Distal Patellar Realignment Rehabilitation Program
Fulkerson Osteotomy
Tibial Tubercle Osteotomy (TTO)

The Gundersen Sports Medicine Distal Patellar Realignment / TTO Rehabilitation Program is an evidence-based and soft tissue healing dependent program allowing patients to progress to vocational and sports-related activities as quickly and safely as possible. Individual variations will occur depending on surgical technique and the patient's response to treatment. Avoid ROM with chondrosis and pain when performing OKC knee extension strengthening exercises. Please contact us at 1-800-362-9567 ext. 58600 if you have questions or concerns.

Phase I: 0-6 weeks	**Immediate post op maximum protection phase**
Goals	• Protect anatomic repair • Minimize knee joint effusion • Gently increase ROM per guidelines, emphasis on extension • Encourage quadriceps function • Prevent negative effects of immobilization
ROM	• wk 0-4: 0-90 deg • wk 4-6: 0-120 deg.
WB	• wk 0-4: NWB/TTWB with brace locked into extension • wk 4-6: TTWB with brace unlocked if good extension ROM and quadriceps control.
Precautions	• Emphasis on regaining extension ROM ASAP to decrease stress to the PF joint during ambulation. • Must follow the WB restrictions as mentioned above to protect the osteotomy site and prevent loss of fixation
Modalities	• Cryotherapy 15 minutes in duration 3x/day • IFC for pain/effusion if needed • NMES quadriceps if needed
Treatment Recommendations Guidelines for progression based on tolerance PT visits may be decreased initially if: ROM 0-90 deg Adequate pain control No excessive swelling SLR without a quadriceps lag	• Active warm-up: bike or Nustep per ROM guidelines with no resistance • ROM: Wk 0-4: Gentle stretching to attain full extension and 90 degrees of flexion. Emphasis on full return of knee extension ASAP. Low-load long duration stretching for extension with heat if needed (1st TERT= Total End Range Time) Manual stretching for extension with overpressure or recurvatum Patellar mobilizations PROM / AAROM / AROM Wk 4-6: progress range of motion 0-120 deg • Flexibility exercises for hamstring, gastoc-soleus • Scar tissue massage • Therapeutic exercises. Exercise in a pain-free manner. Encourage quadriceps activation. wks 1-6 Biofeedback QS, SLR Short arc 0-30 quadriceps with biofeedback with no weight Hip NWB: 4 way SLR, sidelye resisted ER Gastroc soleus strengthening NWB Hamstring curls 0-90 deg Core stability and upper body exercises if desired • IFC for pain/effusion, NMES for quadriceps activation and control as needed • Ice (in stretch for extension if needed) 2nd TERT • HEP for 3rd TERT

Phase II: 6-12 weeks	Moderate protective phase
Goals	• Progress ROM as tolerated • Progress WB (per MD approval) and promote a normal heel-toe walking program • Gradual progression of therapeutic exercises for strengthening, stretching, and balance
ROM	• wk 6+: progress to full ROM as tolerated. Goal of full ROM by 8-12 weeks
WB	• Wk 6-8: WBAT per MD based on xray. Brace unlocked for ambulation if good quadriceps control. • Utilize crutches as needed until patient demonstrates a normal heel-to-toe pattern.
Brace	• Patient will use the post-op brace until wk 7-8. Replace with a PF brace with lateral buttress
Modalities	• Cryotherapy 15 minutes in duration 1-2x/day • IFC for pain/effusion if needed • NMES quadriceps if needed
Precautions	• No WB stretching into flexion until 8 wks • Avoid descending stairs reciprocally until adequate quadriceps control and • lower extremity alignment
Treatment Recommendations Guidelines for progression **based on tolerance**	• Active warm-up: Bike with resistance, Nu Step, Treadmill walking wk 9-10: Elliptical Runner • Stretching for full extension and flexion PROM / AAROM / AROM Patellar mobilizations if needed Manual stretching for extension and flexion Low-load long duration stretching with heat if needed (1st TERT= Total End Range Time) wk 8: WB knee flexion stretch on leg press with light resistance • Flexibility exercises for hamstring, gastoc-soleus, iliopsoas, quadriceps if indicated • Therapeutic exercises: Exercise in a pain-free manner. Gradual progression with avoiding medial collapse during strengthening and functional activities (focus on hip abductor and external rotator strengthening). Incorporate total leg strengthening and balance / proprioception exercises. Biofeedback QS SLR, CKC knee extension Hip 4 way SLR Hamstring OKC isotonics CKC exercises: Progress from 0-60 deg to 0-90 deg: leg press, wall squats, lateral step-overs, step-ups, bridges wk 7: leg press 2:1, partial BW squats and partial deadlifts wk 8: Resisted sidestep with T-band, leg press 1:1, partial lunges with UE support as needed wk 9: Progress to squats to 90 deg, BOSU partial squat 0-60 prone hamstring curls, Stair master wk 10: Progress to full lunges Gastroc soleus strengthening Total leg strengthening Balance / Proprioception training: Double leg progress to single leg, static progressing to dynamic activities

