



**Lahey Hospital  
& Medical Center**

**Rehabilitation Protocol:**

**Medial Patellofemoral Ligament (MPFL)  
Reconstruction with Concomitant Tibial Tubercle  
Transfer (TTT)**

**Department of Orthopaedic Surgery**

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## ◀ Overview

Patellofemoral instability can be a difficult condition for patients to manage. First time dislocations can often be successfully treated with conservative management. However, surgical intervention is indicated for recurrent dislocations.

Multiple factors contribute to the stability of the patellofemoral joint, including extensor mechanism alignment and soft tissue and bony stabilizers that help maintain patella position in the trochlear groove throughout knee flexion and extension.(1) The medial patellofemoral ligament (MPFL) helps to provide patella stability particularly in the first 30 degrees of knee flexion.(2) MPFL rupture is a common result of lateral patella dislocation. The current standard of care for surgical management of chronic lateral patellofemoral instability is MPFL reconstruction.

However, in addition to soft tissue restraints, malalignment due to lateralization of the tibial tubercle (TT) can also contribute to lateral patellar instability. It has been reported that a distance of >20 mm between the tibial tubercle and trochlear groove (TT-TG distance) is considered to be a pathologic malalignment.(2) In these patients, MPFL reconstruction alone may not provide sufficient patella stabilization. In these cases, a concomitant tibial tubercle transfer (TTT) with MPFL reconstruction has been advocated in order to achieve successful surgical outcomes for patients with chronic lateral patellofemoral instability.(2)

An effective rehabilitation program is critical to a successful outcome following such a surgical procedure. Post-operative pain and swelling can greatly impede active quadriceps control as well as interfere with progression of ROM resulting in post-operative stiffness. Early attention to managing pain and swelling will allow necessary early ROM to decrease pain and prevent scar tissue formation.(1) The following rehabilitation protocol is designed to guide patients and physical therapists to assure a successful outcome following surgery.

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1. Current Concepts in Orthopaedic Physical Therapy, 3<sup>rd</sup> Edition. The Knee: Physical Therapy management Utilizing Current Evidence. 2016. *Tara Jo Manal, Anna Shovestul Grieder, Bryan W. Kist.*
  2. Medial Patellofemoral Ligament Reconstruction With Concomitant Tibial Tubercle Transfer: A Systematic Review of Outcomes and Complications. J. M. Burnham et al. *Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 32, No 6, 2016.*

## ◀ Phase I - Protective Phase Weeks 0-4

### *Goals*

- Protection of the post-operative knee
- Control pain and swelling
- Increase motor control of quadriceps activation
- Educate patient regarding weight bearing and assistive device use
- Gradually increase knee flexion ROM: 1<sup>st</sup> 2 weeks maintain full extension, up to 30 degrees by week 3, 60 degrees by week 4, 90 degrees by week 5, 120 degrees by week 6.
- Increase independence with ADL performance

### *Precautions*

- WBAT with brace locked in extension for gait
- Avoid active knee extension
- For sleeping, brace locked in extension 0-2 weeks, brace allow 0-90 degrees 2-4 weeks.
- Observe for signs of deep vein thrombosis (DVT): increased swelling, erythema, calf pain. If present, notify MD immediately

## **Manual Therapy**

- Patella mobilizations – medial glide only

## **Therapeutic Exercise**

- Ankle pumps
- Quad sets
- Heel slides for knee flexion ROM within ROM guidelines (30 degrees at wk 3 and increasing only 30 degrees per week)
- Glute sets
- Straight leg raise (SLR) and prone hip extension with brace locked in extension

## **Gait Training**

- Gait training with B axillary crutches, WBAT, with brace locked in extension.

## **Modalities**

- Electric stimulation for quad activation and pain or swelling control as needed
- Cold pack or ice pack for 10-20 minutes, 3x/day to manage pain and swelling

## ◀ Phase II – Transitional Phase Weeks 4-6

### *Goals*

- Continue to protect the post-operative knee
- Good quadriceps control
- Increase ROM to full motion: at least 0-120 degrees
- Increase strength

### *Precautions*

- FWB with brace locked in extension for gait
- No active knee extension exercises

### **Therapeutic Exercise**

- Ankle pumps and heel slides for active ROM of ankle and knee.
- Quad sets
- Glute sets
- SLR in all planes with brace locked in extension
- Standing heel raises with brace locked in full extension

### **Gait Training**

- Instruct patient in FWB with brace in full extension
- Proprioceptive training/balance in FWB with brace in full extension

### **Modalities**

- Cold pack or ice pack for 10-20 minutes as needed to manage pain and swelling.

