Sports & Orthopaedic Specialists

Criterion Based High Tibial Osteotomy Protocol: PREOPERATIVE REHABILITATION

1-3 visits of Physical therapy if needed. No more than once per week. Focus on teaching home program.

GOALS	**REHAB STRATEGIES**
1) Reduce any joint effusion	Cryotherapy, elevation, ankle pumps
2) Normalize range of motion Extension: 0 Flexion: Heel to buttock in prone	Determined by contralateral knee Extension (focus): Heel on chair, prone hang Flexion: Heel slide, heel slide with patient-applied over-pressure, prone flexion with patient-applied over-pressure Gastroc/soleus: Runner stretches
3) Strengthen lower extremities	Quadriceps (focus): Quads sets, SLR, wall squat to 45 degrees, leg press Hamstrings: Standing ham curls, bridging Glute med/max: Clam shell Gastroc/soleus: Heel raises
4) Improve proprioception	Tandem stance, single leg balance
5) Normalize gait	Encourage full weight bearing and symmetrical patterning Retro walking
6) Patient education	Inform the patient of acute postoperative expectations: -Compressive cryotherapy continuously for the first 72 hours. Then for 20 minutes 3-5 times per day -Exercises: Ankle pumps/quads sets/heel slides (2x/day) - Postop brace locked in full extension. Sleep with brace on. - Non-weight bearing in full extension brace for 6 weeks, then progress to partial weight bearing in brace at full extension from week 6-12 with MD clearance and finally full weight bearing at week 8-12 with MD clearance. -Follow all postoperative instructions from MD -Call MD or PT if questions arise -Begin PT 2-3 weeks following surgery (after postop visit with MD) Remind the patient of return to sport/activity guidelines: Teach the patient that the following time references are the EARLIEST that a specific activity may be started. It will be more important for patients to meet ROM, strength, and functional criteria before these activities are reintroduced. -Running: 6+ months after surgery -Non-contact drills/practice: 7-8+ months after surgery -Contact sport: 9-12 months after surgery
7) Outcome measures	Lower Extremity Functional Scale & ACL- Return to Sport Index

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

INTRODUCTION

-This HTO reconstruction protocol is criterion based. Patients must demonstrate specific functional criteria at each physical therapy visit before progressing to more advanced interventions.

-Throughout this protocol, time references (in weeks since surgery) represent the EARLIEST that a patient may begin an exercise/activity following HTO reconstruction.

PROTOCOL UTILIZATION

Each time reference in the protocol is categorized into four sections:

Functional Criteria

In this section, the therapist will see criteria for how a typically progressing patient should present following surgery. **The patient should be able to demonstrate the listed criteria at the start of the physical therapy visit. If able, progress to the therapeutic exercise listed below.** If unable, continue to focus on PT intervention strategies from prior sessions that will assist the patient in achieving these functional criteria before the next clinic visit.

Patient Education

In this section, the therapist will see points of education that should be discussed with the patient including: Frequency of home program, use of brace, graft strength, exercise technique, return to sport.

Therapeutic Exercise

The therapeutic exercise listed in this protocol conveys the appropriate load for the patient given the time elapsed and the functional progress made since surgery. This is not a complete listing of rehabilitation strategies. Only teach patients exercises appropriate for this time frame if they were able to demonstrate functional criteria listed above.

Outcome Measures

The Lower Extremity Functional Scale and HTO – Return to Sport Index will be used throughout recovery to gauge patient perceived function and self-efficacy with activity.

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

First 2 weeks are generally completed by patient independently, just working on swelling and pain control with some early activation of the quads and gentle range of motion.

