

Meniscus Repair Rehabilitation Program Stable Repair

The Gundersen Sports Medicine Meniscus **Stable Repair** 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. **WB can be progressed to PWB/WBAT with brace locked starting at week 1 as long as the patient has full extension and can SLR without lag.** Individual variations will occur depending on surgical technique and the patient's response to treatment. **This program is outlined for mid body and posterior horn repairs of the meniscus** (for anterior horn repairs limit excessive extension initially).

If an **ACL Reconstruction and Meniscus Repair** are performed, limit ROM 0-90 for 2 weeks and then progress to full passively. No weightbearing flexion for 6 weeks. No squatting >90 for 4 months. Otherwise follow ACL protocol. Return to play will be 9-12 months.

Please contact us at 1-800-362-9567 ext. 58600 if you have questions or concerns.

Phase I: 0-6 weeks	Immediate post op protection phase
Goals	<ul style="list-style-type: none"> • Protect anatomic repair • Minimize knee joint effusion • Gently increase ROM, emphasis on extension • Encourage quadriceps function • Prevent negative effects of immobilization
ROM / Brace	<ul style="list-style-type: none"> • Wk 0-2: 0-90 deg • After 2 weeks, progress ROM as tolerated in NWB position with goal of full by 6-10 weeks but ideally ASAP. Knee flexion motion with WB should be discouraged until after 6 weeks. • Patient will use the post-op brace until wk 7-8.
WB	<ul style="list-style-type: none"> • wk 0-1: NWB with brace locked into extension • wk 1-6: WBAT brace locked in extension with assistive device as needed as long as extension is full and able to SLR.
Precautions / Guidelines	<ul style="list-style-type: none"> • Encourage AROM in NWB to promote healing, prevent atrophy of soft tissue and bone, and prevent a decrease in collagen content in the healing meniscus which occurs with immobilization. Early AROM does not affect the tensile properties of the meniscus. • Emphasis on regaining extension ROM ASAP as this is the most stable position for the meniscus and will decrease stress to the PF joint during ambulation. • No isolated resistance to knee flexion for 6 weeks secondary to the semimembranosus attachment to the medial meniscus / popliteus to the lateral meniscus. • Avoid twisting and pivoting motions for 10-12 weeks to minimize shear forces. • Avoid deep squatting (>90 deg) until 4-6 months
Modalities	<ul style="list-style-type: none"> • Cryotherapy 15 minutes in duration 3x/day • IFC for pain/effusion if needed • NMES quadriceps if needed

Phase I: 0- 6 weeks

Immediate post op protection phase

<p>Treatment Recommendations</p> <p>Guidelines for progression based on tolerance</p>	<ul style="list-style-type: none"> • Active warm-up • ROM: Gentle stretching to attain full extension and gradual return of flexion. Progress as tolerated. Emphasis on full return of knee extension ASAP. <ul style="list-style-type: none"> 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 • Scar tissue massage / tissue effleurage to decrease sensitivity • Flexibility exercises for hamstring, gastroc-soleus • Consider Personalized Blood Flow Restriction to decrease muscle atrophy • Therapeutic exercises. Gentle strengthening protecting the healing meniscus. Exercise in a pain-free manner. Encourage quadriceps activation. No isolated resisted knee flexion. Posterior chain extensibility exercises if indicated. <ul style="list-style-type: none"> Wk:1-3: QS, SLR <ul style="list-style-type: none"> Short arc 0-30 quadriceps Gastroc soleus strengthening NWB Hip strengthening: 4 way SLR, sidelye resisted ER Core stability exercises if desired <ul style="list-style-type: none"> Hollow holds, hollow holds with rotation, dead bugs, pallof Balance exercises with brace locked in extension: <ul style="list-style-type: none"> Weight shifts/ SLS, lateral step overs Only if adequate quad control • IFC for pain/effusion, NMES for quadriceps activation and control as needed