◀ **Phase III – Intermediate Phase**  
**Weeks 6-12**

***Goals***

- Normal gait without brace or crutches
- No effusion
- Regain full motion
- Regain full strength

***Precautions***

- Brace unlocked for ambulation/sleep weeks 6-8
- Wean off brace after week 8
- Limit open and closed chain knee extension arc to 0-30 degrees

**Therapeutic Exercise**

- Stationary Bike
- Quad sets, SAQ, SLR
- Closed chain weight shifting activities including side-stepping; standing TKE
- Balance exercises: alter surface, eyes open/closed, SLS, balance board
- Leg press working gradually progress toward full body weight
- Wall slides (0-30)
- Progress hip and core strengthening: hooklying CLAM with band, bridges
- Therapist assist stretching as needed into flexion and emphasis on full passive and active knee extension.

**Modalities**

- Cold pack or ice pack for 10-15 minutes after activity to limit pain and swelling

**Criteria for progression to next phase:**

- No effusion
- Pt ambulates without assistive device without pain or deviation
- Single leg balance with 30 degrees knee flexion for > 15 seconds

◀ **Phase IV**  
**Week 12 - on**

***Goals***

- Avoid pain at tendon repair site
- Good eccentric and concentric dynamic neuromuscular control

***Precautions***

- Post-activity soreness should resolve within 24 hours
- Avoid post-activity swelling

**Therapeutic Exercise**

- Progress **Phase III** exercises by increasing resistance and repetitions
- Step up/down
- Front lunge and squat activities if ability to maintain neutral knee alignment
- Progress balance and proprioception activities (STAR and ball toss, perturbations)
- Progress overall exercise and endurance training (walking, elliptical, swimming, progress biking). Can begin jogging.

◀ **Phase V – Return to High Level Activity (4+ months)**

**Activities**

- Progressive running and agility program
- Begin multi-plane dynamic neuromuscular control activities including planting, cutting, plyometric exercises
- Obtain clearance from surgeon for return to sports.

## Rehabilitation Protocol for MPFL Reconstruction with Tibial Tubercle Transfer

Post –op Phase/Goals	Interventions/Activities	Precautions
<p><b>Phase I</b> <b>Protective Phase</b> <b>0- 4 Week</b></p> <ul style="list-style-type: none"> <li>• Protection of the post-operative knee</li> <li>• Control pain and swelling</li> <li>• Increase motor control of quadriceps activation</li> <li>• Educate patient regarding weight bearing and assistive device use</li> <li>• Gradually increase knee flexion ROM: 0 degrees for 2 weeks, then increase 30 degrees per week (30 week 3, 60 week 4, 90 week 5, 120 week 6)</li> <li>• Increase independence with ADL performance</li> </ul>	<p><b>Manual Therapy</b></p> <ul style="list-style-type: none"> <li>• Patella mobilizations – medial glide only</li> </ul> <p><b>Therapeutic Exercise</b></p> <ul style="list-style-type: none"> <li>• Ankle pumps</li> <li>• Quad sets</li> <li>• Heel slides for knee flexion ROM within ROM guidelines (30 degrees wk 1 increasing only 30 degrees per week)</li> <li>• Glute sets</li> <li>• Straight leg raise (SLR) and prone hip extension with brace locked in extension</li> </ul> <p><b>Gait Training</b></p> <ul style="list-style-type: none"> <li>• Gait training with B axillary crutches, WBAT, with brace locked in extension.</li> </ul> <p><b>Modalities</b></p> <ul style="list-style-type: none"> <li>• Electric stimulation for quad activation and pain or swelling control as needed</li> <li>• Cold pack or ice pack for 10-20 minutes, 3x/day to manage pain and swelling</li> </ul>	<p><b>Precautions</b></p> <ul style="list-style-type: none"> <li>• WBAT with brace locked in extension for gait</li> <li>• Avoid active knee extension</li> <li>• For sleeping, brace locked in extension 0-2 weeks, brace allow 0-90 degrees 2-4 weeks.</li> <li>• Observe for signs of deep vein thrombosis (DVT): increased swelling, erythema, calf pain. If present, notify MD immediately</li> </ul>

