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Multi-Ligament Knee Reconstruction with Posterior Cruciate Ligament (PCL) Rehabilitation Protocol

This rehabilitation protocol has been developed for the patient who has posterior cruciate ligament (PCL) reconstruction using a secure graft with internal fixation. The PCL reconstruction rehabilitation is unique in that extreme knee flexion places a higher amount of stress on the newly reconstructed PCL. Therefore, there are several activities that should be avoided early post-operatively with a PCL reconstruction, for best results, avoid:

- Isolated hamstring activity including curls, isometric, and intense stretching
- Open chain active knee extension from 90-70°
    - Knee extension from 70-0° **is allowed** with adequate strength
    - Full range knee extension **is allowed** 6 weeks post-op

Flexion should be gained with passive wall slides to avoid active hamstring contraction OR prone passive knee motion exercises

This protocol is divided into several phases according to postoperative weeks and each phase has anticipated goals for the individual patient to reach. When the goals of the phase have been accomplished, the next phase may begin. Each individual patient may meet these goals at different times based on individual issues and special circumstances. The **overall goals** of the reconstruction and the rehabilitation are to:

- Control joint pain, swelling, hemarthrosis
- Regain normal knee range of motion
- Regain normal gait pattern and neuromuscular stability for ambulation
- Regain normal lower extremity strength
- Regain normal proprioception, balance, and coordination for daily activities
- Achieve the level of function based on the orthopedic and patient goals

The physical therapy is **to begin 2nd day post-op**. It is extremely important for the supervised rehabilitation to be supplemented by a home fitness program where the patient performs the given exercises at home or at a gym facility. **Important post-op signs** to monitor:

- Swelling of the knee or surrounding soft tissue
- Abnormal pain response, hypersensitive
- Abnormal gait pattern, with or without assistive device
- Limited range of motion
- Weakness in the lower extremity musculature (quadriceps, hamstring)
- Insufficient lower extremity flexibility

Return to activity requires both time and clinical evaluation. To safely and most efficiently return to normal or high level functional activity the patient requires adequate strength, flexibility, and endurance. Isokinetic testing and functional evaluation are both methods of evaluating a patient's readiness to return to activity.

Phase 1: Week 1

WEEK	EXERCISE	RESTRICTIONS
1	ROM	Brace on at all times
	Knee locked in extension in brace	Partial weightbearing
	Patella mobility	brace (HKB) locked in
	Ankle pumps	extension
	Gastroc/soleus stretching	
	STRENGTH	
	Quad sets with e-stim/biofeedback	
	SLR (flex, abd, add)	
	MODALITIES	
	E-stim/biofeedback as needed	
	Ice 15-20 minutes	

GOALS OF PHASE:

- Full extension
- Control pain, inflammation, and effusion
- Independent in HEP
- Adequate quad/VMO control

Phase 2: Week 2-4

WEEK	EXERCISE	RESTRICTIONS
2-4	ROM	Brace on at all times
	Patella mobs	(except for showering)
	Ankle pumps	Partial WB with HKB
	Initiate light hamsting stretch	locked in extension
	Gastroc/soleus/ITB stretch	
	Wall slides to reach goal	
	STRENGTH	
	Quad sets with biofeedback	
	SLR (flex, abd, add) with weight/tubing	
	Multi-angle isometrics (70-0°)	
	Knee extension (70-0°)	
	Heel raise/Toe raise	
	Wall squats (0-30°)	
	BALANCE TRAINING	
	Weight shift (side-to-side, fwd/bkwd)	
	Single leg balance work	
	Hesitation/Cup walking	
	Steam boats balance work	
	MODALITIES	
	E-stim/biofeedback as needed	
	Ice 15-20 minutes	

GOALS OF PHASE:

- ROM 0-90°
- Partial WB to HKB
- Control pain, inflammation, and effusion
- Increase lower extremity strength
- Enhance proprioception, balance, and coordination

Phase 3: Week 4-8

WEEK	EXERCISE	RESTRICTIONS
4-8	ROM	Partial WB with HKB
	Active & Passive, 0-135°	unlocked
	Patella mobs	Brace on at all times
	Hamstring/ITB stretch	(except showering)
	Gastroc/Soleus stretch	
	Wall slides to reach goal	
	STRENGTH	
	Continue with all strengthening activities from above phases	
	Mini-squats (0-30°)	
	Leg press/total gym (0-60°)	
	Initiate lateral/fwd step-ups/downs	
	Initiate knee extension 90-0°, full range at 6 weeks	
	Bike/EFX for endurance	
	BALANCE TRAINING	
	Single leg balance with plyotoss	
	MODALITIES	
	Ice 15-20 minutes	

GOALS OF PHASE:

- ROM 0-135°
- Increase lower extremity strength and endurance
- Control pain, inflammation, and effusion
- Maximize proprioception, balance, and coordination

Phase 4: Week 8-12

WEEK	EXERCISE	RESTRICTIONS
8-12	ROM	Full WB with functional
	Active & passive unrestricted	brace, unlocked
	Patella mobility	Brace on for walking
	Hamstring/ITB stretch	& balance training;
	Gastroc/Soleus stretch	
	Wall slides to reach goal	
	STRENGTH	
	Continue with all strengthening activities from above phases	
	Mini-squats (0-70°)	
	Leg press/total gym (0-90°)	
	Initiate lateral/fwd step-ups/downs	
	Initiate knee extension, full range	
	Bike/EFX for endurance	

Reverse lunges-knee not to migrate over toe

BALANCE TRAINING

Single leg balance with pyoltoss
Wobble board balance activities
½ foam roller balance activities

MODALITIES

Ice 15-20 minutes

GOALS OF PHASE:

- ROM 0-135°
- Increase lower extremity strength and endurance
- Control pain, inflammation and effusion
- Maximize proprioception, balance and coordination

Phase 5: Week 12-36

WEEK	EXERCISE	RESTRICTIONS
12-36	ROM Continue with all stretching activities STRENGTH Continue with all strengthening activities Increase all weight and repetitions Progress with all single leg activity BALANCE TRAINING Continue with advanced balance/agility training Single leg work on advanced surfaces RUNNING PROGRAM Initiate running on minitramp and progress to treadmill as tolerated Backward walking on treadmill AEROBIC CONDITIONING Walking program Swimming program (kicking) Bike for strength and endurance EFX for strength and endurance FUNCTIONAL TRAINING Lateral movements (slide board, shuffles) Initiate light plyometrics/agility drills High speed training Initiate sport specific training Carioca, figure 8's MODALITIES Ice 15-20 minutes	Full WB Functional brace for agility/plyometrics Brace not necessary for walking, in line running strengthening

GOALS OF PHASE:

- Maximize lower extremity strength and endurance
- Return to previous activity level
- Return to specific functional level