Phase II: 6-12 weeks	Strengthening and Neuro-muscular control phase
Goals	<ul style="list-style-type: none"> • Minimize knee joint effusion • Progress ROM as tolerated • Normalize gait pattern • Gradual progression of therapeutic exercises for stretching, neuro-muscular control, strengthening, and balance • Implement isolated hamstring strengthening.
ROM / Brace / Gait	<ul style="list-style-type: none"> • Unlock brace for ambulation if good quadriceps control, SLR. Work on normalizing gait pattern. • D/C brace at wk 7-8 • Progress ROM as tolerated with goal of full ROM by 8-10 weeks
Modalities	<ul style="list-style-type: none"> • Cryotherapy 15 minutes in duration 1-2x/day • IFC for pain/effusion / NMES quadriceps if needed
Precautions / Guidelines	<ul style="list-style-type: none"> • No WB stretching into flexion until 8 wks • Proximal control (core and hip) to prevent medial collapse/knee valgus • Correct asymmetrical loading patterns: off-set stance, uni-lateral load, 2:1 to single leg progression • Avoid twisting and pivoting motions for 10-12 wks to minimize shear forces. • Avoid deep squatting (> 90 degrees) until 4-6 months
Treatment Recommendations Guidelines for progression based on tolerance	<ul style="list-style-type: none"> • Active warm-up: Bike w/ resistance, wk 7-8: ER • Stretching for full extension and flexion Patellar mobilizations if needed wk 8: WB knee flexion stretch on leg press with light resistance • Flexibility: hamstring, gastoc-soleus, iliopsoas, quadriceps if indicated • Strengthening / N-M control / endurance 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 and N-M control). Incorporate total leg strengthening and balance / proprioception exercises. Core strengthening exercises CKC knee extension Hip strengthening CKC exercises: squat / lunge / hip hinge/dead lift progression step-ups/step-downs Quadriceps strengthening Hamstring OKC isotonics 0-90 deg in seated position with light resistance (15 reps/set initially) wk 9: prone hamstring curls wk 10: Isokinetic quadriceps / hamstrings VSRP 150-300 deg/sec submax to max, progressing to 90 deg/sec Total leg strengthening • Balance / Proprioception training: SLS progressing to dynamic and reactive activities. • Gait training • Core Strengthening

Phase III: 12+ wks	Advanced strengthening and Gradual Return to Activity
Goals	<ul style="list-style-type: none"> • Progress muscle strength and N-M control, endurance, balance activities. Ideally 3x/wk exercises at a fitness center, step-down, or home program • Progress to higher level activity depending on demands and MD/PT approval • Initiate a return to running program at 4 months if passes criteria and has no compensations with running pattern. • Initiate working on landing mechanics and agility drills at 4-5 months if passes criteria • Return back to vocational, recreational, and sport activities at 6-9 months if passes criteria. Sports progression may take 2-4 weeks for full clearance back to full competition
Brace	Your MD may recommend a knee sleeve or functional brace to be used until 12 months from your surgery for higher level activities
Modalities	• Cryotherapy 15 minutes 1x/day or after strenuous activity
Precautions/ Guidelines	<ul style="list-style-type: none"> • Correct asymmetrical loading patterns: off-set stance, uni-lateral load, RNT • Address fear avoidance behaviors with graded exercise progression, cuing, positive reinforcement, referral if necessary • No deep squatting until 4-6 months.
Treatment Recommendations <u>Return to Running Benchmarks:</u> 4 months Passes testing criteria - See next page <u>Return to Landing Drills Benchmarks:</u> 4 months Passes testing criteria - See next page <u>During Landing drills: Focus on:</u> 1. Soft landing with knee flexion > 30 deg 2. no medial collapse/knee valgus 3. no hip IR/ pelvic drop 4. Dynamic postural control	<ul style="list-style-type: none"> • Active warm-up: Bike, Elliptical Runner, Treadmill walking, • Continue with stretching and flexibility exercises as needed ○ Strengthening / N-M control / endurance exercises: Focus on strengthening and N-M control activities. Advance as tolerated with emphasis on functional strengthening. Avoid dynamic valgus during strengthening and functional activities. Progress with balance / proprioception exercises. Progress agility drills and working on landing mechanics. Progress to sports specific activities. <ul style="list-style-type: none"> Total leg strengthening: hip/quadriceps/hamstring Hip strengthening – neuromuscular control to prevent knee valgus Core strengthening – prevent frontal plane trunk lean during landing Single leg strengthening CKC exercises: lunge progression, squat progression, step-up/downs Hamstring full ROM isotonic. Add in physioball HS curls Quadriceps isotonic in ROM without chondrosis Isokinetic quads/hams 0-full flexion if minimal chondrosis Balance exercises: Single leg, progress to dynamic and reactive • Wk 12-14: if adequate strength scores (quads 75%, hamstrings 75%), add in sub-max foot placement drills, anterior lateral hop to stabilization, skaters to prepare for return to running at 4 months • 4 months: continue with strengthening and dynamic balance. Start running program. progress to the following exercises if clinical appropriate <ul style="list-style-type: none"> Landing drills: Low amplitude sub-max drills: <ul style="list-style-type: none"> Shallow jump landings, double to single line jumps, hopping progress to higher level if meets criteria (see sidebar) Agility drills: low amplitude sub-max drills: <ul style="list-style-type: none"> Skipping F/B, jogging F/B, skaters, carioca, agility ladder. • 5 months to 6 months: continue with strength and control drills related to sports specific movements. progress with: <ul style="list-style-type: none"> Landing drills/ jump hopping drills Agility drills: progress to higher level with speed and complexity: <ul style="list-style-type: none"> agility ladder drills, cutting/pivoting (changing directions), changing speeds, anticipated to un-anticipated • 6 months+: possible clearance for return to sport, depending on testing – see next page for testing algorithm