Post –op Phase/Goals	Interventions/Activities	Precautions
<p><b>Phase II – Transitional Phase</b> <b>Weeks 4-6</b></p> <ul style="list-style-type: none"> <li>• Continue to protect the post-operative knee</li> <li>• Good quadriceps control</li> <li>• Increase ROM to full motion: at least 0-120 degrees</li> <li>• Increase strength</li> </ul>	<p><b>Therapeutic Exercise</b></p> <ul style="list-style-type: none"> <li>• Ankle pumps and heel slides for active ROM of ankle and knee.</li> <li>• Quad sets</li> <li>• Glute sets</li> <li>• SLR in all planes with brace locked in extension</li> <li>• Standing heel raises with brace locked in full extension</li> </ul> <p><b>Gait Training</b></p> <ul style="list-style-type: none"> <li>• Instruct patient in FWB with brace in full extension</li> <li>• Proprioceptive training/balance in FWB with brace in full extension</li> </ul> <p><b>Modalities</b></p> <ul style="list-style-type: none"> <li>• Cold pack or ice pack for 10-20 minutes as needed to manage pain and swelling.</li> </ul>	<ul style="list-style-type: none"> <li>• FWB with brace locked in extension for gait</li> <li>• No active knee extension exercises</li> </ul>



Post –op Phase/Goals	Interventions/Activities	Precautions
<p><b>Phase III – Intermediate Phase</b> <b>6-12 Week</b></p> <ul style="list-style-type: none"> <li>• Normal gait without brace or crutches</li> <li>• No effusion</li> <li>• Regain full motion</li> <li>• Regain full strength</li> </ul>	<p><b>Therapeutic Exercise</b></p> <ul style="list-style-type: none"> <li>• Stationary Bike</li> <li>• Quad sets, SAQ, SLR</li> <li>• Closed chain weight shifting activities including side-stepping; standing TKE</li> <li>• Balance exercises: alter surface, eyes open/closed, SLS, balance board</li> <li>• Leg press working gradually progress toward full body weight</li> <li>• Wall slides (0-30)</li> <li>• Progress hip and core strengthening: hooklying CLAM with band, bridges</li> <li>• Therapist assist stretching as needed into flexion and emphasis on full passive and active knee extension</li> </ul> <p><b>Modalities</b></p> <ul style="list-style-type: none"> <li>• Cold pack or ice pack for 10-15 minutes after activity to limit pain and swelling</li> </ul>	<p><b>Precautions</b></p> <ul style="list-style-type: none"> <li>• Brace unlocked for ambulation/sleep weeks 6-8</li> <li>• Wean off brace after week 8</li> <li>• Limit open and closed chain knee extension arc to 0-30 degrees</li> </ul>

Post –op Phase/Goals	Interventions/Activities
<p><b>Phase IV</b> <b>Week 12-on</b></p>	
<ul style="list-style-type: none"> <li>• Avoid pain at tendon repair site</li> <li>• Good eccentric and concentric dynamic neuromuscular control</li> </ul> <p><i>Precautions</i></p> <ul style="list-style-type: none"> <li>• Post-activity soreness should resolve within 24 hours</li> <li>• Avoid post-activity swelling</li> </ul>	<p><b>Therapeutic Exercise</b></p> <ul style="list-style-type: none"> <li>• Progress <b>Phase III</b> exercises by increasing resistance and repetitions</li> <li>• Step up/down</li> <li>• Front lunge and squat activities if ability to maintain neutral knee alignment</li> <li>• Progress balance and proprioception activities (STAR and ball toss, perturbations)</li> <li>• Progress overall exercise and endurance training (walking, elliptical, swimming, progress biking). Can begin jogging.</li> </ul>
<p><b>Phase V – Return to High Level Activity (4+ months)</b></p>	<p><b>Activities</b></p> <ul style="list-style-type: none"> <li>• Progressive running and agility program</li> <li>• Begin multi-plane dynamic neuromuscular control activities including planting, cutting, plyometric exercises</li> <li>• Obtain clearance from surgeon for return to sports.</li> </ul>