POST-OPERATIVE MENISCAL TRANSPLANT PROTOCOL
Mr Mathias Nagy, Specialist Knee Surgeon
Scarborough & Bridlington

Ensure patient achieves milestone prior to progression.

PHASE 1: <u>Post meniscal transplant surgery</u>. Day 1 to 2 weeks post-op

Goal	Treatment	Milestones to Progress
Protection	• Cricket pad splint to be worn at all times when mobilizing and for sleeping • Use of crutches **TOUCH WB ONLY**	• Ensure patient has attended first post-operative clinic review (at 2 weeks post-op)
Minimise swelling and pain	• Use of ice or Game Ready if available • Elevate leg • Ensure adequate pain relief	
Prevent post-operative complications	• Circulatory exercises	
Maintain muscle strength	• Regular static quads • SLR if able	

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PHASE 2: <u>Post meniscal transplant surgery</u>. Weeks 2-6 post-op.

Goal	Treatment	Milestone to Progress
Minimise swelling and pain	• Use of ice • Ensure adequate pain relief • Elevate leg • Use of crutches – **must remain PWB until 6 week clinic review** • **Use of hinged knee brace until 6 week clinic review**	• Minimal or no effusion • Full extension/hyperextension • 90° knee flexion • SLR with no lag (10 reps) • Normal, symmetrical gait pattern with crutches • Ensure patient has attended 6 week post-operative clinic review
Regain full range of extension/hyperextension (compare to non-operative knee)	• Extension exercises: static quads, heel props, prone hanging • Passive stretching	
Increase knee flexion as pain allows to 90°	• Active flexion exercises • Passive flexion over edge of bed • Patella mobilisations • **Ensure no flexion past 90°**	
Improve quads control and lower limb strength	• Static quads, SLRs. **Ensure patient can SLR with no lag** • Co-contraction quads and hams • Hamstring curls (no weight & under 90°) • Gluteal strengthening	
Ensure flexibility	• Hamstring and calf stretches	
Restoration of normal gait pattern	• Gait re-education with elbow crutches, PWB in hinged knee brace	

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PHASE 3: Must have achieved phase 2 milestones. Weeks 6-12 post-op.

Goal	Treatment	Milestone to Progress
Minimise swelling and pain (ensure no swelling before progression) Prevent anterior knee pain	• Continue as above, as necessary	• No effusion • Full range of extension • Normal gait pattern without crutches • Full range of NWB flexion • Single leg stand eyes shut at least 5 seconds • Bilateral squat with even, symmetrical weight bearing • 10 x single leg squats to 60° with good biomechanical alignment and control (i.e. no valgus and good hip/knee/ankle alignment)
Regain/maintain full range of extension/hyperextension (compare to non-operative knee)	• Extension exercises as above • Passive stretching	
Restoration of normal gait pattern	• Ensure FWB, wean off crutches and brace	
Regain full range of flexion	• Active flexion exercises past 90° non-weight bearing • Progress to full quads stretch • **No WB flexion past 90°**	
Improve quads, hamstring and general lower limb strength	• CKC – wall slide squats with gym ball, squats, leg press, single leg small knee bends etc. **Ensure no flexion past 90°** • Hamstring curls, bridging • Calf raises, gluteal strengthening	
Increase aerobic capacity	• Exs bike • Treadmill walking • Step ups • Cross trainer • Rower • Pool exercise	
Improve proprioception	• Single leg stand eyes open/eyes closed • Wobble board • BOSU • Sitfit • Trampette	
Neuromuscular control	• Core stability work • Knee alignment/prevent valgus – squats, lunges, step ups, single leg squats (ensure good hip/knee/ankle alignment)	

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PHASE 4: Upon achievement of phase 3 goals. Over 12 weeks post-op.

