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ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION POST-OPERATIVE REHABILITATION PROTOCOL

Hamstring 4 Stranded Autograft

PHASE I-EARLY FUNCTIONAL (WEEKS 1-2)

Goals:

1. Educate regarding the proper use of continuous passive motion (CPM) machine and home exercise and program (HEP).
2. Decrease pain and effusion.
3. Educate re: the importance of icing.
4. Independent donning, doffing, adjusting hinges, and use of knee brace.
5. Safe ambulation with assistant device and knee brace
6. Partial Weight Bearing (PWB) on the involved leg.
7. Promote normal gait mechanics.
8. Early balance control.
9. Attain full extension and functional flexion of the involved knee.
10. Obtain baseline values for the uninvolved limb (isokinetic testing.)
11. Initiate early neuromotor control of all muscle groups.

Day of Surgery:

- Ambulate PWB with knee brace range from 20 degrees to tolerated active flexion (up to maximum 60 degrees) on level surfaces with auxiliary crutches. The brace will initially be set by the physical therapist.
- CPM will be set at 20 to 60 degrees unless otherwise documented.
- Brace is to be worn at all times except when the limb is in the CPM.

Post-operative Day #1:

- Ambulate as above on level surfaces and stairs.
- CPM progression can be 10 to 20 degrees daily but should not exceed 5 degrees every 3 hours.
  Review of patient ACL (HAMSTRING GRAFT) Home Instructions.
- Straight leg raises (SLR) in all 4 planes with BRACE LOCKED AT 20°.
- For the following exercises, motion in the brace should be restricted between 20° to tolerated active knee flexion up to 60º maximum:
  - Ankle strengthening for all planes with theraband .
  - Quad set with towel roll under the distal femur to limit full extension .
  - Seated hip flexion .
  - Seated knee extension from 90° to 20° .

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Post –operative Day #2-] 4:

- Continue with above ambulation and exercise guidelines
- Continue to block final 20° of extension
- Increase flexion of knee brace correlating to acti ve knee l1exion to 900 maximum
- Continue CPM until 90° active knee flexion. CPM progression can be (10° - 20°) daily but should not exceed 5° every 3 hours.

PHASE II – PROGRESSIVE FUNCTIONAL (WEEKS 3-8)

Goals:

1. Decrease pain and effusion.
2. Obtain full passive range of motion by 5 weeks, full active by 8 weeks.
3. Full weight bearing by 5 weeks.
4. Discontinue brace for sleeping at 4 weeks.
5. Discontinue brace for ADLs and ambulation at 6 weeks

BY THE END OF WEEK	BRACE SETTING FOR AMB/ADLS	BRACE SETTINGS FOR REHAB
3	10º – 110º	20º – 110º
4	10º – 120º	20º – 120º
5	10º – tol flex	20º – tol flex
6	D/C fo rAmb & ADLs	10º – tol flex
7	D/C	10º – tol flex
8	D/C	0º – tol flex

Weeks 3 through 5:

Continue as above.

- Continue as above
- Continue to use rehab brace except when indicated below.
- Modalities to decrease pain, effusion (E-stimulation, ice, etc)
- Myofascial release

BY THE END OF WEEK	PROM	AROM
3	10º - 110º	20º - 90º
4	0º - 120º	0º -120º **
5	Non- Aggressive, PROM as tolerated	

**only with quad sets and heel slides

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- Gait training - continue to ambulate PWB. Progress to full weight bearing (FWB) by 5 weeks.
- Cross friction massage to scar (5-6 weeks).
- Heel slides. (20° to tolerated flexion). May progress extension to 0° with this exercise by the end of week 4.
- Supine wall slides, allowing gravity to assist with knee flexion. DO NOT perform wall slides in the upright or stance position.
- BAPS- in sitting.
- Stationary bicvcle
    - Start with a low, comfortable seat height to promote flexion, most force through non-operated limb - increase seat height in subsequent sessions. The patient does not have to wear the brace while on the stationary bicycle, however do not allow termina12000f extension of operated limb .
- Multi hip
    - To involved lower limb, progress to uninvolved when full weight bearing. Be sure weight is applied proximal to the knee.
- Cable Column
    - Should be performed once the patient is able to straight leg raise with resistance distal to the knee with good quad control. Begin with flexion and extension followed by abduction and adduction. Once the patient exhibits good control with single plane motion progress to multi-joint motions.
- Leg curl (20°_90°)
    - Begin in standing with no added weight. The patient must demonstrate easy effort prior to adding weight.
- Leg Press (70°-20°)
    - Maximum 50% body weight
- Proprioceptive training: static stabilizing: technique
    - At various degrees of knee flexion using therapeutic ball. Begin in supine with legs on the ball then progress to sitting on ball (90º - 20°).
- Knee extension (70º - 20°) .
- Rolling Chair Activitv
    - Active hamstring/quad activity by performing forward propulsion/retropulsion of rolling chair using alternating lower extremities (90° -20°).
- Swimming with hinged aquabrace
    - The patient may perform side stroke or flutter kick initiating motion from the hip. Limit knee flexion to no more than 90 ° and do not allow terminal 20 degrees extension.