Meniscus Repair Rehabilitation Program Testing and Return to Running/Sports Recommendations

Return to running and return to play depends on:

- Timeframe from surgery
- Test performance
- MD and PT approval

Return to Running Benchmarks:

1. Time: at least 4 months post-op
2. MD / PT clearance
3. No knee joint effusion
4. ROM: limb symmetry: extension within 5 deg
flexion within 10 deg
5. Biodex:
Limb symmetry of PT:
Quad: 75%
Hams: 75%
6. Anterior lateral hop to stabilization drill completed with no apprehension and good movement control
7. Proper running form: treadmill running (sub-max at self selected speed)

Recommendations:

1. Biodex:
Quad PT/BW:
Males: 75%, 50% at 180,300deg/sec
Females: 65%, 35% at 180,300deg/sec
H/Q ratio: 65%, 90% at 180,300deg/sec
Total work at 300 deg/sec:
Quad: limb symmetry 75%
Hams: limb symmetry:75%
2. SL 60 deg stork test:
Limb symmetry: 90%
3. Hip Abduction Side Plank test:
Level II or greater
4. Squat WB symmetry with near equal WB
5. Y balance: Limb symmetry: < 4cm

Testing:

12 weeks (3 months)

SL 60 deg Stork test

Hip strength:

Abduction MMT or dynamometry

Hip Abduction Side plank test

Biodex test:

No block

2 speeds: 180 deg/sec (5 reps) 300 deg/sec (30 reps)

Y balance test

Deep squat WB symmetry: 2D video or force plate

FOTO

16 weeks (4 months) – RETURN to RUNNING –

See benchmarks

Repeat previous tests not passed

Anterior lateral hop to stabilization

Trial of running.

Landing assessment

Jump test: no arm swing – submax for apprehension/technique

Single Hop test: no arm swing- submax for apprehension/technique

Return to Landing Drills Benchmarks:

1. Time: at least 4 months

2. MD/ PT clearance

3. No knee joint effusion

4. Biodex: Limb symmetry of PT:

Quadriceps and hamstrings: 80-90% = sub-max landing drills

Quadriceps and hamstrings: 90% = max landing drills

*Minimize the following 4 variables with landing drills:

1. Stiff landing (<30 deg knee flexion)

2. Knee valgus

3. Hip IR / pelvic drop

4. Decreased dynamic balance

Meniscus Repair Rehabilitation Program Testing and Return to Running/Sports Recommendations

24 weeks (6 months)

Repeat previous tests not passed

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)

Landing assessment:

Jump test: no arm swing

Single Hop test: no arm swing

Triple hop/Cross over hop test: arm swing

Agility test: LEFT test components or time

FOTO

9 months/ 1 year / 2 years

Knee ROM

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)

Hip Strength:

MMT or hand held dynamometry

Abduction Side Plank test

Landing Assessment

Jump test

Single Hop test

Triple Hop test/Cross Over Hop: arm swing

Agility test: LEFT test components or time

FOTO

Return to running and return to play

depends on:

Timeframe from surgery

Test performance

MD and PT approval

Return to Play Benchmarks:

1. Time: at least 6-9 months
2. MD/ PT clearance
3. No knee joint effusion
4. ROM: limb symmetry: extension within 5 deg, flexion within 10 deg
5. Biodex: Limb symmetry of PT 90% quad and hams
6. Landing Assessment: no faulty movement patterns
7. Single Hop test: Limb symmetry: 90%,
8. Triple Hop test or Cross-Over Hop Test Limb symmetry: 90%
9. Agility Testing with no compensation

Recommendations:

1. Biodex:
 - a. *Quad PT/BW: (+/-5%)
 - i. Males: 95%, 75%, 50% at 60, 180, 300 deg/sec
 - ii. Females: 85%, 65%, 35% at 60,180,300 deg/sec
 - b. H/Q ratio: (+/- 5%)
 - i. 65%, 75%, 90% at 60, 180, 300 deg/sec
 - c. Hams PT/BW: (+/- 5%)
 - i. Males: 60%, 35%, 25% at 60, 180, 300 deg/sec
 - ii. Females: 60%, 35%, 25% at 60, 180, 300 deg/sec
 - d. Total work: 300 deg/sec
 - i. Quads: Limb symmetry:90%
 - ii. Hams: Limb symmetry: 90%
2. Hip HHD 90% ABD/ER/extension
3. Y balance: Limb symmetry: < 4cm
4. Jump test:
 - a. Males: 90%-100% height
 - b. Females: 80%-90% height
5. Single hop test:
 - a. Males: 80-90% height
 - b. Females: 70-80% height

Return-to-Sports Progression: (2-4 wk, depends on tolerance)

Step 1:

