The Insall Scott Kelly Center for Orthopaedics and Sports Medicine
210 East 64th Street, 4th Floor, New York, NY 10065

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION POST-OPERATIVE REHABILITATION PROTOCOL 2003

AUTOGRAFT BONE-PATELLA TENDON-BONE and ALLOGRAFT PROTOCOL

PHASE I-EARLY FUNCTIONAL (WEEKS 1-2)

Goals:

1. Educate re: the proper use of continuous passive motion (CPM) machine and home exercise 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 **WEIGHT BEARING AS TOLERATED (WBAT)** on the involved leg.
6. Promote normal gait mechanics.
7. Early balance control.
8. Attain full extension and functional flexion of the involved knee.
9. Obtain baseline values for the uninvolved limb (isokinetic testing.)
10. Initiate early neuromotor control of all muscle groups.

Day Of Surgery:

- X Ambulate WBAT with knee brace range from 0° to tolerated active flexion (maximum 60°) on level surfaces with axillary crutches. The brace will initially be set by the physical therapist.
- X CPM will be set at 0° to 60° unless otherwise documented.
- X Brace **SHOULD NOT** be worn while the operated limb is in the CPM. Brace is required only when ambulating and while performing straight leg raise (SLR) exercises outlined below.

Post -operative Day #1:

- X Ambulate as above on level surfaces and stairs.
- X CPM progression can be 10°-20° daily but should not exceed 5° every 3 hours.
- X Review of patient ACL **(BONE-PATELLA TENDON-BONE GRAFT)** Home Instructions.
- X KNEE BRACE MUST WORN WITH THE STRAIGHT LEG RAISE (SLR) EXERCISES LOCKED AT 0°.
- X ankle strengthening for all planes.

X quad set with towel roll under the ankle to promote full extension.
X heel slides.
X hamstring sets.
X seated hip flexion.
X seated active assisted knee extension.
X standing terminal knee extension.
X Straight leg raises (SLR) in all 4 planes with **BRACE LOCKED AT 0°.**

** If patient does not achieve active range of motion to 60° upon discharge, the surgeon/physician should be notified.**

Post -operative Day # 2-7:

X Continue with above ambulation and exercise guidelines.
X Increase knee brace setting with active knee motion.
X Continue CPM until 90^0 active knee flexion is achieved. CPM progression can be 10^0 - 20^0 daily but should not exceed 5^0 every 3 hours.
X BAPS- in sitting.
X Stationary bicycle- start with a low, comfortable seat height to promote flexion, most force through non-operated limb - increase seat height in subsequent sessions.
X Supine wall slides- allow gravity to assist with knee flexion. **DO NOT perform wall slides in the upright or stance position.**
X Home stretching- for quadriceps, hamstrings, and gastrocnemius.
X Balance activities- begin with bilateral stance activities and progress to unilateral on the ground.
X Bilateral standing modified knee bends (0-30^0)- begin with body weight and then add light extrinsic weight accordingly.
X Marching in place- begin in sitting and progress to standing.
X Sidestepping-
X Multi hip- to involved lower limb. Be sure weight is applied proximal to the knee. (flexion, extension, abduction, adduction, terminal knee extension)
X Retro walking- Begin with body weight then progress to pulling a weighted sled. Increase the load as tolerated.
X Quadriceps isometrics- at varied degrees of knee flexion.
X Active knee extension- of the involved knee (full) as tolerated.
X Active knee flexion- full.
X Rolling chair activity- active hamstring/quad activity by performing forward propulsion/retropulsion of rolling chair using alternating lower extremities (90^0 - 0^0).

X 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 the ball (90^0- 0^0).

X Heel Raises- begin with bilateral lower limbs then progress to unilateral.

****IN ALL CLOSED CHAIN KNEE FLEXION EXERCISES, DO NOT ALLOW THE ANTERIOR ASPECT OF THE KNEE TO PASS THE TOES****

BY THE END OF WEEK:	**AROM:**	**PROM:**
1	0-80^0	0-90^0
2	0-105^0	0-120^0
3	0-120^0	0-125^0

****DO NOT PUSH >125^0 WITH PASSIVE RANGE OF MOTION. CONTINUE TO CHECK RANGE OF MOTION PERIODICALLY TO MAKE SURE RANGE IS MAINTAINED.****

Post operative day # 8-14:

X Continue as above.

X Straight leg raises- without the brace if the patient demonstrates good quad control, with resistance applied proximal to the knee. Use the brace locked at 0^0 if an extension lag still exists.

