

Noyes Knee Institute Rehabilitation Protocol: Medial Ligament Repair or Reconstruction

	Postoperative Weeks				Postop Months				
	1-2	3-4	5-6	7-8	9-12	4	5	6	7-12
Brace: Long-leg postoperative Custom unloading if required	X	X	X	X	X	X	X	X	X
Range of motion minimum goals: 0°-90° 0°-110° 0°-120° 0°-130°	X	X	X	X					
Weight bearing: None Toe touch – 25% body weight 25% to 50% body weight Full	X	X	X	X					
Patella mobilization	X	X	X	X	X				
Modalities: Electrical muscle stimulation Pain/edema management (cryotherapy)	X	X	X	X	X	X	X	X	X
Stretching: Hamstring, gastroc-soleus, iliotibial band, quadriceps	X	X	X	X	X	X	X	X	X
Strengthening: Quad isometrics, straight leg raises Active knee extension Closed-chain: gait retraining, toe raises, wall sits, mini-squats Knee flexion hamstring curls (90°) Knee extension quads (90°-30°) Hip abduction-adduction, multi-hip Leg press (70°-10°)	X	X	X	X	X	X	X	X	X
Balance/proprioceptive training: Weight-shifting, cup walking, BBS BBS, BAPS, perturbation training, balance board, mini-trampoline			X	X	X	X	X	X	X
Conditioning: UBC Bike (stationary) Aquatic program Elliptical machine Swimming (kicking) Walking Stair climbing machine Ski machine		X	X	X	X	X	X	X	X
Running: straight								X	X
Cutting: lateral carioca, figure 8's									X
Plyometric training									X
Full sports									X

BBS = Biodex Balance System (Biodex Medical Systems, Inc, Shirley, NY), BAPS = Biomechanical Ankle Platform System (Camp, Jackson, MI), UBC = upper body cycle (Biodex Medical Systems, Inc, Shirley, NY).

SOURCE: Heckmann TP, Barber-Westin SD, Noyes FR: Rehabilitation of medial ligament ruptures. *Noyes' Knee Disorders: Surgery, Rehabilitation, Clinical Outcomes*, Saunders, Philadelphia, 2009, pp. 692-707.

Phase 1. Weeks 1-2 (Visits: 2-4)

General Observation	<ul style="list-style-type: none"> - Non weight bearing, maximum protection - Brace locked at 0° (motion exercises 3-4 times/day) - Avoid valgus loads, abnormal external tibial rotation 	
Evaluation	<ul style="list-style-type: none"> - Pain - Hemarthrosis - Patellar mobility - ROM minimum - Quadriceps contraction & patella migration - Soft tissue contracture 	<p>Goals</p> <p>Controlled Mild Good 0°-90° Good None</p>
<p>Frequency</p> <p>3-4 x/day 10 minutes</p> <p>3 x/day 15 minutes</p> <p>As required</p>	<p>Range of motion</p> <p>ROM (passive, 0°-90°) Patella mobilization Ankle pumps (plantar flexion with resistance band) Hamstring, gastroc-soleus stretches</p> <p>Strengthening</p> <p>Straight leg raises (flexion) Active quadriceps isometrics Knee extension (active-assisted, 90°-30°, per quad control)</p> <p>Modalities</p> <p>Electrical muscle stimulation Cryotherapy</p>	<p>Duration</p> <p>5 reps x 30 secs</p> <p>3 sets x 10 reps 1 set x 10 reps 3 sets x 10 reps</p> <p>20 minutes 20 minutes</p>
Goals	<ul style="list-style-type: none"> - ROM 0°-90° - Adequate quadriceps contraction - Control inflammation, effusion 	

Phase 2. Weeks 3-4 (Visits: 2-4)

