ACL Reconstruction Protocol (Hamstring Graft)

Week one	Week two
Initial Evaluation	**Evaluate**
➢ Range of motion ➢ Joint hemarthrosis ➢ Ability to contract quad/vmo ➢ Gait (generally WBAT in brace) ➢ Patella Mobility ➢ Inspect for infection/signs of DVT ➢ Assess RTW and sport expectations	➢ Range of Motion ➢ Joint Hemarthrosis ➢ Ability to contract quad/vmo ➢ Signs of infection or DVT ➢ Patella mobility
Patient Education	**Patient Education**
➢ Support Physician prescribed meds ➢ Ensure compliance w/ pre-op hep ➢ Reinforce use of brace and assistive device ➢ Restate surgical precautions (No open chain knee extension) (Hold resisted hamstring curl 4-6 weeks) ➢ Discuss frequency and duration of treatment (2-3x/wk is expected for the first 8 weeks, followed by intermittent appointments over another 6-8 weeks)	➢ Reassess crutch use; May use single crutch if appropriate ➢ Brace may be opened to 10 degrees less than the patients pain free ROM if good quad contraction ➢ Reinforce precautions
Therapeutic Exercise	**Therapeutic Exercise**
➢ Review and update pre-op hep (heel slides, ankle pumps, quad sets, towel stretch) ➢ May complete AROM and Isometrics within surgical precautions ➢ Should include early weight shifting and proprioception	➢ Initiate bicycle (do not force flexion) ➢ Begin closed chain exercises ➢ May complete pain free isotonic exercises in limited ROM (total gym, leg press, multi-hip) ➢ No hamstring curl yet
Manual Techniques	**Manual Techniques**
➢ Grade I and II patella mobilizations ➢ PROM as tolerated (focus on extension)	➢ Grade III-IV patella mobilization (if needed) ➢ Posterior capsule mobilization (if needed) ➢ Incision mobilization
Modalities	**Modalities**
➢ NMES / Interferential/Biofeedback ➢ Ice	➢ Modalities may be used as needed
Aquatics	**Aquatics**
➢ Defer until appropriate wound healing or clearance from MD	➢ Gait: forwards/backwards, side stepping ➢ Shallow end: closed chain (supported squats, standing iliopsoas, quadriceps, and gastrocnemius stretching, calf raises, terminal knee ext) ➢ Balance: Feet together, tandem, SLS ➢ Deep end: open chain (mini-bicycles, hip abduction, skiers with barbells), consider focus on duration versus repetitions ➢ Avoid hamstring curls
Goals	**Goals**
➢ Gain full knee extension ➢ Control pain ➢ Gain full knee extension ➢ Reduce joint hemarthrosis ➢ Restore voluntary quad contraction ➢ Independence with post-op precautions ➢ 0-80 degrees ROM	➢ Gain full knee extension ➢ Reduce joint hemarthrosis ➢ Restore voluntary quad contraction ➢ Prevent excessive soft tissue scarring ➢ 0-100 degrees ROM

Week Three	Weeks Four to six
Evaluate	**Evaluate**
➢ Gait and brace needs ➢ Quad Contraction ➢ ROM ➢ Balance	➢ Patella position and related symptoms ➢ ROM ➢ Joint laxity ➢ Gait ➢ HEP compliance
Patient Education	**Patient Education**
➢ D/C brace if good quad contraction ➢ May need single axillary crutch to normalize gait	➢ Wean from crutches
Therapeutic Exercise	**Therapeutic Exercise**
➢ Closed chain exercises for quad contraction and proprioception ➢ Begin active hamstring no resistance ➢ Isotonic activity ➢ Single leg stance ➢ Bilateral dynamic balance activity	➢ Single leg isotonic exercises ➢ Begin resisted hamstring activity if asymptomatic at graft site and physician in agreement ➢ Progress to closed chain exercises on unstable surfaces ➢ Single leg balance activity
Manual Techniques	**Manual Techniques**
➢ Patella mobilizations (if needed) ➢ PROM and posterior capsule stretch as indicated	➢ Patella mobilizations (if needed) ➢ PROM and posterior capsule stretch as indicated
Modalities	**Modalities**
➢ Any as Indicated	➢ Any as Indicated
Aquatics	**Aquatics**
➢ Gait: forwards/backwards, side stepping, add fins for resistance ➢ Shallow end: closed chain; continue previous, (unsupported squats, static lunging in single plane, step ups) ➢ Open Chain (hamstring curls no resistance) ➢ Balance: SLS with perturbations (kick board, ball toss) ➢ Deep end: open chain (bicycles, hip abduction, skiers, knee to chest with barbells), add fins for resistance	➢ Gait: forwards/backwards, side stepping, add fins for resistance ➢ Shallow end: closed chain; continue previous (diagonal or dynamic lunges, lateral step downs) and open chain (hamstring curl with fins) ➢ Balance: continue SLS activities ➢ Deep end: open chain (add running supine/prone/upright with barbells) add fins for resistance and closed chain (squats on barbells)
Goals	**Goals**
➢ Gait with single axillary crutch ➢ Continue to reduce any localized hemarthrosis ➢ Restore voluntary muscle control ➢ Single leg stance with eyes closed for at least 10 seconds ➢ 0-120 degrees ROM	➢ FWB without brace or assistive device if good quad control and physician in agreement ➢ No pain with ADL's ➢ Quad strength at least 4-/5 ➢ Normal ROM