WEEK 0-2: Focus on controlling effusion and pain; obtaining full extension; quad activation

Functional Criteria
-Full extension is emphasized

Patient Education
-Inform patient that they can expect daily rehab from now until return to sport
-Complete home program TWICE per day
-Continuous wear of brace locked in full extension, including sleep. **NWB.** Exception: Home exercise program with brace unlocked.
-Continue to ice/elevate for 20 minutes up to three times per day

Therapeutic Exercise
-Heel slides progression to 90 degrees as tolerated (no overpressure)
-Quad sets
-SLR with brace on
-Patella mobilizations
-Ankle pumps

Outcome Measures
-Lower Extremity Functional Scale (Appendix 2)

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Begin physical therapy with 2-3 visits at one week intervals. Then every other week until the patient has passed functional tests. Emphasis is placed on independent completion of instructed home exercise program. Approximately 12-18 clinic visits in PT from surgery to return to activity/sport.

WEEK 2-4: Focus on maintaining full extension, quad recruitment

Functional Criteria
-Full extension and progression of flexion to 90 degrees

Patient Education
-Inform patient that they can expect up to one hour of daily rehab from now until return to sport
-Complete home program TWICE per day (two 30 minute sessions)
-Continuous wear of brace locked in full extension, including sleep. **NWB.** Exception: home exercise program with brace unlocked.
-Continue to ice/elevate for 20 minutes up to three times per day
-Remind the patient that the following time references are the EARLIEST that a specific activity may be started: Running: 6+ months after surgery. Non-contact activity/sports: 7-8+ months after surgery. Contact sports: 9-12 months after surgery

Therapeutic Exercise
-Heel slides progression to full
-Patella mobilizations
-Quad sets
-SLR with brace on – Need to make sure brace is fitting properly due to atrophy
-UBE for cardio

Outcome Measures
-Lower Extremity Functional Scale (Appendix 2)

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

WEEK 4-6: Focus on ROM towards normal limits, quad recruitment

Functional Criteria
-Extension symmetrical in prone
-Flexion progression (may be limited if patient has OA)

Patient Education
-Remind patient that they can expect up to one hour of daily rehab from now until return to sport
-Complete home program ONCE per day
-Continued brace use in full extension, NWB
-Continue to ice/elevate for 20 minutes once per day
-Educate patient that even though pain is minimal, bone is still healing at this time.

Therapeutic Exercise
-Quad sets
-Heel slides- Progress flexion to full
-SLR
-Heel raises
-Clam shell without band to start
-UBE for cardio

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

WEEK 6-8: Focus on preserving quad control/engagement, LE/core strength progression

At this point rehab begins to strongly focus on the gluteus medius and maximus by implementing the Powers Program. This is an evidence based progression of exercises designed to maximize the recruitment and strength of the gluteals. Take care to prevent dynamic knee valgus and hip internal rotation- as well as minimize contribution of the TFL.

The program consists of eight levels with three separate focuses:

Levels 1-3: Gluteal activation/recruitment
Levels 4-5 Gluteal strength
Levels 6-8: Functional applications and sport specific skill acquisition

It is imperative that the therapist provides extensive education to the patient while progressing through the Powers Program. Make sure the patient feels the exercises challenging the glutes. The quads, of course, will continue to function during weight bearing exercises. The following are the necessary cues for appropriate form:

1) Lower extremity alignment
2) Hips down and back
3) Pelvis level
4) Trunk vertical (no lateral lean)
5) Soft landings

Functional Criteria
-Extension symmetrical
-Flexion symmetrical
-GAIT ASSESSMENT: Progressing toward increased weight bearing
-Completion of adequate SLR and pelvic floor/TA contraction

Patient Education
-Complete home program once per day
-Brace use in full extension-- may begin partial weight bearing as tolerated after week 6 (ONLY IF APPROVED BY MD. MAY HAVE TO WAIT UP TO 6 MORE WEEKS)- would begin 25% body weight for one week then up to 50% body weight the following week. (Have patient use a scale to determine appropriate amount of pressure)
-Continue to ice/elevate for 10-15 minutes once per day
-Reiterate to patient that even though pain is minimal, bone is still healing during this time frame.
-Discuss importance of gluteal strength in alignment of the lower extremity. Strong glutes = diminished strain through the knee