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Weeks 6 through 8:

- As long as tolerated by the patient, extension in the brace may be changed to 10° for rehab exercises. For all closed chain knee t1exion exercises, do not allow the anterior aspect of the knee to pass the toes. Re-evaluate prior extrinsic weights with previous exercises as range of motion progresses.
- Continue as above.
- Modified knee bends (70°-10°)
    - Progress toward full extension by the end of eight weeks. You can add light extrinsic weight when full active extension is achieved
- Marching in place
    - Side stepping.
- Step ups
    - Begin with body weight then add weights and step height gradually (70 ° - 10°). Add weight when full extension is achieved.
- Unilateral modified knee bends
    - (Stationary, on disc, on trampoline 70° - 10°). Add weight when full extension is achieved.
- Heel raises
    - Begin standing with both feet on the f100r then progress to unilateral stance on the floor then on the heel raise dumbbell. Add weights when full extension is achieved.
- Level treadmill walking
    - For conditioning.
- Balance activities
    - Begin with bilateral stance activities and progress to unilateral. Incorporate multi task activities, i.e. unilateral modified knee bend while performing arm curls while balancing on a disc.
- Stairmaster
    - Small steps, low resistance (50°- 10°).
- Terminal knee extension
    - In stance position with theraband (proximal to knee); progress to terminal knee extension on the multihip

Continue to perform quad sets, heel slides, sitting terminal knee extension, and standing terminal knee extension to full range.

** Can discontinue use of rehab brace by 8-9 weeks postoperatively. **

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PHASE III- ACTIVITY SPECIFIC TRAINING:

Goals:

1. Restore normal gait.
2. Retrain for proprioception and normalize responses to dynamic challenges.
3. To optimize force production and absorption with various activities.

Weeks 9 through 12:

- Continue as above.
- Retro walking
  - Begin with body weight then progress to pulling a weighted sled. Increase the sled load as tolerated
- Lateral and forward sled
- Lunges
  - Posterior, anterior, antero-lateral, lateral. Start with body weight and then add extrinsic weight, then sport-cord. Be sure to not allow the anterior aspect of the knee to pass the toes.
- Lateral shuffle
  - Maintain horizontal, not vertical, displacement of the trunk .
- Fitter
- Slide board
- Cariocas
- Swimming
  - - All swimming activities allowed except for dolphin kicking. Do not allow breast stroke or whip kick if the patient complains of medial knee pain.

Weeks 13 through 16 weeks:

- Continue as above.
- Lateral shuffles weighted, Stop and Go.
- Slide board with the patient wearing a weighted vest (or holding a hand dumbbell) incorporating ball toss.
- Begin dynamic skills progression
  - Jumping, hopping, and leaping
- Agility drills
- .May initiate light jogging program if patient demonstrates good force production (i.e. jumping) and absorptiol1 (i.e. landing), especially when leaping from uninvolved to involved limb.
- Begin sports specific training- emphasize force production and absorption during these activities.

****By four months, quad/ham symmetry should be 90%. ****

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Weeks 20 throw2h 24:

- Continue as above.
- May initiate running if the patient demonstrates good force production and absorption, especially when ICClping from uninvohcd to involved.

Functional Testing: KT 2000, Isokinetic testing, patient questionnaire, hop & stop and Noyes performed at 4, 6, 12 months and every year thereafter.

Do not perform Hop & Stop at 4 months if <90% quad/hamstring symmetry. **

The patient may return to activity without a derotation brace if:

SUBIECTIVE:

1. Pain free with ADL and rehab. activities including agility and sport specific drills.
2. No c/o stiffness during or after all above activities.
3. No c/o giving way during all above activities.

OBIECTIVE:

1. Full AROM and PROM (0°- 135°).
2. No quad lag.
3. Isokinetic Testing: 10% difference in quads, equal in hamstrings.
4. KT 2000 (<3mm).
5. Functional Testing: 90% symmetry

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