	CV conditioning / Core Stability • Ice (in stretch if needed) 2nd TERT • HEP for 3rd TERT if needed
Independent strengthening	wk 12-16: Progress to independent strengthening program with monthly or bimonthly rechecks if good ROM, minimal effusion or pain, and good muscle control
Phase III: 12+ wks	**Advanced strengthening and Gradual Return to activity phase**
Goals	• Progress muscle strength, endurance, and balance activities. Ideally 3x/week of exercises at a fitness center, step-down, or home program • Progress to higher level activities depending on functional demands and MD approval • Return back to vocational, recreational, and sport activities
Brace	• Your MD may recommend continuing with the knee brace to be used until 12 months from your surgery for higher level activities
Modalities	Cryotherapy 15 minutes 1x/day or after strenuous activity
Treatment Recommendations **Return to running** **Return to sport**	• Active warm-up: Bike, Elliptical Runner, Nu Step, Treadmill walking • Continue with stretching and flexibility exercises as needed • Strengthening and endurance exercises: Advance as tolerated with emphasis on functional strengthening. Avoid medial collapse during strengthening and functional activities. Total leg strengthening Single leg strengthening Hip strengthening Heel raises Hamstring full ROM isotonics. Quadriceps isotonics in ROM without chondrosis, if needed CKC exercises: Leg press, multiple direction lunges, step-ups, squats, Gastroc soleus exercise Isokinetic quadriceps/hamstrings in ROM without chondrosis Stairmaster, • Dynamic balance exercises • Foot placement drills submax:: agility ladder / line jumps /submax anterior-lateral hop to stabilization • CV conditioning and core stability • Wk 16: (4 months): Return to running program if meets criteria – see next page • 4 ½-5 months: Plyometric program – submax with gradual progression • 6-9 months: Return to play if meets criteria – see next page

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Testing and Return to Running/Sports Recommendations

Testing:

12 weeks (3 months)

SL 60 deg Stork test
Hip strength:
- Abduction MMT
- Hip Abduction Side plank test

Biodex test :
- No block
- 2 speeds: 180 deg/sec (5 reps) 300 deg/sec (30 reps)

Y balance test
FOTO

16 weeks (4 months) – RETURN to RUNNING

Repeat previous tests not passed
Anterior lateral hop to stabilization
Trial of running.
Jump test: no arm swing – submax for apprehension/technique
Single Hop test: no arm swing- submax for apprehension/technique

20 weeks (6 months)

Biodex test: Full ROM with no ext block
- 3 speed test: 60 deg/sec (5 reps),
  180 deg/sec (5 reps),
  300deg/sec (30 reps

Single Hop test: no arm swing
Triple hop/Cross over hop test: arm swing-
Tuck Jump or Landing Assessment
Agility Test: LEFT test components or time
FOTO

Return to Running Criteria:

Return to Running Requirements:
Time: at least 4 months post-op
MD / PT clearance
No knee joint effusion
ROM: limb symmetry:
- extension within 5 deg
- flexion within 10 deg

Biodex:
- Limb symmetry of PT:
  - Quad: 75%
  - Hams: 80-90%

Proper running form: Treadmill running (6-10 mph, 5 min) with equal audibly rhythmic foot strike
Anterior lateral hop to stabilization drill completed with no apprehension and good movement control

Return to Running Recommendations:
Biodex:
180 deg/sec:
- Quad PT/BW: Males: 65%
  Females: 55%
- H/Q ratio: 65%

300 deg/sec:
Quads Power :Limb symmetry:75%
Hams Power: Limb symmetry: 75%
SL 60 deg stork test:
- Limb symmetry: 90%

Hip Abduction Side Plank test:
- Level II or greater

Y balance: Limb symmetry: < 4cm

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Testing and Return to Running/Sports Recommendations

Return to Play Criteria:

Return to Play Requirements:
Time: at least 6-9 months
MD/ PT clearance
No knee joint effusion
ROM: limb symmetry:
extension within 5 deg
flexion within 10 deg
Biodex:
Limb symmetry of PT:
Quad: 90%
Hams: 90%
Tuck Jump or Landing Assessment: no faulty movement patterns
Single Hop test: Limb symmetry: 90%,
Triple Hop test or Cross-Over Hop Test Limb symmetry: 90%
LEFT test or Agility Test with no compensation

Return to Play Recommendations:
Biodex:
60 deg/sec:
Quad PT/BW: Males: 100%
Females: 80%
Hams PT/BW: Males: 60%
Females: 60%
H/Q ratio: 60 deg/sec : 60%
180 deg/sec: 70%
300 deg/sec: 80%
300 deg/sec:
Quads Power : Limb symmetry:90%
Hams Power: Limb symmetry: 90%

Hip Abduction Side Plank test:
Level III or greater
Y balance: Limb symmetry: < 4cm

Distal Patellar Realignment / Fulkerson Osteotomy References

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