Therapeutic Exercise
-Non weight bearing activation of gluteus medius/maximus with isometric holds (Powers Level 1)
-begin prone hang at week 6
-ITB/gluteal stretch, gastrocnemius/soleus stretches
-Mini-squats/wall slides (with MD clearance based on WB)
-SLR 4-way
-Heel raises
-Begin knee flexion hamstring curls/strengthening
-Leg press from 10-70 degrees
Cardio: -Initiate stationary biking without resistance and water walking

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

WEEK 8-10: Focus on gait re-training, static double leg activation of gluteus medius/maximus

Functional Criteria
-Full ROM
-Multi-planar LE and core strength 4/5 with MMT
-Subjective report of completing clam shell with blue band for 60 seconds 5x on right and left for a minimum of three consecutive days
-Objective observation of clam shell with blue band for 60 seconds bilaterally with appropriate form
-GAIT ASSESSMENT: Begin full weight bearing and progression towards a normalized gait pattern with no gross biomechanical deviations.

Patient Education
-Complete home program once per day
- PER MD APPROVAL, either begin or continue with PWB status- would begin 25% body weight for one week then up to 50% body weight the following week, etc. (Have them use a scale to determine appropriate amount of pressure). If already at 50% then progress from 50-75% weightbearing as tolerated. (Have them use a scale to determine appropriate amount of pressure)
-Remind patient of the importance of gluteal strength in alignment of the lower extremity
-With exercises, should feel glutes working more than quads
-Observe for return of effusion/pain with increased activity
-Teach patient to watch technique/form in the mirror
    -Knee aligned over second toe
    -Hips down and back

Therapeutic Exercise
-Static double leg activation of gluteus medius/maximus (Powers level 2)
-Prone hang, prone knee flexion, ITB/gluteal stretch, gastrocnemius/soleus stretches
-Progression of mini-squats/wall slides (with MD clearance based on WB, 4 way hip, leg press (10-70 degrees)
-Knee extension (no resistance!) 30-90 degrees
-Standing hamstring curls and calf raises- progress to single leg
-Double leg squats starting with no weight and progressing to half of body weight per WB status
-Progression of reciprocal pattern on stairs
Cardio:
    -Progress stationary biking, walking, water walking
    -May begin swimming with straight legged kicking

Outcome Measure
Lower Extremity Functional Scale (Appendix 2)

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Week 10-12: Focus on proper self-awareness of LE alignment and gait pattern, progression to normal stair climbing , depending on WB status- possible static single leg activation of gluteus medius/maximus

Functional Criteria
-Full ROM
-Able to perform proper double leg squats
-GAIT ASSESSMENT: Normalized walking gait
-STAIRS ASSESSMENT: Able to ambulate stairs with reciprocal pattern/no rail with no gross biomechanical deviations

Patient Education
-Complete home program every other day
- PER MD APPROVAL, continue with PWB status- would begin 25% body weight for one week then up to 50% body weight the following week, etc. (Have them use a scale to determine appropriate amount of pressure). If already at 50% then progress to full weightbearing as tolerated. (Have them use a scale to determine appropriate amount of pressure)
-No pivoting activities until 7-8 months post-op

Therapeutic Exercise
-Prone hang, prone knee flexion, ITB/glute stretch, gastroc/soleus stretches
-Quad strengthening- no open chain knee extension with resistance ever
-Hamstring strengthening
-Double leg balance progression to single leg
-Progression to static single leg strength based on WB status (Powers level 3)
-Progression of CKC drills to higher reps and trunk/UE movement
Cardio:
-Progression of biking, swimming, walking (25-40 minutes, moderate intensity with 3-5 brief near maximal intensity bursts with recovery periods)

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

WEEK 12-16: Focus on balance progression, gait normalization, reciprocation of stairs, single leg strength and progression of cardio activities

