WENTWORTH-DOUGLASS HOSPITAL
MASSACHUSETTS GENERAL HOSPITAL SUBSIDIARY

**Quadriceps tendon autograft anterior cruciate ligament reconstruction with independent suture tape reinforcement**

Physician Specific Notes:
Mark Cullen, MD

1st Rehab post-op visit 1 week following surgery. He will be scheduling surgeries on Wednesday or Thursday then the physician's first post-op follow up will be Monday. He would like a PT visit scheduled prior to surgery for the education of expectations. He likes PT to be 1 x / week initially, utilizing visits for later in rehab.

The physician's office will provide CPM. CPM 0-30° for 1st week. Increase 5° every other day. If multiple ligaments involved CPM initiated 2 weeks postoperatively.

NMES: If a patient is slow to recruit quadriceps, NMES utilized 1st and 2nd week. Home units may be suggested. Athletes may use NMES combined with exercise. It is suggested in EBP that it may be more effective than exercise alone in improving quadriceps strength. [1]

Refer to surgeon:

- Lacking full knee extension by week 4
- Post-op joint effusion or hematoma is inhibiting VMO contraction and/or limiting knee extension
- Mechanical block or clunk

Brace and Gait Training:

- TTWB with hinge brace locked in full extension until first Rehab post-op visit.
- Brace locked at 0 degrees post-op, then 0-90. Ambulate with 2 crutches, progress to 1 then none with the hinged brace, but not prior to 3 weeks post-op.
- Criteria to discharge AD: full active knee extension. Demonstrates pain free ambulation without visible gait deviations, strong quad isometric (2x10 SLR without lag).

Recommendations/Considerations:

- Knee extension needs to be pushed immediately. Without full knee extension the graft may hypertrophy and prevent end range extension. [2]
- No testing of repaired or reconstructed ligaments (Lachman, Anterior/Posterior Drawer, Varus/Valgus Stress) prior to 12 WEEKS post-operative

Meniscus Repair:

- No forced flexion ROM beyond 90 x 4 weeks
- No closed kinetic chain exercises >90° x 8 weeks
- PWBing x 4 weeks for concomitant root, radial, and/or horizontal cleavage meniscus repairs only. All other types of meniscus repairs will be FWBing

| | |
|---|---|
| **Phase I Weeks 0-4** | Goal: restore ROM with emphasis on early extension, minimize effusion and pain, quad activation, active dynamic gait pattern<br><br>● Upright bike partial revolution<br>● Patellar mobilization: superior/inferior > medial/lateral<br>● Range of Motion<br>  ● Extension: emphasis on extension. Expectation is in full extension no later than 4 week. Use of propping at home for low load long duration.<br>  ● Flexion: ACL and meniscectomy push for symmetrical flexion as appropriate<br>  ● No forced flexion past 90° for all meniscus repairs.<br>  ● ACL and meniscectomy are able to push for symmetrical flexion as appropriate<br>● Strengthening: quad activation<br>  ● initiate isometric quadriceps exercise in first week of rehabilitation<br>  ● NMES during the first postoperative week if the patient is unable to produce voluntary contraction of the quadriceps muscles.[5]<br>  ● OKC can be initiated with low load and high reps<br>  ● Concentric CKC can be performed from week 2 post operative. Initiate standing TKE, performed if no increased pain and/or swelling.[5]<br>  ● progress eccentric CKC when quadriceps is reactivated, provided that the knee does not react with effusion or an increase in pain<br>● Suggested Exercise: quad set, heel side, SLR, hip 4 way in brace, weight shift, standing and/or supine TKE, hamstring curl, calf raises. Neuromuscular training: Training on 2 legs wobble board, forward and back only gradually increasing difficulty by adding perturbations, adding throwing ball, or training on one leg.<br><br>Criteria to start phase II<br>● Closed wound, minimal effusion<br>● No knee pain with phase 1 exercises<br>● Normal patellofemoral joint mobility<br>● Range of motion: 0-120<br>● Volitional control of quadriceps<br>● Active dynamic gait pattern without crutches. |
| **Phase II Weeks 4-8** | Goal: ROM, increase strength and normalize gait mechanics<br><br>Therapeutic Exercise:<br>● Increased CKC quadriceps exercises in full ROM<br>● Multi-angle knee isometrics from 90-60$^{0}$ Initiate open chain knee extension exercises<br>● Progress WB quadriceps exercise with emphasis on proper LE mechanics<br>● Glut, lumbopelvic strength and stability<br>● Progress single leg balance<br>Endurance:<br>● low impact - treadmill walking, stepper, elliptical (6 weeks),upright bike partial to full ROM |