X Standing leg curl- begin in standing with no added weight. The patient must demonstrate easy effort prior to adding weight.

X Multi hip- to bilateral lower limbs. (Flexion, extension, abduction, adduction, terminal knee extension).

X Leg press- begin using bilateral lower limbs (30^0- 0^0). Begin with low extrinsic weight (10-50% maximum of the patient=s body weight) and progress weight if the patient demonstrates good quad control during terminal knee extension. The patient at this time may begin unilateral leg press (10-30% maximum of the patient=s body weight).

X Balance activities- progress to bilateral activities on the disc then unilateral.

X Discontinue crutches at POD #14 if proper gait mechanics are obtained.

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PHASE II - PROGRESSIVE FUNCTIONAL (WEEKS 3-9)

Goals:

1. Decrease pain and effusion.
2. Discontinue the post operative brace when the patient demonstrates good quad control.
3. Continue the development of neuromotor control of all muscle groups.
4. Retrain for proprioception and normalize responses to dynamic challenges.

Weeks 3 through 4:

X Continue as above.

X 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. Be more cautious with those patients who have meniscal, medial or lateral collateral involvement.

X Unilateral modified knee bends (0-30^0)- Stand erect. Extend hip and flex the knee and place the dorsum of the foot on a bench or box behind you. With support to the upper limb, lower the torso, allowing your stance knee to flex to 45^0. ****DO NOT ALLOW THE ANTERIOR ASPECT OF THE KNEES TO PASS THE TOES.**** Begin with body weight and progress with light extrinsic weight.

X Step ups- begin with body weight then add weights and step height gradually. Discontinue if the patient has any complaints of pain.

X Posterior lunges (0-45^0max)- begin with involved limb as the lead leg.

X Balance activities- incorporate multi task activities, i.e. unilateral modified knee bend while performing arm curls while balancing on a disc.

X Closed chain step machine (0-30^0)- begin with low resistance and maintain short steps throughout.

X Swimming- the patient may perform side stroke or flutter kick initiating motion from the hip.

Weeks 5 through 6:

X Continue as above.

X Progressive resisted knee extension- perform activity with a slow controlled motion. Begin with cuff weights for the involved leg and continue to do so until the patient can comfortably lift 20 lbs. Do not allow the activity to begin with $>80^0$ of knee flexion.

X Advanced hamstring activity- with the trunk flexed perform hip extension with upper extremity support, with the hip extended to midrange perform a hamstring curl, in the supine position perform bridging on theraball with hip flexion, and relaxed knee dead lifts if there is no history of low back problems.

X Cross friction massage to scar.

Weeks 7 through 8:

X Continue as above.

X Lateral activities- begin by increasing the speed with lateral stepping progressing to lateral shuffles, ski simulator, modified slide board activities (side lunges, restricted distance slide board) to full range slide board. ****WITH ALL OF THESE EXERCISES BE AWARE OF VALGUS STRESSES****

X Cable column simulated running- once the patient exhibits good control with single plane motion progress to multi joint motion

X Crossover stepping- progress to cariocas as tolerated.

X BAPS- in standing. Be aware of rotation occurring at the knee and valgus/varus stresses.

Weeks 8 through 10:

X Continue as above.

X Lunges- initiate anterior, anterior-lateral, lateral and posterior-lateral lunges. Start with body weight and then add extrinsic weight, then sportcord. Be sure to not allow the anterior aspect of the knee to pass the toes.

X Standing bicycle- with high resistance, may progress to a bike spectrum.

X Plyometrics- begin with mini jumps on the leg press at approximately 30% of body weight.

PHASE III - FUNCTIONAL (WEEKS 10 - 16)

Goals:

1. Master functional tasks of desired physical activity.
2. Optimize force production and absorption with various activities.

Weeks 10 through 12:

X Continue as above.

X Lateral shuffles weighted, Stop and Go.

X Slide board with the patient wearing a weighted vest (or holding a hand dumbbell) incorporating a ball toss.

X Begin dynamic skills progression- (jumping, hopping, and leaping).

X Agility drills-

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X May initiate **light jogging** program if the patient demonstrates good force production (i.e. jumping) and absorption (i.e. landing), especially when leaping from uninvolved to the involved limb.

X 10RM testing at 12 weeks: begin heavy, moderate and light workout days according to strength assessment guidelines.

Weeks 16+:

X Continue as above.

X May initiate **running** if the patient demonstrates good force production and absorption, especially when leaping from uninvolved 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:

Subjective:

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.

Objective:

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

For any questions, please contact:

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