1-on-1 drills (non-contact) sport specific

Step 2:

1-on-1 drills (contact) full speed sport specific

Step 3:

Team scrimmage (non-contact)

Step 4:

Team scrimmage no restrictions

Step 5:

Game activities with restricted playing time

Step 6:

Game activities with no restrictions

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Meniscus Repair Program References

- Arnoczky SP, Warren RF: The microvascular of the meniscus and its response to injury. An experimental study in dogs. *Am J of Sports Med*, 1983; 11: 131-141.
- Barbar FA, Click SD: Meniscus Repair Rehabilitation With Concurrent Anterior Cruciate Reconstruction. *Arthroscopy*, 1997; 13(4): 433-437.
- Barber FA, Harding NR: Meniscal Repair Rehabilitation. *AAOS Instructional Course Lectures*, 2000; 49, 207-209.
- Buseck MS, Noyes FR: Arthroscopic evaluation of meniscal repairs After anterior cruciate ligament reconstruction and immediate motion. *Am J of Sports Med*, 1991; 19(50), 489-494.
- DeHaven KE: Basic science, indications for repair, and open repair. *Journal of Bone and Joint Surgery*, 1994; 76A(1), 140-152.
- DeHaven KE: Meniscus Repair. *Am J of Sports Med*, 1999; 27: 242-250.
- Davies GJ, Zillmer DA: Functional progression of exercise during rehabilitation in Knee Ligament Rehabilitation, *Ellenbecker*, 2000; 345-360.
- Dowdy PA, Miniaci A, Arnoczky SP, Fowler PJ, Boughner DR: The effect of cast immobilization on meniscal healing. An experimental study in the dog. *Am J of Sports Med*, 1995; 23(6) 721-728.
- Eggl S, Wegmuller H, Kosina J, Huckell C, Jakob RP: Long-term results of Arthroscopic meniscal repair. An analysis of isolated tears. *Am J of Sports Med*, 1995; 23(6): 715-720.
- Johnson MJ, Lucas GL, Dusek JK, Henning CE: Isolated Arthroscopic Meniscal Repair: A Long-Term Outcome Study (More Than 10 Years). *Am J of Sports Med*, 1999; 27(1): 44-49.
- Klein L, Player JS, Heiple KG: Isotopic evidence for resorption of soft tissues and bone in mmobilized dogs. *J Bone Joint Surg*, 1982; 64: 225-230.
- Mueller BT, Moulton SG, O'Brien L, Laprade RF. Rehabilitation Following Meniscal Root Repair: A Clinical Commentary. *JOSPT*, 2016; 46(2): 104-113.
- Mariani PP, Santori N, Adriani E, Mastantuono M: Accelerated Rehabilitation After Arthroscopic Meniscal Repair: A Clinical and Magnetic Resonance Imaging Evaluation. *Arthroscopy*, 1996; 12(6), 680-686.
- McCarty EC, Marx G, DeHaven KE: Meniscus Repair: Considerations in Treatment and Update of Clinical Results. *Clinical Orthopaedics and Related Research*, 2002; 1(402): 122-134.
- McClure PW, Blackburn LG, Dusold C. The use of splints in the treatment of joint stiffness: biological rational and algorithm f0r making clinical decisions. *Physical Therapy*, 1994; 74: 1101-1107.
- Mintzer CM, Richmond JC, Taylor J: Meniscal Repair in the Young Athlete. *American Journal of Sports Medicine*, 1998; 26:630-633.
- Morgan CD, Wojtys EM, Casscells CD, Casscells SW: Arthroscopic meniscus repair evaluated by second-look arthroscopy, *Am J Sports Med*, 1991; 19: 632-637.

Neitzel JA, Kernozek TW, Davies GJ: Loading response following anterior cruciate ligament reconstruction during the parallel squat exercises. *Clinical Biomechanics*, 2002; 17(7): 551-554.

Noyes FR, Heckmann TO, Barber-Westin SD: Meniscus Repair and Transplantation: A Comprehensive Update. *JOSPT*, 42(3): 274-291.

Sapega AA, Quedenfeld TC. Biophysical factors in range of motion exercises. *Physician and Sports Medicine*, 1981; 9, 57-65.

Shelbourne KD, Patel DV, Adsit WS, Porter DA: Rehabilitation after mensical repair. *Clinics in Sports Medicine*, 1996; 15(3), 595-612.

Tyler TF, Nicholas SJ, Seneviratne AM: Mensical Surgery Rehabilitation. In *Postsurgical Orthopedic Sports Rehabilitation of Shoulder and Knee*. Ed: Manske. 2006; 337-352.

Woodmass JM, LaPrade RF, Sgaglione NA, Nakamura N, Krych AJ. Current Concept Review: Meniscus Repair. *J Bone Joint Surg AM*. 2017; 99: 1222-1231