation:**

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

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Phase I: Immediate Post-operative phase- Approx time 2 wks post-surgery

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

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

Crutch use: WBAT with crutches (beginning the day of surgery)
TTWB 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 active flexion
- ROM: no greater than 5° active extension lag, 110°

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

CRITERIA FOR PROGRESSION TO PHASE 3

Full ROM
Minimal effusion/pain
Functional strength and control in daily activities

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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

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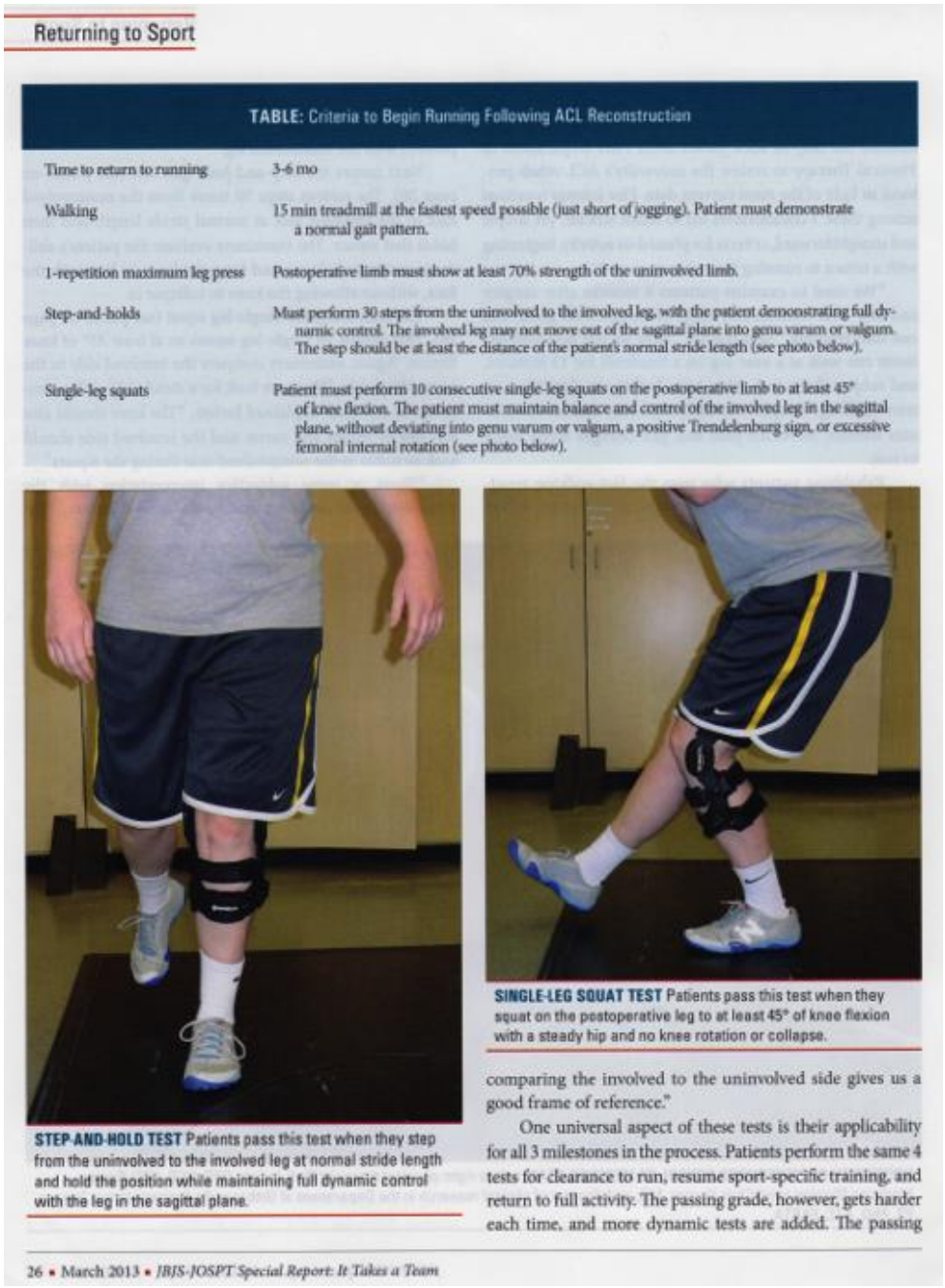
See Attached Table below:



Returning to Sport

TABLE: Criteria to Begin Running Following ACL Reconstruction

Time to return to running	3-6 mo
Walking	15 min treadmill at the fastest speed possible (just short of jogging). Patient must demonstrate a normal gait pattern.
1-repetition maximum leg press	Postoperative limb must show at least 70% strength of the uninvolved limb.
Step-and-holds	Must perform 30 steps from the uninvolved to the involved leg, with the patient demonstrating full dynamic control. The involved leg may not move out of the sagittal plane into genu varum or valgum. The step should be at least the distance of the patient's normal stride length (see photo below).
Single-leg squats	Patient must perform 10 consecutive single-leg squats on the postoperative limb to at least 45° of knee flexion. The patient must maintain balance and control of the involved leg in the sagittal plane, without deviating into genu varum or valgum, a positive Trendelenburg sign, or excessive femoral internal rotation (see photo below).

STEP-AND-HOLD TEST Patients pass this test when they step from the uninvolved to the involved leg at normal stride length and hold the position while maintaining full dynamic control with the leg in the sagittal plane.

SINGLE-LEG SQUAT TEST Patients pass this test when they squat on the postoperative leg to at least 45° of knee flexion with a steady hip and no knee rotation or collapse.

comparing the involved to the uninvolved side gives us a good frame of reference."

One universal aspect of these tests is their applicability for all 3 milestones in the process. Patients perform the same 4 tests for clearance to run, resume sport-specific training, and return to full activity. The passing grade, however, gets harder each time, and more dynamic tests are added. The passing

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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

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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	Running patterns in football
Sprinting	Change of direction
Pivot and drive in basketball	Kicking in soccer
Spiking in volleyball	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.

Physician signature_____