General Observation	<ul style="list-style-type: none"> - Partial weight bearing: toe touch to 25% body weight - Brace locked at 0° (motion exercises 3-4 times/day) - Avoid valgus loads, abnormal external tibial rotation 	
Evaluation	<ul style="list-style-type: none"> - Pain - Effusion - Patellar mobility - ROM minimum - Quadriceps contraction & patella migration - Soft tissue contracture 	<p>Goals</p> <p>Controlled Mild Good 0°-90° Good None</p>
<p>Frequency</p> <p>3-4 x/day 10 minutes</p> <p>2-3 x/day 20 minutes</p> <p>2 x/day 10 minutes</p> <p>As required</p>	<p>Range of motion</p> <p>ROM (passive, 0°-110°) Patella mobilization Ankle pumps (plantar flexion with resistance band) Hamstring, gastroc-soleus stretches</p> <p>Strengthening</p> <p>Straight leg raises (flexion) Isometric training: multi-angle (0°, 60°) Knee extension (active, 90°-30°, per quad control)</p> <p>Aerobic conditioning</p> <p>UBC</p> <p>Modalities</p> <p>Electrical muscle stimulation Cryotherapy</p>	<p>Duration</p> <p>5 reps x 30 secs</p> <p>3 sets x 10 reps 1 set x 10 reps 3 sets x 10 reps</p> <p>20 minutes 20 minutes</p>
Goals	<ul style="list-style-type: none"> - ROM 0°-110° - Control inflammation, effusion - Muscle control 	

Phase 3. Weeks 5-6 (Visits: 1-2)

General Observation	Partial (25%- 50) weight bearing when: - Pain controlled without narcotics - Hemarthrosis controlled - Muscle control throughout ROM - ROM 0°-120° - Custom unloading brace - Avoid valgus loads	
Evaluation	- Pain - Effusion - Patellar mobility - ROM - Muscle control - Inflammatory response	Goals Mild/No RSD Minimal Good 0°-120° 3/5 None
Frequency 3 x/day 10 minutes 2 x/day 20 minutes 2 x/day 10 minutes As required	Range of motion ROM (passive, 0°-120°) Patella mobilization Hamstring, gastroc-soleus stretches Strengthening Straight leg raises (ankle weight, not to exceed 10% of body weight) Isometric training: multi-angle (90°, 60°, 30°) Closed-chain - Mini-squats Knee extension (active, 90°-30°) Aerobic conditioning UBC Stationary bicycling Gait retraining Muscle control quads & hams Walk with toe-in gait, avoid toe-out valgus position Observe gait for any tendency for valgus thrust or external tibial rotation Smooth stance phase flexion pattern Modalities Electrical muscle stimulation Cryotherapy	Duration 5 reps x 30 secs 3 sets x 10 reps 2 sets x 10 reps 3 sets x 20 reps 3 sets x 10 reps 20 minutes 20 minutes
Goals	- ROM 0°-1-0° - Control inflammation, effusion - Muscle control - Early recognition complications (motion, RSD, patellofemoral) - 50% weight bearing	

Phase 4. Weeks 7-8 (Visits: 1-2)

General Observation	<ul style="list-style-type: none"> - Full weight bearing - Custom unloading brace - ROM 0°-130° 	
Evaluation	<ul style="list-style-type: none"> - Pain - Effusion - Patellar mobility - ROM - Muscle control - Inflammatory response 	<p style="text-align: center;">Goals</p> <p>Mild/No RSD Minimal Good 0°-130° 4/5 None</p>
<p>Frequency</p> <p>2 x/day 10 minutes</p> <p>2 x/day 20 minutes</p> <p>3 x/day 5 minutes</p> <p>1-2 x/day 15 minutes</p> <p>As required</p>	<p>Range of motion ROM (0°-120°) Hamstring, gastroc-soleus stretches Patella mobilization</p> <p>Strengthening Straight leg raises (flexion, extension, abduction, adduction) Straight leg raises, rubber tubing Knee extension (active, 90°-30°) Closed-chain - Wall sits - Mini-squats (rubber tubing, 0°-30°) Leg press (70°-10°)</p> <p>Balance training Cup walking BBS</p> <p>Aerobic conditioning UBC Stationary bicycling</p> <p>Gait retraining Progress program Continue to observe for valgus thrust, external tibial rotation</p> <p>Modalities Electrical muscle stimulation Cryotherapy</p>	<p style="text-align: center;">Duration</p> <p>5 reps x 30 secs</p> <p>3 sets x 10 reps 3 sets x 30 reps 3 sets x 10 reps</p> <p>to fatigue x 3 3 sets x 20 reps 3 sets x 10 reps</p> <p>20 minutes 20 minutes</p>
Goals	<ul style="list-style-type: none"> - Full weight bearing - Muscle control - Control inflammation, effusion - ROM 0°-130° 	