Goal	Treatment	Milestone to progress
Control activity related swelling and pain	• Use of cryotherapy post exercise if knee swells with increased activity	• No activity related effusion • Full ROM • Normal gait and stair pattern – good alignment and control • 10 x single leg squats to 60° with good biomechanical alignment and control (i.e. no valgus and good hip/knee/ankle alignment) • Normal straight line running pattern • Single leg press >75% body weight
Regain/maintain full range of movement	• Continue stretches	
Normalise gait and stair pattern	• Treadmill walking – forward/backward/incline	
Improve quads, hamstring, and general lower limb strength	• Continue CKC & OKC – double & single leg press, squats, lunges, increase weight • Hamstring curls – double & single leg, increase weight • Calf, gluteals, adductor strengthening	
Increase aerobic capacity	• Exs bike • Treadmill walking • Step ups • Cross trainer • Rower • Pool walking/running • Running (when good control)	
Improve proprioception	• Single leg stand eyes closed • Wobble board • BOSU • Sitfit • Trampette • Progress to dynamic proprioception	
Neuromuscular control	• Core stability work • Knee alignment/prevent valgus as above – add trunk rotation	
Commence load acceptance/plyometrics	• Jumps with symmetrical squat landing • Progress to straight line jogging when good load acceptance • Squat jumps, forward/ back/ rotational • Bilateral plyometric static and multi-plane exs	

	• Single leg hop with controlled landing • Forward, side hops/ drops from step with controlled single leg landing • Unilateral plyometric static and multi plane activities • Progress above by increasing speed/intensity to fatigue	
Normal straight line running pattern without pain and in full control	• Progress from jogging to running • Increase speed/distance • Change surface/incline • Forward running/backward running	

RETURN TO DRIVING: Patient must be fully weight bearing and have the ability & strength to perform an emergency stop

RETURN TO SPORT: return to full contact sports and sports involving pivoting and cutting is not recommended. Patients can return to some running, strength training and gentle sports such as badminton once appropriately rehabilitated

References:

Cvetanovich, G. L., Christian, D. R., Garcia, G. H., Liu, J. N., Redondo, M. L., Yanke, A. B., & Cole, B. J. (2020). Return to sport and patient satisfaction after meniscal allograft transplantation. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, *36*(9), 2456-2463.

Getgood, A., LaPrade, R. F., Verdonk, P., Gersoff, W., Cole, B., Spalding, T., & IMREF Group. (2017). International Meniscus Reconstruction Experts Forum (IMREF) 2015 consensus statement on the practice of meniscal allograft transplantation. *The American journal of sports medicine*, *45*(5), 1195-1205.

Grassi, A., Macchiarola, L., Lucidi, G. A., Coco, V., Romandini, I., Filardo, G., ... & Zaffagnini, S. (2020). Long-term outcomes and survivorship of fresh-frozen meniscal allograft transplant with soft tissue fixation: minimum 10-year follow-up study. *The American Journal of Sports Medicine*, *48*(10), 2360-2369.

Hurley, E. T., Davey, M. S., Jamal, M. S., Manjunath, A. K., Kingery, M. T., Alaia, M. J., & Strauss, E. J. (2020). High rate of return-to-play following meniscal allograft transplantation. *Knee Surgery, Sports Traumatology, Arthroscopy*, 1-8.

Koch, M., Memmel, C., Zeman, F., Pfeifer, C. G., Zellner, J., Angele, P., ... & Krutsch, W. (2020). Early functional rehabilitation after meniscus surgery: Are currently used orthopedic rehabilitation standards up to date?. *Rehabilitation research and practice*, *2020*.

Lee, B. S., Kim, H. J., Lee, C. R., Bin, S. I., Lee, D. H., Kim, N. J., & Kim, C. W. (2018). Clinical outcomes of meniscal allograft transplantation with or without other procedures: a systematic review and meta-analysis. *The American journal of sports medicine*, *46*(12), 3047-3056.

Rucinski, K., Cook, J. L., Crecelius, C. R., Stucky, R., & Stannard, J. P. (2019). Effects of compliance with procedure-specific postoperative rehabilitation protocols on initial outcomes after osteochondral and meniscal allograft transplantation in the knee. *Orthopaedic journal of sports medicine*, *7*(11), 2325967119884291.

Smoak, J. B., Matthews, J. R., Vinod, A. V., Kluczynski, M. A., & Bisson, L. J. (2020). An up-to-date review of the meniscus literature: a systematic summary of systematic reviews and meta-analyses. *Orthopaedic journal of sports medicine*, *8*(9), 2325967120950306.

Southworth, T. M., Naveen, N. B., Tauro, T. M., Chahla, J., & Cole, B. J. (2020). Meniscal allograft transplants. *Clinics in sports medicine*, *39*(1), 93-123.

Young, J., Tudor, F., Mahmoud, A., & Myers, P. (2017). Meniscal transplantation: procedures, outcomes, and rehabilitation. *Orthopedic research and reviews*, *9*, 35.