Functional Criteria
-Subjective report of consistent completion of home program every other day
-Quad girth within 2cm of non-effected limb
-Gluteus medius strength a minimum of 4/5 bilaterally
-SQUAT ASSESSMENT: Complete 15/15 functional squats with appropriate alignment of lower extremities and hips down/back with no verbal cues

Patient Education
-Complete home program every other day
-No pivoting activities/sports until 7-8 months post-op and no contact sports until 9+ months post-op
-Remind patient of the importance of gluteal strength in alignment of the lower extremity
-With exercises, should feel glutes working more than quads
-Teach patient to watch technique/form in the mirror
-Knee aligned, Hips down and back, Pelvis level and Trunk vertical (no lateral lean)

Therapeutic Exercise
-Dynamic double leg activation of gluteus medius/maximus (Powers level 4)
-Prone hang, prone knee flexion, ITB/glute stretch, gastroc/soleus stretches
-Linear and lateral step ups/downs
-Continued 4 way hip
-Continued hamstring strengthening
-Progression of CKC activities- work on endurance/stamina
-Single leg balance progression to challenge and dynamic component
-Progression to single leg squat
Cardio:
-Progress biking, swimming, walking (linear, focus on acceleration, progress intensity per fatigue/symptoms)

Return to Weight Lifting
-Patient may begin a slow, graduated return to strength training in the gym
-Max of every other day
-Give the ok for: Leg press, prone or seated ham curls, hip abduction, squats with smith/bar, dead lifts, heel raises
-Do not start more advanced Olympic lifts at this time
-**No** seated knee extension ever
-Two to three sets of 12-15 at appropriate weight
-Gradual increase in weight (max of 10% once per week).
-Fatigue and muscle soreness is ok. No pain in knee.

Outcome Measures
Lower Extremity Functional Scale (Appendix 2)
ACL – Return to Sport Index (Appendix 3)

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

WEEK 16+: Focus on lower extremity mechanics and endurance/stamina throughout activities

Functional Criteria
-Subjective report of consistent completion of home program every other day
-Normal quad girth.
-Self-awareness of proper LE mechanics and alignment with high level drills.
-STEP DOWN ASSESSSMENT: Complete 10/10 step downs from 6" box with appropriate alignment of lower extremities, hips down/back, pelvis level, trunk vertical. All with no verbal cues and no visual feedback.

Patient Education
-Complete home program every other day
-No pivoting activities/sports until 7-8 months post-op and no contact sports until 9+ months post-op
-Teach patient to watch technique/form in the mirror

Therapeutic Exercise
-Dynamic single leg strength of gluteals (Powers level 5)
-Single leg squat
-Continued linear and lateral step ups/downs
-Continued hamstring and quadriceps strength
-Integration of strength elements into balance drills
Cardio:
- -Regular cardio workouts 4-6 times per week
- -Increase time/intensity on bike, pool

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

WEEK 20+: Focus on increasing balance, maintaining strength and stamina

Functional Criteria
-Gluteus medius strength of 5-/5 or greater bilaterally
-SINGLE LEG SQUAT ASSESSMENT: Complete 10/10 single leg squats with appropriate alignment of lower extremities, hips down/back, pelvis level, trunk vertical. All with no verbal cues.
-Observe for return of effusion/pain with increased activity

Patient Education
-Complete home program every other day
-No pivoting activities/sports until 7-8 months post-op and no contact sports until 9+ months post-op

Therapeutic Exercise
-Continued focus on single leg balance activities with challenge added
-Continue strength hamstrings, quadriceps, core, gluteus
-Incorporation of sports specific activities without jumping/pivoting yet
-Agility/footwork drills
Cardio:
-Regular cardio workouts 4-6 times per week

Outcome Measures
Lower Extremity Functional Scale (Appendix 2)
ACL – Return to Sport Index (Appendix 3)

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Week 22+: Continued focus on stamina and return to activity

