

Noyes Knee Institute Rehabilitation Protocol: High Tibial or Femoral Osteotomy

	Postoperative Weeks					Postop Months		
	1-2	3-4	5-6	7-8	9-12	4	5	6
<b>Brace:</b> Long-leg postoperative Unloading	X	X	X	X	X	(X)	(X)	(X)
<b>Range of motion minimum goals:</b> 0°-110° 0°-130° 0°-135°	X	X	X					
<b>Weight bearing:</b> None to toe touch ¼ to ½ body weight Full (fracture site healed)	X	X	X	X	(X)			
<b>Patella mobilization</b>	X	X	X	X				
<b>Modalities:</b> Electrical muscle stimulation (EMS) Pain/edema management (cryotherapy)	X X	X X	X X	X X	X	X	X	X
<b>Stretching:</b> Hamstring, gastroc-soleus, iliotibial band, quadriceps	X	X	X	X	X	X	X	X
<b>Strengthening:</b> 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 X	X X X X X	X X X X X	X X X X X	X X X X X
<b>Balance/proprioceptive training:</b> Weight-shifting, mini-trampoline, BAPS, BBS, plyometrics				X	X	X	X	X
<b>Conditioning:</b> UBC Bike (stationary) Aquatic program Swimming (kicking) Walking Stair climbing machine Ski machine		X	X X X	X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X
Recreational activities								X

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

(X): See text - based on patient symptoms, function, resumption weight bearing, fracture site healing.

SOURCE: Noyes FR, Heckmann TP, Barber-Westin SD: Chapter 33: Rehabilitation after tibial and femoral osteotomy. *Noyes' Knee Disorders: Surgery, Rehabilitation, Clinical Outcomes*, Saunders, Philadelphia, 2009, pp. 905-914.

### Range of Motion, Flexibility, and Modality Usage Following Osteotomy

Time Postoperative, Frequency	Extension- Flexion Limits	Patellar Mobilization	Flexibility 5 reps x 20 secs	Electrical Muscle Stimulation 20 minutes	Cryotherapy 20 minutes
1-2 weeks 3-4 x/day, 10 minute sessions	0° - 90°	Medial- lateral Superior- inferior	Hamstring, gastroc-soleus	Yes	Yes
3-4 weeks 3-4 x/day, 10 minute sessions	0° - 110°	Medial- lateral Superior- inferior	Hamstring, gastroc-soleus	Yes	Yes
5-6 weeks 3 x/day, 10 minute sessions	0° - 130°	Medial- lateral Superior- inferior	Hamstring, gastroc-soleus	Yes	Yes
7-8 weeks 2 x/day, 10 minute sessions	0° - 135°	(if required)	Hamstring, gastroc-soleus	Yes	Yes
9-52 weeks 2 x/day, 10 minute sessions	(should be full)		Hamstring, gastroc-soleus, quadriceps, iliotibial band		Yes

## Muscle Strengthening Exercises Following Osteotomy

Time P.O., Frequency	Quadriceps Isometrics (Active)	Straight Leg Raises	Knee Extension (Active-assisted) 90° - 30°	Toe Raises	Wall Sits (to fatigue)	Mini-Squats	Lateral Step-ups (5-10 cm block)	Hamstring Curls 0° - 90°	Multi-hip (Flex, Ext, Abd, Add)	Leg Press 70° - 10°
1-2 weeks 3 x/day 15 minutes	1 set x 10 reps (every hour)	Flex 3 sets x 10 reps	3 sets x 10 reps							
3-4 weeks 2-3 x/day 20 minutes	Multi-angle 0°, 60° 1 set x 10 reps each	Flex, ext, 3 sets x 10 reps	3 sets x 10 reps	3 sets x 10 reps						
5-6 weeks 2 x/day 20 minutes	Multi-angle 30°, 60°, 90° 2 sets x 10 reps	Add Ankle wt ≤ 10% of bodyweight 3 sets x 10 reps	Active 3 sets x 10 reps	3 sets x 10 reps	3 sets to fatigue	3 sets to fatigue				3 sets x 10 reps
7-8 weeks 2 x/day 20 minutes		Add abduction, adduction 3 sets x 10 reps  Add rubber tubing, 3 sets x 30 reps	Active 3 sets x 10 reps	3 sets x 10 reps	3 sets to fatigue	3 sets to fatigue  Add rubber tubing, 0° - 30°	3 sets x 10 reps		3 sets x 10 reps	3 sets x 10 reps
9-12 weeks 2 x/day 20 minutes		3 sets x 10 reps  Rubber tubing, 3 sets x 30 reps	With resistance 3 sets x 10 reps	3 sets x 10 reps	3 sets to fatigue	Add rubber tubing, 0°-40°, 3 sets x 20 reps	3 sets x 10 reps	Active, 3 sets x 10 reps	3 sets x 10 reps	3 sets x 10 reps
13-26 weeks. 2 x/day 20 minutes		Rubber tubing, high speed, 3 sets x 30 reps	With resistance 3 sets x 10 reps			3 sets x 20 reps		Active, 3 sets x 10 reps	3 sets x 10 reps	3 sets x 10 reps

P.O., postoperative; flex, flexion; ext, extension; abd, abduction; add, adduction; reps, repetitions