| | |
|---|---|
| | **Criteria for progression to Phase III:**<br>● 10 SLR without quad lag<br>● Normal gait<br>● 10 heel taps, stance leg to 60 degrees<br>● Full ROM, pain free AROM including PF mobility<br>● Minimal effusion post exercise |
| **Phase III Weeks 8-12** | **Goals:** Full ROM, restore muscle strength and balance, and enhancing neuromuscular control<br>1-2 visits per week with emphasis on patient compliance with resistance training as part of HEP (2-3 days per week outside of therapy).<br><br>Suggested therapeutic exercise:<br>● Multiangle knee isometric from 90-0 (wall slides)<br>● Hamstring strengthening: SL RDL, nordic hamstring<br>● Manual Therapy: Any manual therapy techniques as needed |
| **Phase IV** | **Goals:** strength, power, endurance, progression of functional activities<br>Jog at 4 months if good quad<br>5 months plyometrics and sport metrics program<br>9 months return to sport |
| **Phase VI** | Considerations<br>● Return to treadmill running not before 4 months<br>● Adolescence involved in pivoting sports, return to sport 9 months<br>● No Olympic type squats for 4 months<br>● Running 4-5 months post op straight forward<br>● Return to sport with appropriate parameters 9months<br>Milestones:<br>● 4-5 months Quad strength at least 70%- straight line running<br>● 5 months 1 legged or 2 legged hop test<br>● Functional timeline not just the calendar timeline<br>● 8-9 months return to sport<br>● 8 months at the earliest!<br>● Difference between “starting to play” and “really playing”<br>● Goals: Anticipate gains for up to 1 year |
| | |

**References:**

Beischer S, Gustavsson L, Senorski EH, et al. Young Athletes Who Return to Sport Before 9 Months After Anterior Cruciate Ligament Reconstruction Have a Rate of New Injury 7 Times That of Those Who Delay Return. *J Orthop Sports Phys Ther*. 2020;50(2):83-90. doi:10.2519/jospt.2020.9071

Hunnicutt JL, Gregory CM, McLeod MM, Woolf SK, Chapin RW, Slone HS. Quadriceps Recovery After Anterior Cruciate Ligament Reconstruction With Quadriceps Tendon Versus Patellar Tendon Autografts. *Orthop J Sports Med*. 2019;7(4):2325967119839786. Published 2019 Apr 24. doi:10.1177/2325967119839786

Hunnicutt JL, Slone HS, Xerogeanes JW. Implications for Early Postoperative Care After Quadriceps Tendon Autograft for Anterior Cruciate Ligament Reconstruction: A Technical Note. *J Athl Train*. 2020;55(6):623-627. doi:10.4085/1062-6050-172-19

Logerstedt DS, Scalzitti D, Risberg MA, et al. Knee Stability and Movement Coordination Impairments: Knee Ligament Sprain Revision 2017. *J Orthop Sports Phys Ther*. 2017;47(11):A1-A47. doi:10.2519/jospt.2017.0303

van Melick N, van Cingel RE, Brooijmans F, et al. Evidence-based clinical practice update: practice guidelines for anterior cruciate ligament rehabilitation based on a systematic review and multidisciplinary consensus. *Br J Sports Med*. 2016;50(24):1506-1515. doi:10.1136/bjsports-2015-095898