Functional Criteria
- Adequate quadriceps and gluteus strength and stamina
- Ability to perform single leg squats consistently without valgus

Patient Education
-Complete home program every other day
-Continue to focus on technique/form.
-Self-awareness of proper LE mechanics and alignment with sporting activities
-Begin return to run program PER MD APPROVAL- may need to wait another few weeks

Return to Run Program (Appendix 1)
-Observe jogging in clinic. Use clinical judgment.
-If pain free and biomechanical deviations are small, cue patient and issue Return to Run Program
-If painful and/or biomechanical deviations are moderate+, reassess at next visit.

Therapeutic Exercise
-Continue sport specific drills
-Agility/footwork drills
-Focus on proper deceleration from running
Cardio:
- -Regular cardio workouts 4-6 times per week
- -Progression of running

*****This may be the stopping point in formal PT for patients who complete linear running, but no sports participation with contact, deceleration, pivoting. The patient should be instructed to continue with home program twice per week until the one year anniversary of surgery.

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Week 24+

Functional Criteria

-GAIT ASSESSMENT: Evaluate gait with walking first then linear running if MD approved- level hips, no valgus, soft landing. All with no verbal cues.

Patient Education

-No pivoting activities/sports until 7-8 months post-op and no contact sports until 9+ months post-op
- PER MD APPROVAL- plyometrics may begin 2-4 weeks after running has been mastered.
- Focus on proper form- good alignment, centered body mass, soft landings
-Teach patient to watch technique/form in the mirror
    -Knee aligned
    -Hips down and back
    -Pelvis level
    -Trunk vertical (no lateral lean)
    -Soft landings

Therapeutic Exercise

-Initiate basic 2 legged plyometric drills (emphasize proper landing techniques)
-Ballistic double leg skill re-education (Powers level 6)
-Footwork/agility drills
-Sprint work
-Continued work on plyometrics and proper jump landing

Outcome Measures

Lower Extremity Functional Scale
ACL – Return to Sport Index

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Week 26+

Functional Criteria

-DECELERATION ASSESSMENT: Complete 3/3 deceleration-back pedal drills bilaterally with appropriate alignment of lower extremities, hips down/back, pelvis level, trunk vertical, soft landings. All with no verbal cues.

Patient Education

-No pivoting activities/sports until 7-8 months post-op and no contact sports until 9+ months post-op
-Most patients spend 4 weeks focused on double leg plyometrics and skill acquisition. Very few progress to single leg after only 2 weeks.
-Focus on proper form- good alignment, centered body mass, soft landings
-Teach patient to watch technique/form in the mirror
    -Knee aligned
    -Hips down and back
    -Pelvis level
    -Trunk vertical (no lateral lean)
    -Soft landings

Therapeutic Exercise

-Plyometrics
-Ballistic single leg skill continuation (Powers level 7)
-Footwork/agility drills
-Sprint work
-Sport specific activity

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Week 28+

Functional Criteria

-BROAD JUMP ASSESSMENT: Complete a triple broad jump with appropriate alignment, hips down/back, soft landings. All with no verbal cues.

Patient Education

-No pivoting activities/sports until 7-8 months post-op and no contact sports until 9+ months post-op
-Focus on proper form- good alignment, centered body mass, soft landings
-Teach patient to watch technique/form in the mirror
    -Knee aligned
    -Hips down and back
    -Pelvis level
    -Trunk vertical (no lateral lean)
    -Soft landings

Therapeutic Exercise

-Continued ballistic double leg skill re-education (Powers level 6)
-Plyometrics
-Ballistic single leg skill re-education continuation (Powers level 7)
-Cutting skill acquisition (Powers level 8)
-Footwork/agility drills
-Sprint work
-May begin integration into controlled drills/team practices **without** contact per MD approval- functional progression back into contact sports at 9-12 months per MD approval and after passing functional testing

Functional Testing

-Powers Functional Test (Appendix 4)
    -Step down, drop jump, lateral shuffle, deceleration, triple hop, run-cut

-Noyes Functional Test (Appendix 5)
    -Single, triple, cross-over, timed hop tests
    -Do not test until passed Powers Functional Test

Outcome Measures

Lower Extremity Functional Scale (Appendix 2)
ACL – Return to Sport Index (Appendix 3)

*Most patients do not pass on the first attempt of functional tests. If not passing, re-establish home exercise program to focus on areas of functional deficit. Then retest in 2-3 weeks.