Weeks six to twelve	Weeks twelve to discharge
Evaluate	**Evaluate**
➢ Patella mobility / crepitus ➢ Excessive joint laxity ➢ Balance / single leg stance ➢ HEP compliance ➢ Assess foot and ankle for biomechanical optimization	➢ Any excessive joint laxity ➢ Isokinetic Strength test and/or functional hop testing for comparison to be completed per physician preference at 14 weeks ➢ Address any deficits that may limit return to work or sport goals ➢ HEP compliance
Therapeutic Exercise	**Therapeutic Exercise**
➢ Progress Isotonic strength training to include movement in multiple planes ➢ Progress balance activity to single leg dynamic activity and unstable surfaces at 8 weeks ➢ Begin Cardiovascular training at 10 weeks (bike, swim and elliptical) ➢ May begin ACL group in CFA at 8 weeks (with physician approval)	➢ Sports specific exercises ➢ Encourage participation in the CFA ➢ Complete agility and running activity with good test results and physician approval at 14 weeks ➢ May begin bilateral low level plyometrics with good test results and physician approval at 14 weeks
Aquatics	**Aquatics**
➢ Continue with previous exercises for strength deficits or continued edema ➢ Initiate plyometrics ➢ Likely transition to land therapy at week 8	➢ Continue with previous exercises for strength deficits or continued edema
Goals	**Goals**
➢ 4+/5 strength with manual testing by week eight ➢ Good stability across tibiofemoral joint particularly with single leg balance and control of terminal knee extension ➢ May complete exercise independently with intermittent follow up appointments when above criteria is met (Typically 8 weeks)	➢ Strength of quadriceps and hamstrings no less than 85% per isokinetic test at 14 weeks ➢ Functional hop test for time and distance at 85% or greater at 14 weeks if applicable ➢ Discharge with full return to work or sport activity

Precautions and related issues
Following hamstring graft surgery there is an increased risk of hamstring strain. For this reason, resisted hamstring curl should be held until 4-6 weeks post-op, and close attention should be paid to hamstring related symptoms through out the rehab process. Gaining full knee extension early in the rehab process is crucial to prevent graft site adhesion. Also, ACL reconstruction may be done in conjunction with other surgery or injury often slowing the rehab process. Some of the typical concerns are listed below.
Meniscectomy
➢ No modification required
Meniscal Repair
➢ No combined weight bearing and flexion, or flexion beyond 90 degrees for at least 4 weeks
Micro fracture
➢ NWB typically four weeks, and PWB for two weeks
MCL injury
➢ May need to use brace during exercise (Clarify with surgeon on a case by case basis) ➢ May want to consider completing exercises with slight tibial IR to decrease stress on MCL ➢ May limit motion to the sagittal plane for 4-6 weeks
PCL injury
➢ Follow PCL protocol as it will be a slower rehab than ACL
Chondromalacia
➢ Typically our physicians will give us insight into the location and severity of chondromalacia (grades I to IV) ➢ The location of chondromalacia often provides insight regarding faulty posture and biomechanics. ➢ Both location and severity should be considered when designing treatment programs
Chondroplasty
➢ No modification required ➢ Consider unloading brace for return to activity if limited by pain

References:

- Melick et al. (2016). Evidence-based clinical practice update: practice guidelines for anterior cruciate ligament rehabilitation based on a systematic review and multidisciplinary consensus. *Br J Sports Med.* 50(24): 1506-1515.
- Risberg, M. A, Lewek, M., Synder-Mackler, L. (2004). A systematic review of evidence for anterior cruciate ligament rehabilitation: how much and what type? *Physical Therapy in Sport*, 5(3): 125-145.
- Villalta, E. M., Peiris, C. L. (2013). Early aquatic physical therapy improves function and does not increase risk of wound-related adverse events for adults after orthopedic surgery: a systematic review and meta-analysis. *Arch Phys Med Rehabil*, 94(1): 138–148.
- Wilk, K. E. et al. (2012). Recent Advances in the Rehabilitation of Anterior Cruciate Ligament Injuries. *Journal of Orthopaedic & Sports Physical Therapy*, 42(3): 153–171.
- Zamariloi, A., Pezolato, A., Evandro, M., Shimano, A. (2008). The significance of water rehabilitation in patients with anterior cruciate ligament reconstruction. *Physiotherapy*, 16(2): 3-6.

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