Phase 5. Weeks 9-12 (Visits: 1-2)

General Observation	<ul style="list-style-type: none"> - Full weight bearing - ROM 0°-130° - Custom unloading brace 	
Evaluation	<ul style="list-style-type: none"> - Pain - Manual muscle test Hamstrings, quadriceps, hip abductors/adductors/flexors/extensors - Swelling - Patellar mobility - Crepitus - Gait 	<p style="text-align: center;">Goals</p> <p>Minimal/No RSD 4/5</p> <p>Minimal Good None/slight Symmetrical</p>
<p>Frequency</p> <p>2 x/day 10 minutes</p> <p>2 x/day 20 minutes</p> <p>3 x/day 5 minutes</p> <p>1 x/day 15-20 minutes</p> <p>As required</p>	<p>Range of motion Hamstring, gastroc-soleus, quad, ITB stretches Patellar mobilization</p> <p>Strengthening Straight leg raises Straight leg raises, rubber tubing Hamstring curls (week 12, active, 0°-90°) Knee extension with resistance (90°-30°) Leg press (70°-10°) Closed-chain <ul style="list-style-type: none"> - Wall sits - Mini-squats (rubber tubing, 0°-40°) - Lateral step-ups (2-4" block) Multi-hip machine (flexion, extension, abduction, adduction)</p> <p>Balance training Cup walking, BBS, BAPS, perturbation training</p> <p>Aerobic conditioning (patellofemoral precautions) Water walking Elliptical machine Stationary bicycling Stair machine (low resistance, low stroke) Swimming (kicking) Walking</p> <p>Modalities Cryotherapy</p>	<p style="text-align: center;">Duration</p> <p>5 reps x 30 secs</p> <p>3 sets x 10 reps 3 sets x 30 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps</p> <p>to fatigue x 3 3 sets x 20 reps 3 sets x 10 reps 3 sets x 10 reps</p> <p>20 minutes</p>
Goals	<ul style="list-style-type: none"> - Increase strength and endurance - ROM 0°-130° - Normal gait without valgus, external tibial rotation 	

Phase 6. Weeks 13-26 (Visits: 2-3)

General Observation	No effusion, painless ROM, joint stability Performs activities of daily living, can walk 20 minutes without pain ROM 0°-130° Custom unloading brace	
Evaluation	<ul style="list-style-type: none"> - Pain - Manual muscle test - Swelling - Patellar mobility - Crepitus - Gait 	<p style="text-align: center;">Goals</p> Minimal/No RSD 4/5 Minimal Good None/slight Symmetrical
<p>Frequency</p> 2 x/day 10 minutes	<p>Range of motion</p> Hamstring, gastroc-soleus, quad, ITB stretches	<p style="text-align: center;">Duration</p> 5 reps x 30 secs
<p>2 x/day 20 minutes</p>	<p>Strengthening</p> Straight leg raises, rubber tubing (high speed) Hamstring curls (active, 0°-90°) Knee extension with resistance (90°-30°) Leg press (70°-10°) Multi-hip machine (flexion, extension, abduction, adduction) Closed-chain: Mini-squats (rubber tubing, 0°-40°)	3 sets x 30 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 20 reps
<p>1-3 x/day 5 minutes</p>	<p>Balance training</p> Balance board/2 legged Single leg stance	
<p>3 x/week 20 minutes</p>	<p>Aerobic conditioning (patellofemoral precautions)</p> Stationary bicycling Water walking Swimming (kicking) Walking Elliptical machine Stair machine (low resistance, low stroke) Ski machine (short stride, level, low resistance)	
<p>As required</p>	<p>Modalities</p> Cryotherapy	20 minutes
Goals	Increase strength and endurance	