*If passing scores are obtained during functional testing, recheck with surgeon for return to sport clearance.

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Appendix

1 Return to Run Program

2 Lower Extremity Functional Scale

3 ACL – Return to Sport Index

4 Powers Functional Test

5 Noyes Functional Test

APPENDIX 1: Return to Run Program

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Return to Run Program

-Run no more than every other day

-If pain is increased after a session, take TWO days off. Then repeat same session.
Do not advance to the next level until pain free.

-If weather is good, run outside over flat ground.
-If wintery conditions, run inside on treadmill.

Walk	Jog	Repeat	Total Time
4 min	1 min	6x	30 min
3 min	2 min	6x	30 min
2 min	3 min	6x	30 min
1 min	5 min	5x	30 min
1 min	7 min	4x	32 min
1 min	10 min	3x	33 min
0	30 min	1x	30 min

-After running: Ice for 10-15 minutes

APPENDIX 2: Lower Extremity Functional Scale

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Lower Extremity Functional Scale

Circle the number that corresponds to your ability to do the following activities during the PAST WEEK.

Extremely difficult or unable	Quite a bit of difficulty	Moderate difficulty	A little bit of difficulty	No difficulty
0	1	2	3	4

Usual work, housework, school activities	0	1	2	3	4
Usual hobbies, recreational/sporting activities	0	1	2	3	4
Rolling in bed	0	1	2	3	4
Getting into or out of the bath	0	1	2	3	4
Walking between rooms	0	1	2	3	4
Putting on shoes or socks	0	1	2	3	4
Squatting	0	1	2	3	4
Lifting an object, like a bag of groceries, from the floor	0	1	2	3	4
Performing light activities around home	0	1	2	3	4
Performing heavy activities around home	0	1	2	3	4
Getting into or out of a car	0	1	2	3	4
Walking 2 blocks	0	1	2	3	4
Walking a mile	0	1	2	3	4
Going up or down 10 stairs	0	1	2	3	4
Standing for one hour	0	1	2	3	4
Sitting for one hour	0	1	2	3	4
Running on even ground	0	1	2	3	4
Running on uneven ground	0	1	2	3	4
Making sharp turns while running fast	0	1	2	3	4
Hopping	0	1	2	3	4

Score _____

APPENDIX 3: ACL – Return to Sport Index

ACL Return to Sport Index

Circle the appropriate number for your response. Please complete all questions.

Not at all **Extremely**

1. **Are you confident that you can perform at your previous level of sport participation?**
   0 1 2 3 4 5 6 7 8 9 10
   Not at all Extremely

2. **Do you think you are likely to re-injury your knee by participating in your sport?**
   10 9 8 7 6 5 4 3 2 1 0

3. **Are you nervous about playing your sport?**
   10 9 8 7 6 5 4 3 2 1 0

4. **Are you confident that your knee will <u>not</u> give way by playing your sport?**
   0 1 2 3 4 5 6 7 8 9 10

5. **Are you confident that you could play your sport without concern for your knee?**
   0 1 2 3 4 5 6 7 8 9 10

6. **Do you find it frustrating to have to consider your knee with respect to your sport?**
   10 9 8 7 6 5 4 3 2 1 0

7. **Are you fearful of re-injuring your knee by playing your sport?**
   10 9 8 7 6 5 4 3 2 1 0

