

Meniscal Allograft Transplantation

Physical Therapy Protocol · Medial or Lateral Meniscal Allograft (Bone-Plug / Bridge-in-Slot)

Based on the Sanford Orthopedics & Sports Medicine meniscal allograft transplantation rehabilitation guideline and the Rush University Medical Center (Brian J. Cole, MD) MAT protocol, with progression principles from the 2024 EU-US Meniscus Rehabilitation Consensus (ESSKA-AOSSM-AASPT).



AT A GLANCE

TIMELINE	9-12 months total; slowest of the meniscus procedures - allograft incorporation drives early restrictions
WEIGHT BEARING	NWB/heel-touch weeks 0-6 in brace locked in extension; advance ~25% per week to full by weeks 8-9
KEY MILESTONES	Flexion 90° by week 4, 120° by week 6; brace discontinued ~weeks 8-12 with normalized gait
RETURN TO ACTIVITY	Straight-line running not before 24 weeks; jumping ~6-7 months; cutting/pivoting sport 8-9+ months with testing and clearance

KEY PRECAUTIONS

- No weight bearing in flexion >90° and no tibial rotation under load for the first 8 weeks - both stress the graft and bony fixation.
- Do not force or stretch into hyperextension for the first 6 weeks; no active/resisted hamstring work for the first 12 weeks.
- Closed-chain depth capped at 0-60° through week 12 and ~0-70° through week 24; avoid dynamic valgus and pivoting throughout the first 6 months.
- Swimming permitted after wound healing but no flutter kick (straight-knee activity only) during protected phases.

PHASED REHABILITATION

PHASE 1 – MAXIMUM PROTECTION		Weeks 0-6
GOALS	- Protect the allograft and bony fixation - Full passive extension immediately; flexion to 90° by week 4 and 120° by week 6 - Re-establish quadriceps activation; control pain and effusion	
INTERVENTIONS	- NWB to heel-touch weight bearing with crutches; hinged brace locked in extension for ambulation (unlocked for exercise per surgeon) - PROM/AAROM within limits: extension to 0°, flexion 45° by week 3, 90° by week 4, 120° by week 6; no forced hyperextension - Quad sets, 4-way SLR with brace until no extension lag, ankle pumps - Patellar and tibiofemoral joint mobilizations; scar management once healed - NMES to quadriceps for activation deficits; cryotherapy and elevation for effusion - Hip and core strengthening in non-weight-bearing positions (clamshells, side-lying abduction, prone hip extension)	
CRITERIA TO ADVANCE	- Full passive extension; flexion ≥120° by end of phase - SLR without extension lag - Effusion trace or less; incisions healed - Surgeon clearance to begin weight-bearing progression	

PHASE 2 – PROGRESSIVE WEIGHT BEARING & MOTION		Weeks 6-12
GOALS	- Progress to full weight bearing (~25% per week) with normalized gait; wean brace by weeks 8-12 - Restore full symmetrical ROM - Initiate protected closed-chain strengthening (0-60°)	
INTERVENTIONS	- Progressive weight bearing to full by weeks 8-9; gait training and crutch/brace wean as quad control allows - Closed-chain work limited to 0-60°: weight shifts, mini-squats, leg press in range, wall sits - Light resisted open-chain knee extension; hip strengthening progression - Single-leg stance and balance/proprioception training - Stationary cycling for ROM and conditioning (~week 8-12 as ROM allows) - No weight-bearing flexion >90°, no tibial rotation under load through week 8; no resisted hamstring work	
CRITERIA TO ADVANCE	- Full weight bearing with normalized, device-free gait - Full, symmetrical, pain-free ROM - Effusion trace or less without reactive swelling after exercise - Good control of single-leg stance without extension lag	

PHASE 3 – STRENGTHENING & NEUROMUSCULAR CONTROL		Weeks 12-24
GOALS	- Progressive lower-extremity strength with eccentric control (squat depth $\leq 60\text{-}70^\circ$) - Quadriceps and hamstring LSI $\geq 80\%$ - Tolerate sustained low-impact conditioning	
INTERVENTIONS	- Squat progression, lateral step-downs, lunges, leg press within protected depth - Initiate resisted hamstring strengthening after week 12 - Elliptical (~week 16) and stair climber; continued stationary cycling; pool program without flutter kick until cleared - Single-leg strength work: split squats, step-ups, Romanian deadlift progression - Balance/perturbation training and movement-quality drills; avoid rotational loading and dynamic valgus - Strength testing (isometric or isokinetic) at ~4-6 months to guide impact readiness	
CRITERIA TO ADVANCE	- Quadriceps and hamstring LSI $\geq 80\%$ - Pain-free ADLs and low-impact cardio ≥ 30 minutes without effusion - Proper single-leg squat mechanics without valgus collapse	

PHASE 4 – IMPACT PROGRESSION & RETURN TO ACTIVITY		Months 6-9+
GOALS	- Graded return to impact: running, then jumping, then cutting - Strength and hop-test LSI $\geq 90\%$ before sport-specific participation	
INTERVENTIONS	- Straight-line walk-jog progression at 24+ weeks with physician approval and strength criteria met - Double-leg jumping and agility drills ~6 months; single-leg hopping ~7 months; cutting/pivoting drills ~8 months - Continued progressive resistance training toward full-depth, pain-free squatting per surgeon - Sport-specific conditioning; return-to-sport test battery (strength, hop, balance) before release to pivoting sports	
CRITERIA TO ADVANCE	- Strength deficit $<10\%$; hop and balance test LSI $\geq 90\%$ - No effusion or joint-line pain with impact progression - Physician clearance; many surgeons counsel toward low-impact activity long-term after MAT	

GUIDING PRINCIPLES

This protocol follows criterion-based progression over rigid time-based advancement; phased rehabilitation balancing tissue healing with controlled stress application; objective milestones (ROM, strength LSI, functional testing) to guide phase transitions; individualization based on surgical findings, tissue quality, and patient factors; and ongoing surgeon–therapist communication throughout recovery.

REFERENCES

- Sanford Orthopedics & Sports Medicine. Meniscal Allograft Transplantation Rehabilitation Guideline. https://www.sanfordhealth.org/-/media/org/files/medical-services/physical-therapy/014000-01468-flyer-sosm-meniscal-allograft-transplantation-rehab-guideline-8_5x11.pdf
- Cole BJ (Rush University Medical Center). Meniscal Allograft Transplantation Rehabilitation Protocol. <https://www.briancolemd.com/wp-content/themes/ypo-theme/pdf/meniscal-allograft-transplantation-knee-post-op.pdf>
- Pujol N, Giordano AO, Wong SE, et al. The Formal EU-US Meniscus Rehabilitation 2024 Consensus (ESSKA-AOSSM-AASPT). Part I - Rehabilitation Management After Meniscus Surgery. *Knee Surg Sports Traumatol Arthrosc*. 2025.
- Monson JK, Tollefson LV, LaPrade CM, LaPrade RF. Current Rehabilitation Principles Following Meniscus Repairs. *Curr Rev Musculoskelet Med*. 2025;18(9):331-343.

For clinical use by licensed physical therapists treating patients of Robert Pettit, MD. This document is a rehabilitation guideline, not a substitute for clinical judgment. Progression must be individualized based on intraoperative findings, tissue quality, and patient response. Scan the QR code for the current version of this protocol.