8. **Are you confident about your knee holding up under pressure?**
   0 1 2 3 4 5 6 7 8 9 10

9. **Are you afraid of accidentally injuring your knee by playing your sport?**
   10 9 8 7 6 5 4 3 2 1 0

10. **Do thoughts of having to go through surgery and rehabilitation again prevent you from playing your sport?**
    10 9 8 7 6 5 4 3 2 1 0

11. **Are you confident about your ability to perform well at your sport?**
    0 1 2 3 4 5 6 7 8 9 10

12. **Do you feel relaxed about playing your sport?**
    0 1 2 3 4 5 6 7 8 9 10

Raw SCORE_____/12 = _____

APPENDIX 4: Powers Functional Test

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Powers Functional Test

Patient sticker

-Give the patient verbal instructions. Example: *This is a step down test. Stand on the box on your surgical leg, bend your knee, and touch your opposite heel to the ground.*
-If desired, show the patient how to do the test.
-Allow for two practice attempts – surgical leg only.
-Complete each test twice. View once from an anterior vantage point and once from a lateral vantage point. Video if desired. Document biomechanical aptitudes or faults.
-Scoring: 2 = adequate / 1 = borderline / 0 = inadequate

	Anterior view			**Lateral view**	
	Hip Stability (Knee(s) aligned)	**Pelvis Stability** (Pelvis level)	**Trunk Stability** (Torso vertical)	**Shock Absorption** (Soft landings)	**Hip Strategy** (Hips down and back)
1 Step Down	0 1 2	0 1 2	0 1 2	----------	0 1 2
2 Drop Jump	0 1 2	----------	----------	0 1 2	0 1 2
3 Lateral Shuffle	0 1 2	----------	0 1 2	----------	0 1 2
4 Deceleration	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2
5 Triple Hop	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2
6 Run Cut	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2

Passing / low risk	45-50
Moderate risk	40-44
Substantial risk	<40

Score: _____/50

1 Patient stands on surgical limb on 6” box. Bends knee to touch opposite heel to floor.
2 Patient stands on 12” box. Jumps to ground, rebounds vertically, and lands.
3 In athletic stance, patient shuffles quickly sideways 4-5 times then rapidly changes direction. Go first toward surgical limb so that direction change takes place on affected extremity.
4 Run 4-6 steps forward, plant on surgical leg in single leg squat, then back pedal for 4-6 steps.
5 Patient completes three moderate to large forward hops on surgical limb.
6 Run 4-6 steps forward, plant on surgical leg in single leg squat, then cut 90 degrees and continue running forward.

APPENDIX 5: Noyes Functional Test

Criterion Based High Tibial Osteotomy Protocol: POSTOPERATIVE REHABILITATION

Noyes Functional Test

Patient sticker

-Give the patient verbal instructions. Example: *This is a single hop for distance. Jump from your left leg to your left leg as far as you possibly can. You must land in control for at least one full second before you put your other leg down*.
-If desired, show the patient how to do the test.
-Allow for two practice attempts on each leg.
-Measure three official trials alternating legs. Record the mean and the limb symmetry index. Give the patient ample rest between tests.
-The literature advocates for 85% limb symmetry index to demonstrate preparedness for return to sport (Reid et al 2007). A referring physician may subscribe to higher standards.

1. Single Hop

	Affected	Unaffected
1)	_____	_____
2)	_____	_____
3)	_____	_____
Mean	_____	_____

Limb Symmetry Index _____%

2. Triple Hop

	Affected	Unaffected
1)	_____	_____
2)	_____	_____
3)	_____	_____
Mean	_____	_____

_____%

3. Cross Over Triple Hop

	Affected	Unaffected
1)	_____	_____
2)	_____	_____
3)	_____	_____
Mean	_____	_____

_____%

2. Timed Six Meter Hop

	Affected	Unaffected
1)	_____	_____
2)	_____	_____
3)	_____	_____
Mean	_____	_____

_____%